

PG No. 10 $S_4 \bar{4}$ [tetragonal] (lgs basis)

bra: = $\langle s, \uparrow |, \langle s, \downarrow |$
ket: = $|s, \uparrow \rangle, |s, \downarrow \rangle$

Table 1: (s,s) block.

| No. | multipole | matrix |
|-----|----------------------------------|-------------------------------------------------------------------------------------|
| 1 | symmetry | 1 |
| | $\mathbb{Q}_0^{(a)}(A)$ | $\begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{bmatrix}$ |
| 2 | symmetry | z |
| | $\mathbb{M}_1^{(1,-1;a)}(A)$ | $\begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{bmatrix}$ |
| 3 | symmetry | y |
| | $\mathbb{M}_{1,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{bmatrix}$ |
| 4 | symmetry | x |
| | $\mathbb{M}_{1,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{bmatrix}$ |

bra: = $\langle s, \uparrow |, \langle s, \downarrow |$
ket: = $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

Table 2: (s,p) block.

| No. | multipole | matrix |
|-----|-----------------------------|----------------------------------------------------------------------------------------------------|
| 5 | symmetry | z |
| | $\mathbb{Q}_1^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ |
| 6 | symmetry | x |
| | $\mathbb{Q}_{1,1}^{(a)}(E)$ | $\begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |

continued ...

Table 2

| No. | multipole | matrix |
|-----|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7 | symmetry | y $\mathbb{Q}_{1,2}^{(a)}(E) \begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$ |
| 8 | symmetry | z $\mathbb{Q}_1^{(1,0;a)}(B) \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 9 | symmetry | x $\mathbb{Q}_{1,1}^{(1,0;a)}(E) \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 10 | symmetry | y $\mathbb{Q}_{1,2}^{(1,0;a)}(E) \begin{bmatrix} \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 11 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\mathbb{G}_2^{(1,-1;a)}(A, 1) \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 12 | symmetry | $\sqrt{3}xy$ $\mathbb{G}_2^{(1,-1;a)}(A, 2) \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 13 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\mathbb{G}_2^{(1,-1;a)}(B) \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \end{bmatrix}$ |
| 14 | symmetry | $\sqrt{3}xz$ $\mathbb{G}_{2,1}^{(1,-1;a)}(E) \begin{bmatrix} \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 15 | symmetry | $\sqrt{3}yz$ $\mathbb{G}_{2,2}^{(1,-1;a)}(E) \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 16 | symmetry | 1 |

continued ...

Table 2

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_0^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$ |
| 17 | symmetry | z |
| | $\mathbb{T}_1^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$ |
| 18 | symmetry | x |
| | $\mathbb{T}_{1,1}^{(a)}(E)$ | $\begin{bmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 19 | symmetry | y |
| | $\mathbb{T}_{1,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$ |
| 20 | symmetry | z |
| | $\mathbb{T}_1^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 21 | symmetry | x |
| | $\mathbb{T}_{1,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 22 | symmetry | y |
| | $\mathbb{T}_{1,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 23 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{M}_2^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 24 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{M}_2^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 25 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 2

| No. | multipole | matrix |
|-----|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{M}_2^{(1,-1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{6} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$ |
| 26 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{M}_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 27 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{M}_{2,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 28 | symmetry | 1 |
| | $\mathbb{M}_0^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & \frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$ |

bra: = $\langle s, \uparrow |, \langle s, \downarrow |$ ket: = $|d_v, \uparrow\rangle, |d_v, \downarrow\rangle, |d_{xy}, \uparrow\rangle, |d_{xy}, \downarrow\rangle, |d_{xz}, \uparrow\rangle, |d_{xz}, \downarrow\rangle, |d_{yz}, \uparrow\rangle, |d_{yz}, \downarrow\rangle, |d_u, \uparrow\rangle, |d_u, \downarrow\rangle$

Table 3: (s,d) block.

| No. | multipole | matrix |
|-----|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 29 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{Q}_2^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ |
| 30 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(a)}(B,1)$ | $\begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 31 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{Q}_2^{(a)}(B,2)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 32 | symmetry | $\sqrt{3}yz$ |

continued ...

Table 3

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$ |
| 33 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{Q}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 34 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{Q}_2^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 35 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 36 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{Q}_2^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 37 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{Q}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 38 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{Q}_{2,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & \frac{\sqrt{2}}{4} \\ \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 39 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{G}_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & \frac{\sqrt{15}i}{10} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{15}i}{10} \end{bmatrix}$ |
| 40 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{G}_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 41 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 3

| No. | multipole | matrix |
|-----|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_3^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 42 | symmetry | $\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{G}_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & -\frac{3\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{15}}{20} \\ \frac{3\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{15}}{20} & 0 \end{bmatrix}$ |
| 43 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{G}_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ \frac{3\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 \end{bmatrix}$ |
| 44 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{G}_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{i}{4} \\ -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{i}{4} & 0 \end{bmatrix}$ |
| 45 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{G}_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{1}{4} \\ \frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{1}{4} & 0 \end{bmatrix}$ |
| 46 | symmetry | z |
| | $\mathbb{G}_1^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{30}}{20} & \frac{\sqrt{10}i}{10} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{10}i}{10} \end{bmatrix}$ |
| 47 | symmetry | y |
| | $\mathbb{G}_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}}{20} \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{10}}{20} & 0 \end{bmatrix}$ |
| 48 | symmetry | x |
| | $\mathbb{G}_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{30}}{20} & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 \end{bmatrix}$ |
| 49 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{T}_2^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$ |
| 50 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |

continued ...

Table 3

| No. | multipole | matrix |
|-----|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_2^{(a)}(B, 1)$ | $\begin{bmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 51 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{T}_2^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 52 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{T}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$ |
| 53 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{T}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 54 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{T}_2^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 55 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 56 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 57 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$ |
| 58 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{T}_{2,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$ |
| 59 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 3

| No. | multipole | matrix |
|-----|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{15}}{10} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{15}}{10} \end{bmatrix}$ |
| 60 | symmetry | $\sqrt{15}xyz$ |
| | $M_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 61 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $M_3^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 62 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $M_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}i}{20} \\ -\frac{3\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{15}i}{20} & 0 \end{bmatrix}$ |
| 63 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $M_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} \\ \frac{3\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 \end{bmatrix}$ |
| 64 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $M_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ -\frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{1}{4} & 0 \end{bmatrix}$ |
| 65 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $M_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{i}{4} \\ -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{i}{4} & 0 \end{bmatrix}$ |
| 66 | symmetry | z |
| | $M_1^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{10}}{10} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}}{10} \end{bmatrix}$ |
| 67 | symmetry | y |
| | $M_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{10}i}{20} \\ -\frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{10}i}{20} & 0 \end{bmatrix}$ |
| 68 | symmetry | x |

continued ...

Table 3

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------|------------------------|------------------------|-------------------------|--------------------------|------------------------|-------------------------|---|---|-------------------------|-------------------------|
| | $M_{1,2}^{(1,1;a)}(E)$ | 0 | $\frac{\sqrt{30}}{20}$ | 0 | $-\frac{\sqrt{30}i}{20}$ | $\frac{\sqrt{30}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ |
| | | $\frac{\sqrt{30}}{20}$ | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{20}$ | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 |

bra: = $\langle s, \uparrow |, \langle s, \downarrow |$ ket: = $|f_2, \uparrow\rangle, |f_2, \downarrow\rangle, |f_1, \uparrow\rangle, |f_1, \downarrow\rangle, |f_{bz}, \uparrow\rangle, |f_{bz}, \downarrow\rangle, |f_3, \uparrow\rangle, |f_3, \downarrow\rangle, |f_{3x}, \uparrow\rangle, |f_{3x}, \downarrow\rangle, |f_{3y}, \uparrow\rangle, |f_{3y}, \downarrow\rangle, |f_{az}, \uparrow\rangle, |f_{az}, \downarrow\rangle$

Table 4: (s,f) block.

| No. | multipole | matrix | | | | | | | | | |
|-----|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| 69 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | |
| | $Q_3^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | |
| 70 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | |
| | $Q_3^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | |
| 71 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | |
| | $Q_3^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$ | | | | | | | | | |
| 72 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | |
| | $Q_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} \frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | |
| 73 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | |
| | $Q_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 \end{bmatrix}$ | | | | | | | | | |
| 74 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | |
| | $Q_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{8} & 0 & 0 \end{bmatrix}$ | | | | | | | | | |
| 75 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | |

continued ...

Table 4

| No. | multipole | matrix |
|-----|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{8} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 76 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{Q}_3^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{2}}{8} & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & \frac{\sqrt{30}}{24} & 0 & 0 \\ -\frac{\sqrt{2}i}{8} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 77 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_3^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 \\ \frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 78 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{Q}_3^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 79 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & -\frac{\sqrt{3}}{8} \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & -\frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{16} & \frac{\sqrt{3}}{8} & 0 & 0 \end{bmatrix}$ |
| 80 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} -\frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 81 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} -\frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{30}i}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} \\ 0 & \frac{3\sqrt{2}i}{16} & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 \end{bmatrix}$ |
| 82 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{3\sqrt{2}i}{16} & 0 & 0 & \frac{\sqrt{3}}{24} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{30}i}{48} & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & 0 & 0 & -\frac{3\sqrt{2}i}{16} & -\frac{\sqrt{3}}{24} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{48} & \frac{\sqrt{5}}{8} & 0 & 0 \end{bmatrix}$ |
| 83 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}i}{56} & 0 & \frac{\sqrt{14}}{56} & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{56} & 0 & \frac{\sqrt{210}}{56} & 0 & 0 \\ \frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{14}}{56} & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & -\frac{\sqrt{210}i}{56} & 0 & -\frac{\sqrt{210}}{56} & 0 & 0 & 0 \end{bmatrix}$ |
| 84 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |

continued ...

Table 4

| No. | multipole | matrix |
|-----|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}}{56} & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 \\ -\frac{\sqrt{14}}{56} & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & -\frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 \end{bmatrix}$ |
| 85 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}i}{24} & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{2}}{8} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{30}i}{24} & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$ |
| 86 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{42}i}{24} & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{56} & 0 & -\frac{\sqrt{70}}{56} & \frac{\sqrt{105}i}{42} & 0 \\ -\frac{\sqrt{42}i}{24} & 0 & -\frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{56} & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{105}i}{42} \end{bmatrix}$ |
| 87 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 3)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 88 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & \frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & \frac{\sqrt{5}}{8} & 0 \end{bmatrix}$ |
| 89 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 \end{bmatrix}$ |
| 90 | symmetry | $-\frac{\sqrt{5}xz(x^2 - 6y^2 + z^2)}{2}$ |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{14}i}{16} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}i}{56} & 0 & \frac{\sqrt{21}}{14} & -\frac{\sqrt{210}i}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{56} \\ 0 & \frac{\sqrt{14}i}{16} & 0 & 0 & -\frac{3\sqrt{21}i}{56} & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & \frac{\sqrt{210}i}{112} & 0 & 0 & -\frac{\sqrt{35}i}{56} & 0 \end{bmatrix}$ |
| 91 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ |
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{14}i}{16} & 0 & 0 & \frac{3\sqrt{21}}{56} & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & -\frac{\sqrt{210}i}{112} & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & 0 & 0 & -\frac{\sqrt{14}i}{16} & -\frac{3\sqrt{21}}{56} & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{112} & \frac{\sqrt{35}}{56} & 0 \end{bmatrix}$ |
| 92 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_2^{(1,1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{70}i}{28} & 0 & \frac{\sqrt{70}}{28} & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & \frac{\sqrt{42}}{84} & 0 & 0 \\ \frac{\sqrt{70}i}{28} & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & -\frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 \end{bmatrix}$ |
| 93 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 4

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_2^{(1,1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{70}}{28} & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 \\ \frac{\sqrt{70}}{28} & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{42} & \frac{\sqrt{42}}{84} & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 \end{bmatrix}$ |
| 94 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{G}_2^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & \frac{\sqrt{14}}{14} & \frac{\sqrt{21}i}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & -\frac{\sqrt{14}}{14} & 0 & 0 & -\frac{\sqrt{21}i}{14} \end{bmatrix}$ |
| 95 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{105}}{42} & \frac{\sqrt{42}i}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & -\frac{\sqrt{42}i}{21} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 \end{bmatrix}$ |
| 96 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{G}_{2,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & \frac{\sqrt{42}i}{21} & 0 & 0 & -\frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{21} & \frac{\sqrt{7}}{14} & 0 \end{bmatrix}$ |
| 97 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{T}_3^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 98 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_3^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 99 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{T}_3^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$ |
| 100 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{T}_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} \frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 101 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{T}_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 \end{bmatrix}$ |
| 102 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |

continued ...

Table 4

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{8} & 0 & 0 \end{bmatrix}$ |
| 103 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{T}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{8} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 104 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{T}_3^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{2}i}{8} & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 \\ -\frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 105 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_3^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}i}{8} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & \frac{\sqrt{30}}{24} & 0 & 0 \\ -\frac{\sqrt{2}i}{8} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{30}i}{24} & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 106 | symmetry | $\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{T}_3^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 107 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{16} & \frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & -\frac{\sqrt{3}i}{8} & 0 & 0 \end{bmatrix}$ |
| 108 | symmetry | $\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{T}_{3,2}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} -\frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} \\ 0 & \frac{\sqrt{30}}{16} & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & \frac{\sqrt{3}}{8} & 0 \end{bmatrix}$ |
| 109 | symmetry | $\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} -\frac{3\sqrt{2}}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{24} & 0 & \frac{\sqrt{3}i}{6} & \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & \frac{3\sqrt{2}}{16} & 0 & 0 & -\frac{\sqrt{3}}{24} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{30}}{48} & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 \end{bmatrix}$ |
| 110 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{T}_{3,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & 0 & -\frac{3\sqrt{2}}{16} & \frac{\sqrt{3}i}{24} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & -\frac{\sqrt{30}}{48} & -\frac{\sqrt{5}i}{8} & 0 & 0 \end{bmatrix}$ |
| 111 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |

continued ...

Table 4

| No. | multipole | matrix |
|-----|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}}{56} & 0 & -\frac{\sqrt{14}i}{56} & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{56} & 0 & -\frac{\sqrt{210}i}{56} & 0 & 0 \\ \frac{\sqrt{14}}{56} & 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & -\frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 \end{bmatrix}$ |
| 112 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $M_4^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{14}}{56} & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & -\frac{\sqrt{210}i}{56} & 0 & \frac{\sqrt{210}}{56} & 0 & 0 \\ \frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & \frac{\sqrt{210}i}{56} & 0 & \frac{\sqrt{210}}{56} & 0 & 0 \end{bmatrix}$ |
| 113 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $M_4^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{2}i}{8} & \frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{30}}{24} & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$ |
| 114 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |
| | $M_4^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{42}}{24} & 0 & -\frac{\sqrt{42}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & \frac{\sqrt{70}i}{56} & \frac{\sqrt{105}}{42} & 0 \\ -\frac{\sqrt{42}}{24} & 0 & \frac{\sqrt{42}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & -\frac{\sqrt{70}i}{56} & 0 & 0 & -\frac{\sqrt{105}}{42} \end{bmatrix}$ |
| 115 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |
| | $M_4^{(1,-1;a)}(B, 3)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 116 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |
| | $M_{4,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & 0 & \frac{\sqrt{2}}{16} & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{16} & -\frac{\sqrt{5}i}{8} & 0 & 0 \end{bmatrix}$ |
| 117 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $M_{4,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & \frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} \\ 0 & \frac{\sqrt{2}}{16} & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & \frac{\sqrt{5}}{8} & 0 \end{bmatrix}$ |
| 118 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $M_{4,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}}{56} & 0 & -\frac{\sqrt{21}i}{14} & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & \frac{\sqrt{14}}{16} & 0 & 0 & -\frac{3\sqrt{21}}{56} & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & \frac{\sqrt{210}}{112} & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 \end{bmatrix}$ |
| 119 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |
| | $M_{4,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{14}}{16} & 0 & 0 & -\frac{3\sqrt{21}i}{56} & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & \frac{\sqrt{35}i}{56} \\ 0 & 0 & 0 & -\frac{\sqrt{14}}{16} & \frac{3\sqrt{21}i}{56} & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{112} & -\frac{\sqrt{35}i}{56} & 0 \end{bmatrix}$ |
| 120 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |

continued ...

Table 4

| No. | multipole | matrix |
|-----|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_2^{(1,1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{70}}{28} & 0 & -\frac{\sqrt{70}i}{28} & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 \\ \frac{\sqrt{70}}{28} & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & \frac{\sqrt{42}i}{84} & 0 & 0 & 0 \end{bmatrix}$ |
| 121 | symmetry | $\sqrt{3}xy$ |
| | $M_2^{(1,1;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{70}i}{28} & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & \frac{\sqrt{42}i}{84} & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 \\ -\frac{\sqrt{70}i}{28} & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & -\frac{\sqrt{42}i}{84} & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 \end{bmatrix}$ |
| 122 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $M_2^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 & -\frac{\sqrt{14}i}{14} & \frac{\sqrt{21}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & -\frac{\sqrt{21}}{14} \end{bmatrix}$ |
| 123 | symmetry | $\sqrt{3}xz$ |
| | $M_{2,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & -\frac{\sqrt{105}i}{42} & \frac{\sqrt{42}}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{42}}{21} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 \end{bmatrix}$ |
| 124 | symmetry | $\sqrt{3}yz$ |
| | $M_{2,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & \frac{\sqrt{42}}{21} & 0 & 0 & \frac{\sqrt{7}i}{14} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{21} & -\frac{\sqrt{7}i}{14} & 0 \end{bmatrix}$ |

bra: = $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
ket: = $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

Table 5: (p,p) block.

| No. | multipole | matrix |
|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 125 | symmetry | 1 |
| | $Q_0^{(a)}(A)$ | $\begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 126 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{Q}_2^{(a)}(A)$ | $\begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{bmatrix}$ |
| 127 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(a)}(B,1)$ | $\begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 128 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{Q}_2^{(a)}(B,2)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 129 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{Q}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$ |
| 130 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 131 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{Q}_2^{(1,-1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 132 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 133 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{Q}_2^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 134 | symmetry | $\sqrt{3}yz$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 135 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{Q}_{2,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$ |
| 136 | symmetry | 1 |
| | $\mathbb{Q}_0^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 137 | symmetry | z |
| | $\mathbb{G}_1^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 138 | symmetry | y |

continued ...

Table 5

| No. | multipole | matrix |
|-----|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{1,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$ |
| 139 | symmetry | x |
| | $\mathbb{G}_{1,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 140 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{T}_2^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 141 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 142 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_2^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 143 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$ |
| 144 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{T}_{2,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$ |
| 145 | symmetry | z |
| | $\mathbb{M}_1^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 146 | symmetry | y |

continued ...

Table 5

| No. | multipole | matrix |
|-----|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{1,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 147 | symmetry | $\begin{array}{c} x \\ \left[\begin{array}{cccccc} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{array} \right] \end{array}$ |
| 148 | symmetry | $\begin{array}{c} z \\ \left[\begin{array}{cccccc} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{array} \right] \end{array}$ |
| 149 | symmetry | $\begin{array}{c} y \\ \left[\begin{array}{cccccc} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{array} \right] \end{array}$ |
| 150 | symmetry | $\begin{array}{c} x \end{array}$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{1,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$ |
| 151 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $M_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix}$ |
| 152 | symmetry | $\sqrt{15}xyz$ |
| | $M_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 153 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $M_3^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 154 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 5

| No. | multipole | matrix |
|-----|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{5} & -\frac{\sqrt{5}}{10} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$ |
| 155 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $M_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{5}}{5} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{5}}{10} & 0 \\ \frac{\sqrt{5}}{5} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \end{bmatrix}$ |
| 156 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $M_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \end{bmatrix}$ |
| 157 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $M_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \end{bmatrix}$ |
| 158 | symmetry | z |

continued ...

Table 5

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{M}_1^{(1,1;a)}(A)$ | $\begin{bmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{bmatrix}$ |
| 159 | symmetry | y |
| | $\mathbb{M}_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{bmatrix}$ |
| 160 | symmetry | x |
| | $\mathbb{M}_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{bmatrix}$ |

bra: = $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

ket: = $|d_v, \uparrow\rangle, |d_v, \downarrow\rangle, |d_{xy}, \uparrow\rangle, |d_{xy}, \downarrow\rangle, |d_{xz}, \uparrow\rangle, |d_{xz}, \downarrow\rangle, |d_{yz}, \uparrow\rangle, |d_{yz}, \downarrow\rangle, |d_u, \uparrow\rangle, |d_u, \downarrow\rangle$

Table 6: (p,d) block.

| No. | multipole | matrix |
|-----|-----------|--------|
| 161 | symmetry | z |

continued ...

Table 6

| No. | multipole | matrix |
|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $Q_1^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} \end{bmatrix}$ |
| 162 | symmetry | $\begin{array}{c} x \\ Q_{1,1}^{(a)}(E) \\ \begin{bmatrix} \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$ |
| 163 | symmetry | $\begin{array}{c} y \\ Q_{1,2}^{(a)}(E) \\ \begin{bmatrix} 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \end{bmatrix} \end{array}$ |
| 164 | symmetry | $\begin{array}{c} \sqrt{15}xyz \\ Q_3^{(a)}(A, 1) \\ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$ |
| 165 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_3^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 166 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{Q}_3^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} \end{bmatrix}$ |
| 167 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} \frac{3\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 \\ 0 & \frac{3\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 168 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 \\ 0 & -\frac{3\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \end{bmatrix}$ |
| 169 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 \\ 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \end{bmatrix}$ |
| 170 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 \\ 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 171 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{Q}_3^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2i}}{12} & 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{2i}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6i}}{12} \\ \frac{\sqrt{2i}}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{2i}}{12} & 0 & 0 & \frac{\sqrt{6i}}{12} & 0 \\ 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2i}}{12} & 0 & 0 & -\frac{\sqrt{2i}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2i}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{12} & \frac{\sqrt{6}}{12} & 0 \\ -\frac{\sqrt{2i}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 \\ 0 & \frac{\sqrt{2i}}{6} & 0 & 0 & -\frac{\sqrt{2i}}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 172 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_3^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2i}}{12} & 0 & 0 & -\frac{\sqrt{2i}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ \frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2i}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & \frac{\sqrt{2i}}{12} & 0 & -\frac{\sqrt{2}}{12} & -\frac{\sqrt{2i}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} \\ \frac{\sqrt{2i}}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2i}}{12} & 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 \\ 0 & 0 & \frac{\sqrt{2i}}{6} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2i}}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2i}}{6} & -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2i}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 173 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_3^{(1,-1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}}{20} \\ \frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & \frac{\sqrt{10}}{20} & 0 \\ 0 & -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} \\ -\frac{\sqrt{30}i}{60} & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 \end{bmatrix}$ |
| 174 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}i}{60} & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{30}}{60} & \frac{\sqrt{10}i}{20} & 0 \\ 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & -\frac{\sqrt{10}i}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 \end{bmatrix}$ |
| 175 | symmetry | $\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & \frac{\sqrt{30}}{20} & -\frac{\sqrt{10}i}{20} & 0 \\ 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{10}i}{20} \\ 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{30}}{20} & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 176 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} \frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{\sqrt{2}}{6} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & -\frac{\sqrt{2}}{6} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{6} & 0 & -\frac{\sqrt{2}}{12} & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{6} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 177 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{2}}{6} & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 \\ \frac{\sqrt{2}}{6} & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 \end{bmatrix}$ |
| 178 | symmetry | $\begin{matrix} z \\ \mathbb{Q}_1^{(1,0;a)}(B) \end{matrix}$ $\begin{bmatrix} 0 & -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} \\ \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 179 | symmetry | $\begin{matrix} x \\ \mathbb{Q}_{1,1}^{(1,0;a)}(E) \end{matrix}$ $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & \frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & -\frac{\sqrt{5}}{10} & 0 \end{bmatrix}$ |
| 180 | symmetry | $\begin{matrix} y \\ \mathbb{Q}_{1,2}^{(1,0;a)}(E) \end{matrix}$ $\begin{bmatrix} \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} \\ 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$ |
| 181 | symmetry | $\sqrt{15}xyz$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_3^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & -\frac{i}{12} & 0 & -\frac{1}{6} & \frac{i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} \\ -\frac{i}{12} & 0 & \frac{1}{6} & 0 & 0 & -\frac{i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 \\ 0 & -\frac{1}{12} & 0 & \frac{i}{6} & 0 & 0 & -\frac{i}{6} & 0 & 0 & \frac{\sqrt{3}}{12} \\ \frac{1}{12} & 0 & \frac{i}{6} & 0 & 0 & 0 & 0 & \frac{i}{6} & -\frac{\sqrt{3}}{12} & 0 \\ \frac{i}{6} & 0 & 0 & 0 & 0 & -\frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 \\ 0 & -\frac{i}{6} & 0 & 0 & -\frac{i}{6} & 0 & -\frac{1}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 182 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_3^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{1}{6} & 0 & \frac{i}{12} & 0 & 0 & -\frac{i}{6} & 0 & 0 & \frac{\sqrt{3}}{12} \\ \frac{1}{6} & 0 & \frac{i}{12} & 0 & 0 & 0 & 0 & \frac{i}{6} & -\frac{\sqrt{3}}{12} & 0 \\ 0 & \frac{i}{6} & 0 & \frac{1}{12} & -\frac{i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ \frac{i}{6} & 0 & -\frac{1}{12} & 0 & 0 & \frac{i}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \\ 0 & 0 & -\frac{i}{6} & 0 & 0 & \frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{6} & -\frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 183 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{Q}_3^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{60} & 0 & -\frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ -\frac{\sqrt{15}}{60} & 0 & -\frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 \\ 0 & \frac{\sqrt{15}i}{60} & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} \\ \frac{\sqrt{15}i}{60} & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 \end{bmatrix}$ |
| 184 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}i}{15} & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 \\ -\frac{7\sqrt{15}i}{120} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{60} & \frac{\sqrt{5}i}{40} & 0 \\ 0 & \frac{7\sqrt{15}i}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & -\frac{\sqrt{5}i}{40} \\ 0 & \frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 & 0 & -\frac{3\sqrt{5}}{40} \\ -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{60} & \frac{3\sqrt{5}}{40} & 0 \end{bmatrix}$ |
| 185 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} -\frac{7\sqrt{15}i}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 & 0 & -\frac{\sqrt{5}i}{40} & 0 \\ 0 & \frac{7\sqrt{15}i}{120} & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{40} \\ 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & -\frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}i}{40} \\ \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 & 0 & \frac{3\sqrt{5}i}{40} & 0 \end{bmatrix}$ |
| 186 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} -\frac{5i}{24} & 0 & 0 & 0 & 0 & \frac{i}{12} & 0 & -\frac{1}{6} & \frac{\sqrt{3}i}{24} & 0 \\ 0 & \frac{5i}{24} & 0 & 0 & \frac{i}{12} & 0 & \frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}i}{24} \\ 0 & 0 & \frac{i}{6} & 0 & 0 & -\frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{6} & \frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 & 0 \\ 0 & -\frac{i}{24} & 0 & -\frac{1}{6} & \frac{i}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} \\ -\frac{i}{24} & 0 & \frac{1}{6} & 0 & 0 & -\frac{i}{12} & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 187 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{i}{6} & 0 & 0 & \frac{1}{6} & 0 & -\frac{i}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{6} & -\frac{1}{6} & 0 & -\frac{i}{6} & 0 & 0 & 0 \\ \frac{5i}{24} & 0 & 0 & 0 & 0 & -\frac{i}{6} & 0 & \frac{1}{12} & \frac{\sqrt{3}i}{24} & 0 \\ 0 & -\frac{5i}{24} & 0 & 0 & -\frac{i}{6} & 0 & -\frac{1}{12} & 0 & 0 & -\frac{\sqrt{3}i}{24} \\ 0 & \frac{1}{24} & 0 & -\frac{i}{6} & 0 & 0 & \frac{i}{12} & 0 & 0 & -\frac{\sqrt{3}i}{8} \\ -\frac{1}{24} & 0 & -\frac{i}{6} & 0 & 0 & 0 & 0 & -\frac{i}{12} & \frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 188 | symmetry | z |
| | $\mathbb{Q}_1^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{15}}{20} \\ -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{15}}{20} & 0 \\ 0 & \frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{20} & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 189 | symmetry | x |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{20} & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{15}i}{20} \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 \\ \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 \end{bmatrix}$ |
| 190 | symmetry | y |
| | $\mathbb{Q}_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{10} & \frac{\sqrt{15}i}{20} & 0 \\ 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 191 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_2^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 192 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{G}_2^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 193 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_2^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 194 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{G}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 \end{bmatrix}$ |
| 195 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{G}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 196 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_2^{(1,-1;a)}(A,1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} \\ -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 197 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_2^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ -\frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 198 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{G}_2^{(1,-1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} \\ -\frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 \\ 0 & \frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{15}}{60} \\ -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & -\frac{\sqrt{15}}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & \frac{\sqrt{15}i}{15} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}i}{15} \end{bmatrix}$ |
| 199 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{G}_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} \\ 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$ |
| 200 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{G}_{2,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{5}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & -\frac{\sqrt{5}}{10} & 0 \end{bmatrix}$ |
| 201 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{7}i}{28} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} \\ \frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 \\ 0 & \frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}}{28} \\ -\frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{21}}{28} & 0 \\ -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 \end{bmatrix}$ |
| 202 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}}{28} \\ 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{21}}{28} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{28} & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} \\ 0 & 0 & \frac{\sqrt{7}}{28} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 \\ 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 \end{bmatrix}$ |
| 203 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{30} & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & -\frac{\sqrt{5}}{20} \\ \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{30} & \frac{\sqrt{5}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & -\frac{\sqrt{15}}{30} & \frac{\sqrt{5}i}{10} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{5}i}{10} \end{bmatrix}$ |
| 204 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{21} & -\frac{\sqrt{21}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{28} \\ -\frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & \frac{\sqrt{21}i}{42} & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 \\ 0 & \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{21} & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & -\frac{\sqrt{7}}{28} \\ -\frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{21} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{42} & \frac{\sqrt{7}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & -\frac{\sqrt{21}}{42} & \frac{\sqrt{7}i}{14} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & -\frac{\sqrt{7}i}{14} \end{bmatrix}$ |
| 205 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(B, 3)$ | $\begin{bmatrix} 0 & \frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{4} & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 206 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & -\frac{\sqrt{3}i}{8} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & -\frac{1}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & -\frac{\sqrt{3}}{8} \\ \frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & \frac{\sqrt{3}}{8} & 0 \end{bmatrix}$ |
| 207 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} -\frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{8} & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 208 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} -\frac{3\sqrt{7}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & \frac{\sqrt{7}}{14} & -\frac{\sqrt{21}i}{56} & 0 \\ 0 & \frac{3\sqrt{7}i}{56} & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{21}i}{56} \\ 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & -\frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{56} \\ -\frac{3\sqrt{7}i}{56} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{7}i}{28} & 0 & 0 & -\frac{\sqrt{21}i}{56} & 0 \end{bmatrix}$ |
| 209 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 \\ \frac{3\sqrt{7}i}{56} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{7}}{28} & -\frac{\sqrt{21}i}{56} & 0 \\ 0 & -\frac{3\sqrt{7}i}{56} & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{28} & 0 & 0 & \frac{\sqrt{21}i}{56} \\ 0 & \frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & -\frac{\sqrt{21}}{56} \\ -\frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{28} & \frac{\sqrt{21}}{56} & 0 \end{bmatrix}$ |
| 210 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_2^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{i}{12} & 0 & -\frac{1}{12} & -\frac{i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ \frac{i}{12} & 0 & \frac{1}{12} & 0 & 0 & \frac{i}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \\ 0 & \frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 & \frac{i}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ -\frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 & 0 & 0 & -\frac{i}{6} & \frac{\sqrt{3}}{12} & 0 \\ \frac{i}{3} & 0 & 0 & 0 & 0 & -\frac{i}{12} & 0 & \frac{1}{12} & 0 & 0 \\ 0 & -\frac{i}{3} & 0 & 0 & -\frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 211 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{G}_2^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 & -\frac{i}{6} & 0 & 0 & \frac{\sqrt{3}}{12} \\ -\frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 & 0 & 0 & \frac{i}{6} & -\frac{\sqrt{3}}{12} & 0 \\ 0 & -\frac{i}{12} & 0 & \frac{1}{12} & -\frac{i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ -\frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & \frac{i}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \\ 0 & 0 & \frac{i}{3} & 0 & 0 & -\frac{1}{12} & 0 & -\frac{i}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{3} & \frac{1}{12} & 0 & -\frac{i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 212 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{G}_2^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ \frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & -\frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} \\ \frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 213 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} -\frac{i}{12} & 0 & 0 & 0 & 0 & \frac{i}{12} & 0 & -\frac{1}{6} & -\frac{\sqrt{3}i}{12} & 0 \\ 0 & \frac{i}{12} & 0 & 0 & \frac{i}{12} & 0 & \frac{1}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & -\frac{i}{12} & 0 & 0 & \frac{1}{3} & 0 & -\frac{i}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{12} & -\frac{1}{3} & 0 & -\frac{i}{12} & 0 & 0 & 0 \\ 0 & -\frac{i}{6} & 0 & -\frac{1}{6} & \frac{i}{12} & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 & -\frac{i}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 214 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{G}_{2,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{i}{12} & 0 & 0 & -\frac{1}{12} & 0 & \frac{i}{3} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{12} & \frac{1}{12} & 0 & \frac{i}{3} & 0 & 0 & 0 \\ \frac{i}{12} & 0 & 0 & 0 & 0 & -\frac{i}{6} & 0 & \frac{1}{12} & -\frac{\sqrt{3}i}{12} & 0 \\ 0 & -\frac{i}{12} & 0 & 0 & -\frac{i}{6} & 0 & -\frac{1}{12} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & \frac{1}{6} & 0 & -\frac{i}{6} & 0 & 0 & \frac{i}{12} & 0 & 0 & 0 \\ -\frac{1}{6} & 0 & -\frac{i}{6} & 0 & 0 & 0 & 0 & -\frac{i}{12} & 0 & 0 \end{bmatrix}$ |
| 215 | symmetry | 1 |
| | $\mathbb{G}_0^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{60} \\ \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 \\ 0 & -\frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{60} \\ \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} & \frac{\sqrt{30}}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & \frac{\sqrt{30}i}{30} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{30}i}{30} \end{bmatrix}$ |
| 216 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_2^{(1,1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{4\sqrt{35}i}{105} & 0 & \frac{\sqrt{35}}{30} & \frac{\sqrt{35}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{210} \\ \frac{4\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{30} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{105}i}{210} & 0 \\ 0 & \frac{4\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{30} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & \frac{\sqrt{105}}{210} \\ -\frac{4\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{42} & -\frac{\sqrt{105}}{210} & 0 \\ \frac{\sqrt{35}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{105} & 0 & \frac{\sqrt{35}}{105} & 0 & 0 \\ 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & 0 \end{bmatrix}$ |
| 217 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_2^{(1,1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{35}}{30} & 0 & \frac{4\sqrt{35}i}{105} & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{105}}{210} \\ \frac{\sqrt{35}}{30} & 0 & \frac{4\sqrt{35}i}{105} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & \frac{\sqrt{105}}{210} & 0 \\ 0 & \frac{\sqrt{35}i}{30} & 0 & \frac{4\sqrt{35}}{105} & \frac{\sqrt{35}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{210} \\ \frac{\sqrt{35}i}{30} & 0 & -\frac{4\sqrt{35}}{105} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{105}i}{210} & 0 \\ 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & \frac{\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 & 0 \end{bmatrix}$ |
| 218 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{G}_2^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{105}i}{210} & 0 & -\frac{\sqrt{105}}{210} & -\frac{\sqrt{105}i}{70} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{35} \\ -\frac{\sqrt{105}i}{210} & 0 & \frac{\sqrt{105}}{210} & 0 & 0 & \frac{\sqrt{105}i}{70} & 0 & 0 & \frac{\sqrt{35}i}{35} & 0 \\ 0 & \frac{\sqrt{105}}{210} & 0 & -\frac{\sqrt{105}i}{210} & 0 & 0 & -\frac{\sqrt{105}i}{70} & 0 & 0 & \frac{\sqrt{35}}{35} \\ -\frac{\sqrt{105}}{210} & 0 & -\frac{\sqrt{105}i}{210} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{70} & -\frac{\sqrt{35}}{35} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{105}i}{105} & 0 & \frac{2\sqrt{105}}{105} & \frac{3\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{105}i}{105} & 0 & -\frac{2\sqrt{105}}{105} & 0 & 0 & -\frac{3\sqrt{35}i}{70} \end{bmatrix}$ |
| 219 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} -\frac{\sqrt{35}i}{105} & 0 & 0 & 0 & 0 & \frac{4\sqrt{35}i}{105} & 0 & \frac{\sqrt{35}}{42} & \frac{2\sqrt{105}i}{105} & 0 \\ 0 & \frac{\sqrt{35}i}{105} & 0 & 0 & \frac{4\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{2\sqrt{105}i}{105} \\ 0 & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}i}{105} & -\frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & \frac{4\sqrt{35}i}{105} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{70} \\ \frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{4\sqrt{35}i}{105} & 0 & 0 & -\frac{\sqrt{105}i}{70} & 0 \end{bmatrix}$ |
| 220 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{G}_{2,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}i}{105} & \frac{\sqrt{35}}{105} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & 0 \\ \frac{\sqrt{35}i}{105} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & \frac{4\sqrt{35}}{105} & \frac{2\sqrt{105}i}{105} & 0 \\ 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & -\frac{4\sqrt{35}}{105} & 0 & 0 & -\frac{2\sqrt{105}i}{105} \\ 0 & -\frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & \frac{4\sqrt{35}i}{105} & 0 & 0 & -\frac{\sqrt{105}}{70} \\ \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{35}i}{105} & \frac{\sqrt{105}}{70} & 0 \end{bmatrix}$ |
| 221 | symmetry | z |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_1^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10i}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10i}}{10} \end{bmatrix}$ |
| 222 | symmetry | x $\mathbb{T}_{1,1}^{(a)}(E) \begin{bmatrix} \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10i}}{20} & 0 \\ 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10i}}{20} \\ 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 223 | symmetry | y $\mathbb{T}_{1,2}^{(a)}(E) \begin{bmatrix} 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10i}}{20} & 0 \\ 0 & -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10i}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 \end{bmatrix}$ |
| 224 | symmetry | $\sqrt{15}xyz$ $\mathbb{T}_3^{(a)}(A, 1) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 225 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_3^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 226 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{T}_3^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} \end{bmatrix}$ |
| 227 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{T}_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} \frac{3\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & \frac{3\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 228 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{T}_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & -\frac{3\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 \end{bmatrix}$ |
| 229 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \end{bmatrix}$ |
| 230 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{T}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 231 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{T}_3^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2}i}{12} & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{6}i}{12} & 0 \\ \frac{\sqrt{2}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{6} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 232 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_3^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ \frac{\sqrt{2}i}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2}i}{12} & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{6} & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{6} & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 233 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_3^{(1,-1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{10}i}{20} \\ \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & \frac{\sqrt{10}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{60} & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} \\ \frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & \frac{\sqrt{30}}{60} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 \end{bmatrix}$ |
| 234 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{60} & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{60} & -\frac{\sqrt{10}}{20} & 0 \\ 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{10}}{20} \\ 0 & \frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \end{bmatrix}$ |
| 235 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{T}_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{20} & \frac{\sqrt{10}}{20} & 0 \\ 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{30} & 0 & -\frac{\sqrt{30}i}{20} & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 236 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} -\frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2}i}{12} & -\frac{\sqrt{6}}{12} & 0 \\ 0 & \frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}i}{6} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{12} & -\frac{\sqrt{2}i}{6} & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{6} & 0 & -\frac{\sqrt{2}i}{12} & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{6} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 237 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{6} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{12} & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{2}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{2}i}{12} & -\frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & -\frac{\sqrt{2}i}{6} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{6} & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & 0 \end{bmatrix}$ |
| 238 | symmetry | $\begin{array}{c} z \\ \mathbb{T}_1^{(1,0;a)}(B) \end{array}$ $\begin{bmatrix} 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 239 | symmetry | $\begin{array}{c} x \\ \mathbb{T}_{1,1}^{(1,0;a)}(E) \end{array}$ $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{20} & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & \frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & \frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$ |
| 240 | symmetry | $\begin{array}{c} y \\ \mathbb{T}_{1,2}^{(1,0;a)}(E) \end{array}$ $\begin{bmatrix} \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} \\ 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \end{bmatrix}$ |
| 241 | symmetry | $\sqrt{15}xyz$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_3^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & -\frac{1}{12} & 0 & \frac{i}{6} & \frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ -\frac{1}{12} & 0 & -\frac{i}{6} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 \\ 0 & \frac{i}{12} & 0 & \frac{1}{6} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} \\ -\frac{i}{12} & 0 & \frac{1}{6} & 0 & 0 & 0 & 0 & \frac{1}{6} & \frac{\sqrt{3}i}{12} & 0 \\ \frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{1}{6} & 0 & -\frac{i}{6} & 0 & 0 \\ 0 & -\frac{1}{6} & 0 & 0 & -\frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 242 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_3^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{i}{6} & 0 & \frac{1}{12} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} \\ -\frac{i}{6} & 0 & \frac{1}{12} & 0 & 0 & 0 & 0 & \frac{1}{6} & \frac{\sqrt{3}i}{12} & 0 \\ 0 & \frac{1}{6} & 0 & -\frac{i}{12} & -\frac{1}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} \\ \frac{1}{6} & 0 & \frac{i}{12} & 0 & 0 & \frac{1}{6} & 0 & 0 & \frac{\sqrt{3}}{12} & 0 \\ 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{6} & \frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 & 0 \end{bmatrix}$ |
| 243 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{T}_3^{(1,0;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{15}i}{60} & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} \\ \frac{\sqrt{15}i}{60} & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & \frac{\sqrt{15}}{60} & 0 & -\frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \\ \frac{\sqrt{15}}{60} & 0 & \frac{\sqrt{15}i}{60} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & \frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 \end{bmatrix}$ |
| 244 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{15} & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & 0 \\ -\frac{7\sqrt{15}}{120} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} & \frac{\sqrt{5}}{40} & 0 \\ 0 & \frac{7\sqrt{15}}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{60} & 0 & 0 & -\frac{\sqrt{5}}{40} \\ 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & \frac{3\sqrt{5}i}{40} \\ \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{60} & -\frac{3\sqrt{5}i}{40} & 0 \end{bmatrix}$ |
| 245 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{3,2}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} -\frac{7\sqrt{15}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & -\frac{\sqrt{5}}{40} & 0 \\ 0 & \frac{7\sqrt{15}}{120} & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{40} \\ 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}}{24} & 0 & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{40} \\ \frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & \frac{3\sqrt{5}}{40} & 0 \end{bmatrix}$ |
| 246 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{T}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} -\frac{5}{24} & 0 & 0 & 0 & 0 & \frac{1}{12} & 0 & \frac{i}{6} & \frac{\sqrt{3}}{24} & 0 \\ 0 & \frac{5}{24} & 0 & 0 & \frac{1}{12} & 0 & -\frac{i}{6} & 0 & 0 & -\frac{\sqrt{3}}{24} \\ 0 & 0 & \frac{1}{6} & 0 & 0 & \frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{6} & -\frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 & 0 \\ 0 & -\frac{1}{24} & 0 & \frac{i}{6} & \frac{1}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} \\ -\frac{1}{24} & 0 & -\frac{i}{6} & 0 & 0 & -\frac{1}{12} & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 \end{bmatrix}$ |
| 247 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{T}_{3,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{6} & 0 & 0 & -\frac{i}{6} & 0 & -\frac{1}{6} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{6} & \frac{i}{6} & 0 & -\frac{1}{6} & 0 & 0 & 0 \\ \frac{5}{24} & 0 & 0 & 0 & 0 & -\frac{1}{6} & 0 & -\frac{i}{12} & \frac{\sqrt{3}}{24} & 0 \\ 0 & -\frac{5}{24} & 0 & 0 & -\frac{1}{6} & 0 & \frac{i}{12} & 0 & 0 & -\frac{\sqrt{3}}{24} \\ 0 & -\frac{i}{24} & 0 & -\frac{1}{6} & 0 & 0 & \frac{1}{12} & 0 & 0 & \frac{\sqrt{3}i}{8} \\ \frac{i}{24} & 0 & -\frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{1}{12} & -\frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 248 | symmetry | z |
| | $\mathbb{T}_1^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}i}{20} \\ -\frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{20} & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} \\ -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 249 | symmetry | x |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{20} & \frac{\sqrt{15}}{20} & 0 \\ 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{15}}{20} \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 \end{bmatrix}$ |
| 250 | symmetry | y |
| | $\mathbb{T}_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{15}}{20} & 0 \\ 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{15}}{20} \\ 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 251 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{M}_2^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 252 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{M}_2^{(a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 253 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_2^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 254 | symmetry | $\sqrt{3}xz$ |
| | $M_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{4} & 0 \\ 0 & \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6i}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6i}}{12} & 0 & 0 \end{bmatrix}$ |
| 255 | symmetry | $\sqrt{3}yz$ |
| | $M_{2,2}^{(a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{4} & 0 \\ 0 & \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{4} \\ 0 & 0 & \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 256 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $M_2^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15i}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5i}}{20} \\ \frac{\sqrt{15i}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5i}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15i}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15i}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 257 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_2^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} \\ \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 258 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $M_2^{(1,-1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{20} & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} \\ -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}}{60} & 0 \\ 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{15}i}{60} \\ \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & \frac{\sqrt{15}i}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{20} & \frac{\sqrt{15}}{15} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{15}}{15} \end{bmatrix}$ |
| 259 | symmetry | $\sqrt{3}xz$ |
| | $M_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} \\ 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 \end{bmatrix}$ |
| 260 | symmetry | $\sqrt{3}yz$ |
| | $M_{2,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & -\frac{\sqrt{5}}{20} & 0 \\ 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{5}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & \frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$ |
| 261 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{7}}{28} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} \\ \frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 \\ 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{21}i}{28} \\ \frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{21}i}{28} & 0 \\ -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 \end{bmatrix}$ |
| 262 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $M_4^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{21}i}{28} \\ 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{21}i}{28} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{7}i}{28} & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} \\ 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{21}}{28} & 0 \\ 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \end{bmatrix}$ |
| 263 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $M_4^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{30} & -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & \frac{\sqrt{5}i}{20} \\ -\frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & -\frac{\sqrt{5}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & \frac{\sqrt{15}i}{30} & \frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & -\frac{\sqrt{5}}{10} \end{bmatrix}$ |
| 264 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |
| | $M_4^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21}i}{21} & -\frac{\sqrt{21}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{28} \\ -\frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{21} & 0 & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 \\ 0 & -\frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{21} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & \frac{\sqrt{7}i}{28} \\ \frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} & -\frac{\sqrt{7}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & \frac{\sqrt{21}i}{42} & \frac{\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & -\frac{\sqrt{7}}{14} \end{bmatrix}$ |
| 265 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_4^{(1,-1;a)}(B, 3)$ | $\begin{bmatrix} 0 & -\frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{4} & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 266 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |
| | $M_{4,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & -\frac{\sqrt{3}}{8} & 0 \\ 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & \frac{\sqrt{3}}{8} \\ 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & -\frac{\sqrt{3}i}{8} & 0 \end{bmatrix}$ |
| 267 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $M_{4,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} -\frac{1}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & \frac{\sqrt{3}}{8} & 0 \\ 0 & \frac{1}{8} & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{8} & 0 & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} \\ -\frac{1}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & \frac{\sqrt{3}}{8} & 0 \end{bmatrix}$ |
| 268 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $M_{4,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} -\frac{3\sqrt{7}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{21}}{56} & 0 \\ 0 & \frac{3\sqrt{7}}{56} & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}}{56} \\ 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{56} \\ -\frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{7}}{28} & 0 & 0 & -\frac{\sqrt{21}}{56} & 0 \end{bmatrix}$ |
| 269 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{4,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ \frac{3\sqrt{7}}{56} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{28} & -\frac{\sqrt{21}}{56} & 0 \\ 0 & -\frac{3\sqrt{7}}{56} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & \frac{\sqrt{21}}{56} \\ 0 & -\frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & \frac{\sqrt{21}i}{56} \\ \frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{28} & -\frac{\sqrt{21}i}{56} & 0 \end{bmatrix}$ |
| 270 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & -\frac{1}{12} & 0 & -\frac{i}{12} & \frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ -\frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 \\ 0 & \frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} \\ -\frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & 0 & 0 & \frac{1}{6} & \frac{\sqrt{3}i}{12} & 0 \\ -\frac{1}{3} & 0 & 0 & 0 & 0 & \frac{1}{12} & 0 & \frac{i}{12} & 0 & 0 \\ 0 & \frac{1}{3} & 0 & 0 & \frac{1}{12} & 0 & -\frac{i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 271 | symmetry | $\sqrt{3}xy$ $\begin{bmatrix} 0 & \frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & \frac{1}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ -\frac{i}{12} & 0 & -\frac{1}{12} & 0 & 0 & 0 & 0 & -\frac{1}{6} & -\frac{\sqrt{3}i}{12} & 0 \\ 0 & \frac{1}{12} & 0 & \frac{i}{12} & \frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ \frac{1}{12} & 0 & -\frac{i}{12} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 \\ 0 & 0 & -\frac{1}{3} & 0 & 0 & -\frac{i}{12} & 0 & \frac{1}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{3} & \frac{i}{12} & 0 & \frac{1}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 272 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\begin{bmatrix} 0 & -\frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ -\frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ \frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 273 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} \frac{1}{12} & 0 & 0 & 0 & 0 & -\frac{1}{12} & 0 & -\frac{i}{6} & \frac{\sqrt{3}}{12} & 0 \\ 0 & -\frac{1}{12} & 0 & 0 & -\frac{1}{12} & 0 & \frac{i}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & 0 & \frac{1}{12} & 0 & 0 & \frac{i}{3} & 0 & \frac{1}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{12} & -\frac{i}{3} & 0 & \frac{1}{12} & 0 & 0 & 0 \\ 0 & \frac{1}{6} & 0 & -\frac{i}{6} & -\frac{1}{12} & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{6} & 0 & \frac{i}{6} & 0 & 0 & \frac{1}{12} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 274 | symmetry | $\sqrt{3}yz$ |
| | $M_{2,2}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{12} & 0 & 0 & -\frac{i}{12} & 0 & -\frac{1}{3} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{12} & \frac{i}{12} & 0 & -\frac{1}{3} & 0 & 0 & 0 \\ -\frac{1}{12} & 0 & 0 & 0 & 0 & \frac{1}{6} & 0 & \frac{i}{12} & \frac{\sqrt{3}}{12} & 0 \\ 0 & \frac{1}{12} & 0 & 0 & \frac{1}{6} & 0 & -\frac{i}{12} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & \frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 & -\frac{1}{12} & 0 & 0 & 0 \\ -\frac{i}{6} & 0 & \frac{1}{6} & 0 & 0 & 0 & 0 & \frac{1}{12} & 0 & 0 \end{bmatrix}$ |
| 275 | symmetry | 1 |
| | $M_0^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & \frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{10}i}{20} & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{60} \\ \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 \\ 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & \frac{\sqrt{30}i}{60} \\ -\frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & -\frac{\sqrt{30}i}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{10}i}{20} & \frac{\sqrt{30}}{30} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} \end{bmatrix}$ |
| 276 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $M_2^{(1,1;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{4\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{30} & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{210} \\ \frac{4\sqrt{35}}{105} & 0 & \frac{\sqrt{35}i}{30} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{105}}{210} & 0 \\ 0 & -\frac{4\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{30} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{105}i}{210} \\ \frac{4\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & \frac{\sqrt{105}i}{210} & 0 \\ \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{105} & 0 & 0 \\ 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & \frac{\sqrt{35}i}{105} & 0 & 0 & 0 \end{bmatrix}$ |
| 277 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 6

| No. | multipole | matrix |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{M}_2^{(1,1;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{35}i}{30} & 0 & \frac{4\sqrt{35}}{105} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{105}i}{210} \\ -\frac{\sqrt{35}i}{30} & 0 & \frac{4\sqrt{35}}{105} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & -\frac{\sqrt{105}i}{210} & 0 \\ 0 & \frac{\sqrt{35}}{30} & 0 & -\frac{4\sqrt{35}i}{105} & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{210} \\ \frac{\sqrt{35}}{30} & 0 & \frac{4\sqrt{35}i}{105} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{105}}{210} & 0 \\ 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & -\frac{\sqrt{35}i}{105} & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & 0 \end{bmatrix}$ |
| 278 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{M}_2^{(1,1;a)}(B)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{105}}{210} & 0 & \frac{\sqrt{105}i}{210} & -\frac{\sqrt{105}}{70} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{35} \\ -\frac{\sqrt{105}}{210} & 0 & -\frac{\sqrt{105}i}{210} & 0 & 0 & \frac{\sqrt{105}}{70} & 0 & 0 & \frac{\sqrt{35}}{35} & 0 \\ 0 & -\frac{\sqrt{105}i}{210} & 0 & -\frac{\sqrt{105}}{210} & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & -\frac{\sqrt{35}i}{35} \\ \frac{\sqrt{105}i}{210} & 0 & -\frac{\sqrt{105}}{210} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{70} & \frac{\sqrt{35}i}{35} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{105}}{105} & 0 & -\frac{2\sqrt{105}i}{105} & \frac{3\sqrt{35}}{70} & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{105}}{105} & 0 & \frac{2\sqrt{105}i}{105} & 0 & 0 & -\frac{3\sqrt{35}}{70} \end{bmatrix}$ |
| 279 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{M}_{2,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} -\frac{\sqrt{35}}{105} & 0 & 0 & 0 & 0 & \frac{4\sqrt{35}}{105} & 0 & -\frac{\sqrt{35}i}{42} & \frac{2\sqrt{105}}{105} & 0 \\ 0 & \frac{\sqrt{35}}{105} & 0 & 0 & \frac{4\sqrt{35}}{105} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{2\sqrt{105}}{105} \\ 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}}{105} & \frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{42} & \frac{4\sqrt{35}}{105} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{70} \\ \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{4\sqrt{35}}{105} & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 \end{bmatrix}$ |
| 280 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{M}_{2,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & \frac{\sqrt{35}i}{105} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}}{105} & -\frac{\sqrt{35}i}{105} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 \\ \frac{\sqrt{35}}{105} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{4\sqrt{35}i}{105} & \frac{2\sqrt{105}}{105} & 0 \\ 0 & -\frac{\sqrt{35}}{105} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & \frac{4\sqrt{35}i}{105} & 0 & 0 & -\frac{2\sqrt{105}}{105} \\ 0 & \frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{4\sqrt{35}}{105} & 0 & 0 & \frac{\sqrt{105}i}{70} \\ -\frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{35}}{105} & -\frac{\sqrt{105}i}{70} & 0 \end{bmatrix}$ |

bra: = $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

ket: = $|f_2, \uparrow \rangle, |f_2, \downarrow \rangle, |f_1, \uparrow \rangle, |f_1, \downarrow \rangle, |f_{bz}, \uparrow \rangle, |f_{bz}, \downarrow \rangle, |f_3, \uparrow \rangle, |f_3, \downarrow \rangle, |f_{3x}, \uparrow \rangle, |f_{3x}, \downarrow \rangle, |f_{3y}, \uparrow \rangle, |f_{3y}, \downarrow \rangle, |f_{az}, \uparrow \rangle, |f_{az}, \downarrow \rangle$

Table 7: (p,f) block.

| No. | multipole | matrix |
|-----|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 281 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} \end{bmatrix}$ |
| 282 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\begin{bmatrix} \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 283 | symmetry | $\sqrt{3}xy$ $\begin{bmatrix} 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 \\ -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 284 | symmetry | $\sqrt{3}yz$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{21} & 0 & 0 \end{bmatrix}$ |
| 285 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{Q}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{21} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 286 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ |
| | $\mathbb{Q}_4^{(a)}(A, 1)$ | $\begin{bmatrix} \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \end{bmatrix}$ |
| 287 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |
| | $\mathbb{Q}_4^{(a)}(A, 2)$ | $\begin{bmatrix} -\frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{42} \end{bmatrix}$ |
| 288 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $Q_4^{(a)}(A, 3)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 289 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |
| | $Q_4^{(a)}(B, 1)$ | $\begin{bmatrix} \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 290 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $Q_4^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 \\ \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 291 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $Q_{4,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 292 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{4,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 \end{bmatrix}$ |
| 293 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |
| | $\mathbb{Q}_{4,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{21}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{21}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & 0 & \frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 294 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $\mathbb{Q}_{4,2}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 295 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{1}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{1}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & \frac{i}{8} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & \frac{i}{8} \\ 0 & \frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{48} & 0 & -\frac{\sqrt{6}i}{48} & 0 & 0 \\ -\frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{48} & 0 & -\frac{\sqrt{6}i}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 296 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|---------------------------|---------------------------|----------------------------|----------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{168}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | $-\frac{\sqrt{35}}{56}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{168}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | $\frac{\sqrt{35}}{56}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{168}$ | 0 | $-\frac{\sqrt{21}}{28}$ | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{56}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{168}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{14}}{16}$ | 0 | $-\frac{\sqrt{14}i}{16}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{336}$ | 0 | $-\frac{\sqrt{210}i}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{14}}{16}$ | 0 | $-\frac{\sqrt{14}i}{16}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{336}$ | 0 | $-\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 |
| 297 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 3)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{8} & 0 & -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{8} & 0 & -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{8} & 0 & \frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}i}{8} & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | | | | | |
| 298 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(B, 1)$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | $-\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{105}}{56}$ | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | $\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{56}$ |
| | | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | $\frac{\sqrt{42}i}{112}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{42}}{112}$ | 0 | $\frac{\sqrt{42}i}{112}$ | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 |
| 299 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(B, 2)$ | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{56}$ |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | $\frac{\sqrt{105}}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{42}i}{112}$ | 0 | $\frac{\sqrt{42}}{112}$ | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{112}$ | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 |
| 300 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|----------------------------------------|----------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|
| | $\mathbb{Q}_{4,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | $\frac{3i}{16}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{32}$ | 0 | 0 | $-\frac{\sqrt{15}i}{16}$ | 0 |
| | | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{3i}{16}$ | 0 | 0 | $\frac{3\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{16}$ |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 |
| 301 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{4,2}^{(1,-1;a)}(E, 1)$ | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | $-\frac{3i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}}{32}$ | $-\frac{\sqrt{15}i}{16}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | $\frac{3i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | $\frac{\sqrt{15}i}{16}$ |
| | | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | $\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 |
| 302 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{4,1}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{3\sqrt{42}}{224}$ | $\frac{\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{224}$ | $-\frac{\sqrt{105}i}{112}$ | 0 |
| | | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | 0 | $-\frac{\sqrt{7}i}{112}$ | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{112}$ |
| | | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $-\frac{5\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | $-\frac{3\sqrt{42}}{224}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ | $\frac{5\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $\frac{3\sqrt{7}}{56}$ | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{32}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 |
| 303 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{4,2}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{3\sqrt{42}i}{224}$ | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{5\sqrt{70}i}{224}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{3\sqrt{42}i}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{5\sqrt{70}i}{224}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | $-\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{105}i}{112}$ | 0 |
| | | $-\frac{3\sqrt{42}i}{224}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{112}$ | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{42}i}{32}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{32}$ | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | 0 |
| 304 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_2^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{84} & 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{84} & 0 & -\frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{84} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & \frac{\sqrt{21}i}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{21} & 0 & \frac{\sqrt{21}i}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 305 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{105}i}{42} & 0 & 0 & \frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70}i}{84} & 0 & 0 & \frac{\sqrt{7}i}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} \\ 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & -\frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{42} & \frac{\sqrt{42}}{84} & 0 \\ \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & \frac{\sqrt{70}}{84} & \frac{\sqrt{7}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} \\ 0 & -\frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & -\frac{\sqrt{70}}{84} & 0 & 0 & -\frac{\sqrt{7}i}{42} & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{42} & 0 & 0 & \frac{\sqrt{7}}{21} & 0 & \frac{\sqrt{7}i}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{42} & -\frac{\sqrt{7}}{21} & 0 & \frac{\sqrt{7}i}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 306 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{Q}_2^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & \frac{\sqrt{70}}{84} & -\frac{\sqrt{7}i}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{84} \\ 0 & -\frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & -\frac{\sqrt{70}}{84} & 0 & 0 & \frac{\sqrt{7}i}{42} & 0 & 0 & \frac{\sqrt{42}i}{84} & 0 \\ 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{70}i}{84} & 0 & 0 & \frac{\sqrt{7}i}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} \\ 0 & 0 & 0 & -\frac{\sqrt{105}i}{42} & \frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{70}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{42} & \frac{\sqrt{42}}{84} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{21} & 0 & \frac{\sqrt{7}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{42} & 0 & 0 & -\frac{\sqrt{7}i}{21} & 0 & -\frac{\sqrt{7}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 307 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{Q}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{105}i}{84} & 0 & -\frac{\sqrt{105}}{84} & \frac{\sqrt{70}i}{84} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}i}{84} & 0 & \frac{\sqrt{7}}{84} & -\frac{\sqrt{42}i}{84} & 0 \\ -\frac{\sqrt{105}i}{84} & 0 & \frac{\sqrt{105}}{84} & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & 0 & -\frac{5\sqrt{7}i}{84} & 0 & -\frac{\sqrt{7}}{84} & 0 & 0 & \frac{\sqrt{42}i}{84} \\ 0 & \frac{\sqrt{105}}{84} & 0 & -\frac{\sqrt{105}i}{84} & 0 & 0 & \frac{\sqrt{70}i}{84} & 0 & 0 & \frac{\sqrt{7}}{84} & 0 & -\frac{\sqrt{7}i}{12} & 0 & 0 \\ -\frac{\sqrt{105}}{84} & 0 & -\frac{\sqrt{105}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{84} & -\frac{\sqrt{7}}{84} & 0 & -\frac{\sqrt{7}i}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & -\frac{\sqrt{70}}{84} & \frac{\sqrt{7}i}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & \frac{\sqrt{70}}{84} & 0 & 0 & -\frac{\sqrt{7}i}{21} & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 \end{bmatrix}$ |
| 308 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,2}^{(1,0;a)}(E)$ | $\begin{array}{cccccccccccccccc} 0 & -\frac{\sqrt{105}}{84} & 0 & \frac{\sqrt{105}i}{84} & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & 0 & \frac{\sqrt{7}}{12} & 0 & -\frac{\sqrt{7}i}{84} & 0 & 0 \\ \frac{\sqrt{105}}{84} & 0 & \frac{\sqrt{105}i}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{84} & -\frac{\sqrt{7}}{12} & 0 & -\frac{\sqrt{7}i}{84} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{105}i}{84} & 0 & -\frac{\sqrt{105}}{84} & \frac{\sqrt{70}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{84} & 0 & \frac{5\sqrt{7}}{84} & \frac{\sqrt{42}i}{84} & 0 \\ -\frac{\sqrt{105}i}{84} & 0 & \frac{\sqrt{105}}{84} & 0 & 0 & -\frac{\sqrt{70}i}{84} & 0 & 0 & -\frac{\sqrt{7}i}{84} & 0 & -\frac{5\sqrt{7}}{84} & 0 & 0 & -\frac{\sqrt{42}i}{84} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70}i}{84} & 0 & 0 & -\frac{\sqrt{7}i}{21} & 0 & 0 & \frac{\sqrt{42}}{28} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70}i}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{21} & -\frac{\sqrt{42}}{28} & 0 \end{array}$ |
| 309 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $\mathbb{Q}_4^{(1,0;a)}(A, 1)$ | $\begin{array}{cccccccccccccccc} 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 \\ 0 & \frac{\sqrt{6}}{48} & 0 & \frac{\sqrt{6}i}{48} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & 0 \\ -\frac{\sqrt{6}}{48} & 0 & \frac{\sqrt{6}i}{48} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & 0 & 0 \end{array}$ |
| 310 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |
| | $\mathbb{Q}_4^{(1,0;a)}(A, 2)$ | $\begin{array}{cccccccccccccccc} 0 & 0 & \frac{\sqrt{210}i}{60} & 0 & 0 & -\frac{\sqrt{35}}{280} & 0 & -\frac{3\sqrt{35}i}{140} & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{21}}{168} \\ 0 & 0 & 0 & -\frac{\sqrt{210}i}{60} & \frac{\sqrt{35}}{280} & 0 & -\frac{3\sqrt{35}i}{140} & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{21}}{168} & 0 \\ \frac{\sqrt{210}i}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{280} & 0 & \frac{3\sqrt{35}}{140} & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{21}i}{168} \\ 0 & -\frac{\sqrt{210}i}{60} & 0 & 0 & -\frac{\sqrt{35}i}{280} & 0 & -\frac{3\sqrt{35}}{140} & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{21}i}{168} & 0 \\ 0 & -\frac{\sqrt{210}}{240} & 0 & -\frac{\sqrt{210}i}{240} & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{112} & 0 & \frac{5\sqrt{14}i}{112} & 0 & 0 \\ \frac{\sqrt{210}}{240} & 0 & -\frac{\sqrt{210}i}{240} & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{14}}{112} & 0 & \frac{5\sqrt{14}i}{112} & 0 & 0 & 0 \end{array}$ |
| 311 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_4^{(1,0;a)}(A, 3)$ | $\begin{array}{cccccccccccccccc} \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{40} & 0 & \frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & -\frac{\sqrt{15}i}{40} & 0 & -\frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & \frac{\sqrt{15}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{10} & -\frac{\sqrt{15}}{40} & 0 & \frac{\sqrt{15}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}i}{40} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}$ |
| 312 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_4^{(1,0;a)}(B, 1)$ | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{280}$ | $-\frac{\sqrt{105}}{56}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | $\frac{\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | 0 | $-\frac{\sqrt{105}}{140}$ | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ |
| | | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{70}}{80}$ | 0 | $-\frac{\sqrt{70}i}{80}$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{80}$ | 0 | $-\frac{\sqrt{70}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | $\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | 0 | 0 |
| 313 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,0;a)}(B, 2)$ | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{56}$ | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ |
| | | 0 | $\frac{\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{56}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{56}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{280}$ | $\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | $-\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{80}$ | 0 | $-\frac{\sqrt{70}}{80}$ | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | $\frac{3\sqrt{42}}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}i}{80}$ | 0 | $\frac{\sqrt{70}}{80}$ | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | 0 | 0 |
| 314 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{4,1}^{(1,0;a)}(E, 1)$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | $-\frac{\sqrt{6}}{8}$ | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ | $\frac{\sqrt{6}}{8}$ | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{i}{16}$ | 0 |
| | | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{80}$ | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{i}{16}$ |
| | | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | $\frac{1}{4}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | $\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | $-\frac{1}{4}$ | 0 |
| 315 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{4,2}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $\frac{\sqrt{10}}{160}$ | $-\frac{\sqrt{15}i}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | $-\frac{i}{16}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | $\frac{i}{16}$ |
| | | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | $-\frac{\sqrt{6}i}{8}$ | 0 | 0 |
| | | $-\frac{3\sqrt{10}}{160}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ | $-\frac{\sqrt{6}}{32}$ | 0 | $-\frac{\sqrt{6}i}{8}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{40}$ | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{i}{4}$ |
| | | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $\frac{i}{4}$ | 0 |
| 316 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{4,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{3\sqrt{70}i}{280} & 0 & -\frac{19\sqrt{70}}{1120} & \frac{11\sqrt{105}i}{560} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{56} & 0 & \frac{5\sqrt{42}}{224} & -\frac{\sqrt{7}i}{112} & 0 \\ -\frac{3\sqrt{70}i}{280} & 0 & \frac{19\sqrt{70}}{1120} & 0 & 0 & -\frac{11\sqrt{105}i}{560} & 0 & 0 & -\frac{\sqrt{42}i}{56} & 0 & -\frac{5\sqrt{42}}{224} & 0 & 0 & \frac{\sqrt{7}i}{112} \\ 0 & -\frac{9\sqrt{70}}{1120} & 0 & \frac{\sqrt{70}i}{70} & 0 & 0 & -\frac{\sqrt{105}i}{56} & 0 & 0 & \frac{5\sqrt{42}}{224} & 0 & 0 & 0 & 0 \\ \frac{9\sqrt{70}}{1120} & 0 & \frac{\sqrt{70}i}{70} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{56} & -\frac{5\sqrt{42}}{224} & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{70}i}{160} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{140} & 0 & \frac{\sqrt{105}}{56} & -\frac{\sqrt{42}i}{224} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{28} \\ 0 & -\frac{3\sqrt{70}i}{160} & 0 & 0 & -\frac{\sqrt{105}i}{140} & 0 & -\frac{\sqrt{105}}{56} & 0 & 0 & \frac{\sqrt{42}i}{224} & 0 & 0 & \frac{\sqrt{7}i}{28} & 0 \end{bmatrix}$ |
| 317 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $\mathbb{Q}_{4,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{70}}{70} & 0 & -\frac{9\sqrt{70}i}{1120} & 0 & 0 & \frac{\sqrt{105}i}{56} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}i}{224} & 0 & 0 \\ -\frac{\sqrt{70}}{70} & 0 & -\frac{9\sqrt{70}i}{1120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{56} & 0 & 0 & -\frac{5\sqrt{42}i}{224} & 0 & 0 & 0 \\ 0 & -\frac{19\sqrt{70}i}{1120} & 0 & -\frac{3\sqrt{70}}{280} & \frac{11\sqrt{105}i}{560} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}i}{224} & 0 & \frac{\sqrt{42}}{56} & \frac{\sqrt{7}i}{112} & 0 \\ -\frac{19\sqrt{70}i}{1120} & 0 & \frac{3\sqrt{70}}{280} & 0 & 0 & -\frac{11\sqrt{105}i}{560} & 0 & 0 & -\frac{5\sqrt{42}i}{224} & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & -\frac{\sqrt{7}i}{112} \\ 0 & 0 & \frac{3\sqrt{70}i}{160} & 0 & 0 & -\frac{\sqrt{105}}{140} & 0 & -\frac{\sqrt{105}i}{56} & 0 & 0 & \frac{\sqrt{42}i}{224} & 0 & 0 & -\frac{\sqrt{7}}{28} \\ 0 & 0 & 0 & -\frac{3\sqrt{70}i}{160} & \frac{\sqrt{105}}{140} & 0 & -\frac{\sqrt{105}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{224} & \frac{\sqrt{7}}{28} & 0 \end{bmatrix}$ |
| 318 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |
| | $\mathbb{Q}_2^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{84} & 0 & -\frac{\sqrt{105}i}{84} & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 & 0 & \frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{84} & 0 & -\frac{\sqrt{105}i}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{28} & -\frac{\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{84} & 0 & \frac{\sqrt{105}}{84} & \frac{\sqrt{42}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{84} & 0 & -\frac{\sqrt{105}}{84} & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & \frac{\sqrt{42}i}{84} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & \frac{\sqrt{42}i}{84} & 0 & 0 \end{bmatrix}$ |
| 319 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{Q}_2^{(1,1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{210}i}{168} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{84} & 0 & 0 & -\frac{5\sqrt{14}i}{168} & 0 & 0 & \frac{\sqrt{21}}{84} \\ 0 & 0 & 0 & \frac{\sqrt{210}i}{168} & -\frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{84} & 0 & 0 & 0 & 0 & \frac{5\sqrt{14}i}{168} & -\frac{\sqrt{21}}{84} & 0 \\ \frac{\sqrt{210}i}{168} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{84} & -\frac{5\sqrt{14}i}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{84} \\ 0 & -\frac{\sqrt{210}i}{168} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{84} & 0 & 0 & \frac{5\sqrt{14}i}{168} & 0 & 0 & \frac{\sqrt{21}i}{84} & 0 \\ 0 & -\frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{14}}{168} & 0 & -\frac{\sqrt{14}i}{168} & 0 & 0 \\ \frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & \frac{\sqrt{14}}{168} & 0 & -\frac{\sqrt{14}i}{168} & 0 & 0 & 0 \end{bmatrix}$ |
| 320 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|--------------------------|
| | $\mathbb{Q}_2^{(1,1;a)}(B, 2)$ | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | $\frac{\sqrt{35}}{42}$ | $\frac{5\sqrt{14i}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ |
| | | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{5\sqrt{14i}}{168}$ | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ |
| | | 0 | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | $-\frac{5\sqrt{14i}}{168}$ | 0 | $\frac{\sqrt{21i}}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{168}$ | $-\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{168}$ | $-\frac{\sqrt{21i}}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{210i}}{56}$ | 0 | $-\frac{\sqrt{210}}{56}$ | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{168}$ | 0 | $-\frac{\sqrt{14}}{168}$ | 0 |
| | | $-\frac{\sqrt{210i}}{56}$ | 0 | $\frac{\sqrt{210}}{56}$ | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | $\frac{\sqrt{14i}}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 |
| 321 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{168}$ | 0 | $\frac{11\sqrt{14}}{168}$ | $\frac{\sqrt{21i}}{21}$ |
| | | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | $\frac{5\sqrt{14i}}{168}$ | 0 | $-\frac{11\sqrt{14}}{168}$ | 0 | $-\frac{\sqrt{21i}}{21}$ |
| | | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14i}}{168}$ | 0 |
| | | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | $\frac{\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14i}}{168}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | $-\frac{\sqrt{14i}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14i}}{42}$ | 0 | 0 | 0 |
| 322 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{2,2}^{(1,1;a)}(E)$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14i}}{168}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14i}}{168}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{11\sqrt{14i}}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | $-\frac{\sqrt{21i}}{21}$ |
| | | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | $-\frac{11\sqrt{14i}}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{21i}}{21}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | $\frac{\sqrt{14i}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{42}$ | 0 |
| 323 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_3^{(a)}(A)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{4}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{4}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{4}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{4}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 324 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_3^{(a)}(B, 1)$ | $\begin{bmatrix} -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 325 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_3^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 \\ -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 326 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{G}_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 327 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{G}_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} \\ 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & 0 \end{bmatrix}$ |
| 328 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 \end{bmatrix}$ |
| 329 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{G}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 330 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{G}_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & -\frac{\sqrt{21}}{42} & \frac{\sqrt{210}i}{70} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{70} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & -\frac{\sqrt{210}i}{70} & 0 & 0 & \frac{\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & \frac{\sqrt{210}i}{70} & 0 & 0 & \frac{\sqrt{35}}{70} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{70} & -\frac{\sqrt{35}}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{105} & 0 & -\frac{\sqrt{210}i}{105} & \frac{3\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{105} & 0 & \frac{\sqrt{210}}{105} & 0 & 0 & -\frac{3\sqrt{35}i}{70} \end{bmatrix}$ |
| 331 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{G}_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{14}i}{84} & 0 & 0 & -\frac{\sqrt{21}}{42} \\ 0 & 0 & 0 & -\frac{\sqrt{210}i}{84} & -\frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{84} & \frac{\sqrt{21}}{42} & 0 \\ -\frac{\sqrt{210}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & -\frac{\sqrt{14}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} \\ 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14}i}{84} & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & \frac{\sqrt{14}}{21} & 0 & \frac{\sqrt{14}i}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & -\frac{\sqrt{14}}{21} & 0 & \frac{\sqrt{14}i}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 332 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_3^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{210i}}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & -\frac{\sqrt{35}}{42} & -\frac{\sqrt{14i}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21i}}{42} \\ 0 & -\frac{\sqrt{210i}}{84} & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14i}}{84} & 0 & 0 & -\frac{\sqrt{21i}}{42} & 0 \\ 0 & 0 & \frac{\sqrt{210i}}{84} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & \frac{\sqrt{14i}}{84} & 0 & 0 & \frac{\sqrt{21}}{42} \\ 0 & 0 & 0 & -\frac{\sqrt{210i}}{84} & -\frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14i}}{84} & -\frac{\sqrt{21}}{42} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14i}}{21} & 0 & -\frac{\sqrt{14}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35i}}{42} & 0 & 0 & \frac{\sqrt{14i}}{21} & 0 & \frac{\sqrt{14}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 333 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $\mathbb{G}_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & -\frac{3\sqrt{14}}{56} & 0 & -\frac{\sqrt{14i}}{28} & 0 & 0 & -\frac{\sqrt{21i}}{42} & 0 & 0 & -\frac{\sqrt{210}}{280} & 0 & \frac{\sqrt{210i}}{420} & 0 & 0 \\ \frac{3\sqrt{14}}{56} & 0 & -\frac{\sqrt{14i}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{42} & \frac{\sqrt{210}}{280} & 0 & \frac{\sqrt{210i}}{420} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14i}}{28} & 0 & -\frac{3\sqrt{14}}{56} & \frac{\sqrt{21i}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{420} & 0 & -\frac{3\sqrt{210}}{280} & \frac{\sqrt{35i}}{70} & 0 \\ \frac{\sqrt{14i}}{28} & 0 & \frac{3\sqrt{14}}{56} & 0 & 0 & -\frac{\sqrt{21i}}{42} & 0 & 0 & \frac{\sqrt{210i}}{420} & 0 & \frac{3\sqrt{210}}{280} & 0 & 0 & -\frac{\sqrt{35i}}{70} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21i}}{42} & 0 & 0 & -\frac{\sqrt{210i}}{105} & 0 & 0 & -\frac{3\sqrt{35}}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21i}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{105} & \frac{3\sqrt{35}}{140} & 0 \end{bmatrix}$ |
| 334 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $\mathbb{G}_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{14i}}{56} & 0 & -\frac{\sqrt{14}}{28} & -\frac{\sqrt{21i}}{42} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{210i}}{280} & 0 & \frac{\sqrt{210}}{420} & \frac{\sqrt{35i}}{70} & 0 \\ \frac{3\sqrt{14i}}{56} & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{21i}}{42} & 0 & 0 & -\frac{3\sqrt{210i}}{280} & 0 & -\frac{\sqrt{210}}{420} & 0 & 0 & -\frac{\sqrt{35i}}{70} \\ 0 & \frac{\sqrt{14}}{28} & 0 & \frac{3\sqrt{14i}}{56} & 0 & 0 & -\frac{\sqrt{21i}}{42} & 0 & 0 & \frac{\sqrt{210}}{420} & 0 & -\frac{\sqrt{210i}}{280} & 0 & 0 \\ -\frac{\sqrt{14}}{28} & 0 & \frac{3\sqrt{14i}}{56} & 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{42} & -\frac{\sqrt{210}}{420} & 0 & -\frac{\sqrt{210i}}{280} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{28} & 0 & -\frac{\sqrt{21}}{42} & -\frac{\sqrt{210i}}{105} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{35i}}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{28} & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & \frac{\sqrt{210i}}{105} & 0 & 0 & -\frac{3\sqrt{35i}}{140} & 0 \end{bmatrix}$ |
| 335 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{G}_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210i}}{168} & 0 & \frac{\sqrt{210}}{84} & -\frac{\sqrt{35i}}{42} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{14i}}{168} & 0 & -\frac{\sqrt{14}}{84} & \frac{\sqrt{21i}}{42} & 0 \\ -\frac{\sqrt{210i}}{168} & 0 & -\frac{\sqrt{210}}{84} & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & -\frac{5\sqrt{14i}}{168} & 0 & \frac{\sqrt{14}}{84} & 0 & 0 & -\frac{\sqrt{21i}}{42} \\ 0 & -\frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{210i}}{168} & 0 & 0 & -\frac{\sqrt{35i}}{42} & 0 & 0 & -\frac{\sqrt{14}}{84} & 0 & -\frac{\sqrt{14i}}{24} & 0 & 0 \\ \frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{210i}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{35i}}{42} & \frac{\sqrt{14}}{84} & 0 & -\frac{\sqrt{14i}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35i}}{84} & 0 & \frac{\sqrt{35}}{42} & -\frac{\sqrt{14i}}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21i}}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35i}}{84} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14i}}{21} & 0 & 0 & -\frac{\sqrt{21i}}{28} & 0 \end{bmatrix}$ |
| 336 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{3,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}}{168} & 0 & -\frac{\sqrt{210i}}{84} & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & \frac{\sqrt{14}}{24} & 0 & \frac{\sqrt{14i}}{84} & 0 & 0 \\ \frac{\sqrt{210}}{168} & 0 & -\frac{\sqrt{210i}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35i}}{42} & -\frac{\sqrt{14}}{24} & 0 & \frac{\sqrt{14i}}{84} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{210i}}{84} & 0 & -\frac{\sqrt{210}}{168} & -\frac{\sqrt{35i}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14i}}{84} & 0 & \frac{5\sqrt{14}}{168} & -\frac{\sqrt{21i}}{42} & 0 \\ \frac{\sqrt{210i}}{84} & 0 & \frac{\sqrt{210}}{168} & 0 & 0 & \frac{\sqrt{35i}}{42} & 0 & 0 & \frac{\sqrt{14i}}{84} & 0 & -\frac{5\sqrt{14}}{168} & 0 & 0 & \frac{\sqrt{21i}}{42} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{84} & 0 & -\frac{\sqrt{35i}}{42} & 0 & 0 & \frac{\sqrt{14i}}{21} & 0 & 0 & \frac{\sqrt{21}}{28} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{84} & 0 & -\frac{\sqrt{35i}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14i}}{21} & -\frac{\sqrt{21}}{28} & 0 \end{bmatrix}$ |
| 337 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |
| | $\mathbb{G}_5^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{10i}}{20} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10i}}{20} & -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{10i}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15i}}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10i}}{20} & 0 & 0 & \frac{\sqrt{15i}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 338 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |
| | $\mathbb{G}_5^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{84} & 0 & \frac{\sqrt{21}}{84} & -\frac{\sqrt{210i}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35i}}{42} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{84} & 0 & -\frac{\sqrt{21}}{84} & 0 & 0 & \frac{\sqrt{210i}}{84} & 0 & 0 & -\frac{\sqrt{35i}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{84} & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & 0 & -\frac{\sqrt{35}}{42} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{84} & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{84} & \frac{\sqrt{35}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & -\frac{\sqrt{210}}{84} & \frac{\sqrt{35i}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35i}}{21} \end{bmatrix}$ |
| 339 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |
| | $\mathbb{G}_5^{(1,-1;a)}(A, 3)$ | $\begin{bmatrix} \frac{\sqrt{10i}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15i}}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10i}}{20} & 0 & 0 & \frac{\sqrt{15i}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{10i}}{20} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10i}}{20} & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10i}}{20} & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{10i}}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 340 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_5^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{30i}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5i}}{20} & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & 0 & 0 & -\frac{\sqrt{30i}}{120} & 0 & 0 & \frac{\sqrt{5i}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{8} & \frac{\sqrt{3}}{12} & 0 \\ -\frac{\sqrt{30i}}{120} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3i}}{12} \\ 0 & \frac{\sqrt{30i}}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{2i}}{8} & 0 & 0 & -\frac{\sqrt{3i}}{12} & 0 \\ 0 & -\frac{\sqrt{30}}{120} & 0 & \frac{\sqrt{30i}}{120} & 0 & 0 & -\frac{\sqrt{5i}}{10} & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 \\ \frac{\sqrt{30}}{120} & 0 & \frac{\sqrt{30i}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5i}}{10} & \frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 \end{bmatrix}$ |
| 341 | symmetry | $-\frac{\sqrt{105z(x-y)(x+y)(x^2+y^2-2z^2)}}{4}$ |
| | $\mathbb{G}_5^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} -\frac{\sqrt{30i}}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5i}}{20} & 0 & 0 & \frac{\sqrt{2i}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{12} \\ 0 & \frac{\sqrt{30i}}{120} & 0 & 0 & -\frac{\sqrt{5i}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & \frac{\sqrt{3i}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{30i}}{120} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{30i}}{120} & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{8} & \frac{\sqrt{3}}{12} & 0 \\ 0 & -\frac{\sqrt{30i}}{120} & 0 & -\frac{\sqrt{30}}{120} & \frac{\sqrt{5i}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{2i}}{8} & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 \\ -\frac{\sqrt{30i}}{120} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{5i}}{10} & 0 & 0 & \frac{\sqrt{2i}}{8} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 \end{bmatrix}$ |
| 342 | symmetry | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |
| | $\mathbb{G}_{5,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{5\sqrt{14}}{112} & 0 & \frac{13\sqrt{14i}}{336} & 0 & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & \frac{\sqrt{210}}{336} & 0 & \frac{\sqrt{210i}}{336} & 0 & 0 \\ -\frac{5\sqrt{14}}{112} & 0 & \frac{13\sqrt{14i}}{336} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21i}}{84} & -\frac{\sqrt{210}}{336} & 0 & \frac{\sqrt{210i}}{336} & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{14i}}{112} & 0 & -\frac{5\sqrt{14}}{84} & \frac{5\sqrt{21i}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{336} & 0 & -\frac{\sqrt{210}}{84} & \frac{\sqrt{35i}}{56} & 0 \\ \frac{5\sqrt{14i}}{112} & 0 & \frac{5\sqrt{14}}{84} & 0 & 0 & -\frac{5\sqrt{21i}}{168} & 0 & 0 & \frac{\sqrt{210i}}{336} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35i}}{56} \\ 0 & 0 & \frac{\sqrt{14i}}{48} & 0 & 0 & \frac{5\sqrt{21}}{168} & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & \frac{\sqrt{210i}}{112} & 0 & 0 & \frac{\sqrt{35}}{56} \\ 0 & 0 & 0 & -\frac{\sqrt{14i}}{48} & -\frac{5\sqrt{21}}{168} & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210i}}{112} & -\frac{\sqrt{35}}{56} & 0 \end{bmatrix}$ |
| 343 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |
| | $\mathbb{G}_{5,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{5\sqrt{14i}}{84} & 0 & -\frac{5\sqrt{14}}{112} & -\frac{5\sqrt{21i}}{168} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & \frac{\sqrt{210}}{336} & \frac{\sqrt{35i}}{56} & 0 \\ \frac{5\sqrt{14i}}{84} & 0 & \frac{5\sqrt{14}}{112} & 0 & 0 & \frac{5\sqrt{21i}}{168} & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & -\frac{\sqrt{210}}{336} & 0 & 0 & -\frac{\sqrt{35i}}{56} \\ 0 & -\frac{13\sqrt{14}}{336} & 0 & -\frac{5\sqrt{14i}}{112} & 0 & 0 & \frac{\sqrt{21i}}{84} & 0 & 0 & \frac{\sqrt{210}}{336} & 0 & \frac{\sqrt{210i}}{336} & 0 & 0 \\ \frac{13\sqrt{14}}{336} & 0 & -\frac{5\sqrt{14i}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21i}}{84} & -\frac{\sqrt{210}}{336} & 0 & \frac{\sqrt{210i}}{336} & 0 & 0 & 0 \\ -\frac{\sqrt{14i}}{48} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{21i}}{168} & 0 & \frac{\sqrt{21}}{84} & \frac{\sqrt{210i}}{112} & 0 & 0 & 0 & 0 & \frac{\sqrt{35i}}{56} \\ 0 & \frac{\sqrt{14i}}{48} & 0 & 0 & -\frac{5\sqrt{21i}}{168} & 0 & -\frac{\sqrt{21}}{84} & 0 & 0 & -\frac{\sqrt{210i}}{112} & 0 & 0 & \frac{\sqrt{35i}}{56} & 0 \end{bmatrix}$ |
| 344 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{5,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{10}}{80} & 0 & \frac{3\sqrt{10}i}{80} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 \\ -\frac{\sqrt{10}}{80} & 0 & \frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & \frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{80} & 0 & 0 & -\frac{\sqrt{15}i}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & \frac{i}{8} & 0 \\ \frac{\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{40} & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & -\frac{i}{8} \\ 0 & 0 & -\frac{3\sqrt{10}i}{80} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & 0 & \frac{1}{8} \\ 0 & 0 & 0 & \frac{3\sqrt{10}i}{80} & \frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{16} & -\frac{1}{8} & 0 \end{bmatrix}$ |
| 345 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |
| | $\mathbb{G}_{5,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}}{80} & \frac{\sqrt{15}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & \frac{i}{8} & 0 \\ 0 & 0 & \frac{\sqrt{10}}{80} & 0 & 0 & -\frac{\sqrt{15}i}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & -\frac{i}{8} \\ 0 & -\frac{3\sqrt{10}}{80} & 0 & -\frac{\sqrt{10}i}{80} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 \\ \frac{3\sqrt{10}}{80} & 0 & -\frac{\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & \frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 \\ \frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{40} & 0 & -\frac{\sqrt{15}}{20} & \frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & \frac{i}{8} \\ 0 & -\frac{3\sqrt{10}i}{80} & 0 & 0 & \frac{\sqrt{15}i}{40} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & \frac{i}{8} & 0 \end{bmatrix}$ |
| 346 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |
| | $\mathbb{G}_{5,1}^{(1,-1;a)}(E, 3)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}i}{40} & 0 & \frac{\sqrt{30}}{30} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \\ -\frac{\sqrt{30}i}{40} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} \\ 0 & \frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}i}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & \frac{\sqrt{30}i}{120} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \end{bmatrix}$ |
| 347 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |
| | $\mathbb{G}_{5,2}^{(1,-1;a)}(E, 3)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{30}}{40} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & -\frac{\sqrt{3}i}{12} & 0 & 0 \\ \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{40} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & -\frac{\sqrt{30}i}{120} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & \frac{\sqrt{3}}{12} & 0 & 0 \end{bmatrix}$ |
| 348 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_3^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & \frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{6}}{24} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 349 | symmetry | $\sqrt{15}xyz$ $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & \frac{1}{24} & 0 & \frac{i}{6} & 0 & 0 & -\frac{\sqrt{10}i}{24} & 0 & 0 & \frac{\sqrt{15}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{24} & -\frac{1}{24} & 0 & \frac{i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{24} & -\frac{\sqrt{15}}{24} & 0 \\ \frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & -\frac{i}{24} & 0 & \frac{1}{6} & -\frac{\sqrt{10}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} \\ 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & -\frac{i}{24} & 0 & -\frac{1}{6} & 0 & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 \\ 0 & \frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & \frac{i}{6} & 0 & 0 & -\frac{\sqrt{10}}{48} & 0 & -\frac{\sqrt{10}i}{48} & 0 & 0 \\ -\frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & -\frac{i}{6} & \frac{\sqrt{10}}{48} & 0 & -\frac{\sqrt{10}i}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 350 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ $\begin{bmatrix} -\frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & \frac{i}{6} & 0 & -\frac{1}{24} & -\frac{\sqrt{10}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} \\ 0 & \frac{\sqrt{6}i}{24} & 0 & 0 & \frac{i}{6} & 0 & \frac{1}{24} & 0 & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & \frac{1}{6} & 0 & \frac{i}{24} & 0 & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 & -\frac{\sqrt{15}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{24} & -\frac{1}{6} & 0 & \frac{i}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{24} & \frac{\sqrt{15}}{24} & 0 \\ 0 & -\frac{\sqrt{6}i}{16} & 0 & -\frac{\sqrt{6}}{16} & \frac{i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{48} & 0 & \frac{\sqrt{10}}{48} & 0 & 0 \\ -\frac{\sqrt{6}i}{16} & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & -\frac{i}{6} & 0 & 0 & -\frac{\sqrt{10}i}{48} & 0 & -\frac{\sqrt{10}}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 351 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}i}{32} & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & -\frac{11\sqrt{6}i}{96} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & -\frac{11\sqrt{6}i}{96} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{32} & 0 & 0 & \frac{\sqrt{15}i}{48} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 & \frac{i}{16} & 0 \\ \frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{48} & 0 & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 & 0 & 0 & -\frac{i}{16} \\ 0 & 0 & -\frac{3\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & -\frac{\sqrt{6}i}{96} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{10}i}{32} & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 \end{bmatrix}$ |
| 352 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{3,2}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}}{32} & -\frac{\sqrt{15}i}{48} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{96} & \frac{i}{16} & 0 \\ 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 & \frac{\sqrt{15}i}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{96} & 0 & 0 & -\frac{i}{16} \\ 0 & \frac{\sqrt{10}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & -\frac{11\sqrt{6}}{96} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{10}}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & \frac{11\sqrt{6}}{96} & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & -\frac{\sqrt{6}i}{96} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 353 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $\mathbb{G}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{6}}{96} & \frac{7i}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{24} & 0 & \frac{5\sqrt{10}}{96} & \frac{\sqrt{15}i}{48} & 0 \\ -\frac{\sqrt{6}i}{24} & 0 & \frac{\sqrt{6}}{96} & 0 & 0 & -\frac{7i}{48} & 0 & 0 & -\frac{\sqrt{10}i}{24} & 0 & -\frac{5\sqrt{10}}{96} & 0 & 0 & -\frac{\sqrt{15}i}{48} \\ 0 & \frac{\sqrt{6}}{96} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & -\frac{i}{24} & 0 & 0 & -\frac{7\sqrt{10}}{96} & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 \\ -\frac{\sqrt{6}}{96} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & \frac{i}{24} & \frac{7\sqrt{10}}{96} & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 & 0 \\ -\frac{3\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & \frac{i}{6} & 0 & \frac{1}{24} & -\frac{\sqrt{10}i}{96} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{6}i}{32} & 0 & 0 & \frac{i}{6} & 0 & -\frac{1}{24} & 0 & 0 & \frac{\sqrt{10}i}{96} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 354 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $\mathbb{G}_{3,2}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 & \frac{i}{24} & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & \frac{7\sqrt{10}i}{96} & 0 & 0 \\ \frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{6}i}{96} & 0 & 0 & 0 & 0 & -\frac{i}{24} & \frac{\sqrt{10}}{24} & 0 & \frac{7\sqrt{10}i}{96} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{96} & 0 & -\frac{\sqrt{6}}{24} & \frac{7i}{48} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{10}i}{96} & 0 & \frac{\sqrt{10}}{24} & -\frac{\sqrt{15}i}{48} & 0 \\ -\frac{\sqrt{6}i}{96} & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & -\frac{7i}{48} & 0 & 0 & -\frac{5\sqrt{10}i}{96} & 0 & -\frac{\sqrt{10}}{24} & 0 & 0 & \frac{\sqrt{15}i}{48} \\ 0 & 0 & -\frac{3\sqrt{6}i}{32} & 0 & 0 & \frac{1}{6} & 0 & -\frac{i}{24} & 0 & 0 & \frac{\sqrt{10}i}{96} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{6}i}{32} & -\frac{1}{6} & 0 & -\frac{i}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{96} & 0 & 0 \end{bmatrix}$ |
| 355 | symmetry | z |
| | $\mathbb{G}_1^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{14}}{28} & \frac{\sqrt{35}i}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{35}i}{35} & 0 & 0 & -\frac{\sqrt{210}i}{140} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{35}i}{35} & 0 & 0 & -\frac{\sqrt{210}i}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{35} & \frac{\sqrt{210}}{140} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{35} & 0 & \frac{\sqrt{35}}{35} & \frac{\sqrt{210}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{35} & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 & -\frac{\sqrt{210}i}{70} \end{bmatrix}$ |
| 356 | symmetry | y |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & -\frac{\sqrt{35}}{140} & 0 & -\frac{\sqrt{35}i}{140} & 0 & 0 \\ \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & \frac{\sqrt{35}}{140} & 0 & -\frac{\sqrt{35}i}{140} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{21}}{28} & -\frac{\sqrt{14}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{140} & 0 & -\frac{3\sqrt{35}}{140} & -\frac{\sqrt{210}i}{140} & 0 \\ -\frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & -\frac{\sqrt{35}i}{140} & 0 & \frac{3\sqrt{35}}{140} & 0 & 0 & \frac{\sqrt{210}i}{140} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{35}i}{35} & 0 & 0 & -\frac{\sqrt{210}}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{35} & \frac{\sqrt{210}}{140} & 0 \end{bmatrix}$ |
| 357 | symmetry | x |
| | $\mathbb{G}_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & \frac{\sqrt{14}i}{28} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{35}i}{140} & 0 & -\frac{\sqrt{35}}{140} & -\frac{\sqrt{210}i}{140} & 0 \\ \frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & -\frac{3\sqrt{35}i}{140} & 0 & \frac{\sqrt{35}}{140} & 0 & 0 & \frac{\sqrt{210}i}{140} \\ 0 & -\frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & -\frac{\sqrt{35}}{140} & 0 & -\frac{\sqrt{35}i}{140} & 0 & 0 \\ \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & \frac{\sqrt{35}}{140} & 0 & -\frac{\sqrt{35}i}{140} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{14}}{28} & \frac{\sqrt{35}i}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{35}i}{35} & 0 & 0 & -\frac{\sqrt{210}i}{140} & 0 \end{bmatrix}$ |
| 358 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{G}_3^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{168} & 0 & -\frac{\sqrt{105}}{168} & -\frac{\sqrt{42}i}{42} & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}i}{84} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{168} & 0 & \frac{\sqrt{105}}{168} & 0 & 0 & \frac{\sqrt{42}i}{42} & 0 & 0 & \frac{5\sqrt{7}i}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{168} & 0 & -\frac{\sqrt{105}i}{168} & 0 & 0 & -\frac{\sqrt{42}i}{42} & 0 & 0 & \frac{5\sqrt{7}}{84} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{168} & 0 & -\frac{\sqrt{105}i}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{42} & -\frac{5\sqrt{7}}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}i}{168} & 0 & \frac{5\sqrt{42}}{168} & \frac{2\sqrt{7}i}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}i}{168} & 0 & -\frac{5\sqrt{42}}{168} & 0 & 0 & -\frac{2\sqrt{7}i}{21} \end{bmatrix}$ |
| 359 | symmetry | $\sqrt{15}xyz$ |
| | $\mathbb{G}_3^{(1,1;a)}(B,1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{42}i}{168} & 0 & 0 & -\frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{70}i}{56} & 0 & 0 & -\frac{\sqrt{105}}{168} \\ 0 & 0 & 0 & \frac{\sqrt{42}i}{168} & \frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{56} & \frac{\sqrt{105}}{168} & 0 \\ \frac{\sqrt{42}i}{168} & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & \frac{\sqrt{70}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{168} \\ 0 & -\frac{\sqrt{42}i}{168} & 0 & 0 & \frac{3\sqrt{7}i}{56} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{70}i}{56} & 0 & 0 & -\frac{\sqrt{105}i}{168} & 0 \\ 0 & -\frac{\sqrt{42}}{48} & 0 & \frac{\sqrt{42}i}{48} & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{70}i}{112} & 0 & 0 \\ \frac{\sqrt{42}}{48} & 0 & \frac{\sqrt{42}i}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{70}i}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 360 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|-----------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|
| | $\mathbb{G}_3^{(1,1;a)}(B, 2)$ | $-\frac{\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | $\frac{3\sqrt{7}}{56}$ | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ |
| | | 0 | $\frac{\sqrt{42i}}{168}$ | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ |
| | | 0 | 0 | $-\frac{\sqrt{42i}}{168}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{105}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42i}}{168}$ | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{56}$ | $-\frac{\sqrt{105}}{168}$ |
| | | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | $\frac{\sqrt{42}}{48}$ | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 |
| | | $\frac{\sqrt{42i}}{48}$ | 0 | $-\frac{\sqrt{42}}{48}$ | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 |
| 361 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_{3,1}^{(1,1;a)}(E, 1)$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{13\sqrt{70i}}{672}$ | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42i}}{672}$ |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{13\sqrt{70i}}{672}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | $-\frac{\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42i}}{672}$ | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{70i}}{224}$ | 0 | $-\frac{\sqrt{70}}{42}$ | $-\frac{5\sqrt{105i}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42i}}{672}$ | 0 | $-\frac{\sqrt{42}}{42}$ | $-\frac{5\sqrt{7i}}{112}$ |
| | | $-\frac{5\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | $\frac{5\sqrt{105i}}{336}$ | 0 | 0 | $-\frac{5\sqrt{42i}}{672}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | $\frac{5\sqrt{7i}}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{70i}}{96}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $-\frac{5\sqrt{42i}}{224}$ | 0 | $\frac{\sqrt{7}}{28}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70i}}{96}$ | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42i}}{224}$ | $-\frac{\sqrt{7}}{28}$ |
| 362 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_{3,2}^{(1,1;a)}(E, 1)$ | 0 | $\frac{\sqrt{70i}}{42}$ | 0 | $\frac{5\sqrt{70}}{224}$ | $\frac{5\sqrt{105i}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ | 0 | $-\frac{5\sqrt{42}}{672}$ | $-\frac{5\sqrt{7i}}{112}$ |
| | | $\frac{\sqrt{70i}}{42}$ | 0 | $-\frac{5\sqrt{70}}{224}$ | 0 | 0 | $-\frac{5\sqrt{105i}}{336}$ | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ | 0 | $\frac{5\sqrt{42}}{672}$ | 0 | $\frac{5\sqrt{7i}}{112}$ |
| | | 0 | $\frac{13\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $-\frac{5\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42i}}{168}$ | 0 |
| | | $-\frac{13\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | $\frac{5\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42i}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{70i}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | $-\frac{5\sqrt{42i}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{7i}}{28}$ |
| | | 0 | $-\frac{\sqrt{70i}}{96}$ | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{5\sqrt{42i}}{224}$ | 0 | 0 | $\frac{\sqrt{7i}}{28}$ |
| 363 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_{3,1}^{(1,1;a)}(E, 2)$ | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $-\frac{11\sqrt{42}}{672}$ | $-\frac{\sqrt{7i}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{3\sqrt{70}}{224}$ | $-\frac{5\sqrt{105i}}{336}$ |
| | | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{11\sqrt{42}}{672}$ | 0 | 0 | $\frac{\sqrt{7i}}{112}$ | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | $\frac{5\sqrt{105i}}{336}$ |
| | | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42i}}{42}$ | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 |
| | | $\frac{17\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42i}}{42}$ | 0 | 0 | 0 | $-\frac{3\sqrt{7i}}{56}$ | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42i}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | $-\frac{5\sqrt{70i}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{105i}}{84}$ |
| | | 0 | $\frac{\sqrt{42i}}{96}$ | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{5\sqrt{70i}}{224}$ | 0 | 0 | $\frac{\sqrt{105i}}{84}$ |
| 364 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------|-------------------------|--------------------------|-------------------------|---------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|
| | $\mathbb{G}_{3,2}^{(1,1;a)}(E, 2)$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | $-\frac{17\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{224}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{42}$ | 0 | $-\frac{17\sqrt{42}i}{672}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{3\sqrt{70}i}{224}$ | 0 | 0 |
| | | 0 | $-\frac{11\sqrt{42}i}{672}$ | 0 | $-\frac{\sqrt{42}}{56}$ | $-\frac{\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{224}$ | 0 | $\frac{\sqrt{70}}{56}$ | $\frac{5\sqrt{105}i}{336}$ |
| | | $-\frac{11\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{112}$ | 0 | 0 | $\frac{3\sqrt{70}i}{224}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{5\sqrt{105}i}{336}$ |
| | | 0 | 0 | $-\frac{\sqrt{42}i}{96}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{5\sqrt{70}i}{224}$ | 0 | $-\frac{\sqrt{105}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{96}$ | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{70}i}{224}$ | $\frac{\sqrt{105}}{84}$ |
| 365 | symmetry | $-x^2 - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | |
| | $\mathbb{T}_2^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} \end{bmatrix}$ | | | | | | | | | | | | |
| 366 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{T}_2^{(a)}(B, 1)$ | $\begin{bmatrix} \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{84} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{84} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | | | | |
| 367 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | |
| | $\mathbb{T}_2^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 \\ -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ | | | | | | | | | | | | |
| 368 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{2,1}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7i}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7i}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{21} & 0 & 0 \end{bmatrix}$ |
| 369 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{T}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7i}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7i}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{21} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 370 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ |
| | $\mathbb{T}_4^{(a)}(A, 1)$ | $\begin{bmatrix} \frac{\sqrt{30i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{30i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3i}}{6} \end{bmatrix}$ |
| 371 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |
| | $\mathbb{T}_4^{(a)}(A, 2)$ | $\begin{bmatrix} -\frac{\sqrt{42i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70i}}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{42i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70i}}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70i}}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42i}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70i}}{56} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105i}}{42} \end{bmatrix}$ |
| 372 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_4^{(a)}(A, 3)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 373 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |
| | $\mathbb{T}_4^{(a)}(B, 1)$ | $\begin{bmatrix} \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 374 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $\mathbb{T}_4^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 \\ \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 375 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |
| | $\mathbb{T}_{4,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 376 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{4,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} \\ 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & 0 & 0 \end{bmatrix}$ |
| 377 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |
| | $\mathbb{T}_{4,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{21}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{21}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{56} \\ 0 & 0 & \frac{\sqrt{14}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{112} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 378 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $\mathbb{T}_{4,2}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{56} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{14}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{112} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{14}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{112} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 379 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |
| | $\mathbb{T}_4^{(1,-1;a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{i}{8} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & \frac{i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{1}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & -\frac{1}{8} \\ 0 & \frac{\sqrt{10}i}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{48} & 0 & \frac{\sqrt{6}}{48} & 0 & 0 \\ -\frac{\sqrt{10}i}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{48} & 0 & \frac{\sqrt{6}}{48} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 380 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_4^{(1,-1;a)}(A,2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{168} & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35}i}{56} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{168} & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & \frac{\sqrt{35}i}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{168} & 0 & -\frac{\sqrt{21}i}{28} & -\frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{168} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 \\ 0 & -\frac{\sqrt{14}i}{16} & 0 & \frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 \\ \frac{\sqrt{14}i}{16} & 0 & \frac{\sqrt{14}}{16} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 & 0 \end{bmatrix}$ |
| 381 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_4^{(1,-1;a)}(A,3)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{1}{8} & 0 & -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{8} & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{8} & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{8} & 0 & \frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{8} & 0 & -\frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 382 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |
| | $\mathbb{T}_4^{(1,-1;a)}(B,1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & \frac{3\sqrt{7}i}{56} & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & \frac{\sqrt{105}i}{56} \\ 0 & 0 & 0 & \frac{\sqrt{42}}{56} & -\frac{3\sqrt{7}i}{56} & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{56} & -\frac{\sqrt{105}i}{56} & 0 \\ \frac{\sqrt{42}}{56} & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{28} & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{56} \\ 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & \frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{105}}{56} & 0 \\ 0 & -\frac{\sqrt{42}i}{112} & 0 & -\frac{\sqrt{42}}{112} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{70}i}{112} & 0 & \frac{\sqrt{70}}{112} & 0 & 0 \\ \frac{\sqrt{42}i}{112} & 0 & -\frac{\sqrt{42}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{70}i}{112} & 0 & \frac{\sqrt{70}}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 383 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |
| | $\mathbb{T}_4^{(1,-1;a)}(B,2)$ | $\begin{bmatrix} -\frac{\sqrt{42}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & -\frac{3\sqrt{7}i}{56} & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{56} \\ 0 & \frac{\sqrt{42}}{56} & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & \frac{3\sqrt{7}i}{56} & 0 & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{105}}{56} & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & \frac{\sqrt{7}i}{28} & 0 & -\frac{3\sqrt{7}}{56} & 0 & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{105}i}{56} \\ 0 & 0 & 0 & \frac{\sqrt{42}}{56} & -\frac{\sqrt{7}i}{28} & 0 & -\frac{3\sqrt{7}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & \frac{\sqrt{105}i}{56} & 0 \\ 0 & -\frac{\sqrt{42}}{112} & 0 & \frac{\sqrt{42}i}{112} & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{112} & 0 & \frac{\sqrt{70}i}{112} & 0 & 0 \\ -\frac{\sqrt{42}}{112} & 0 & -\frac{\sqrt{42}i}{112} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{70}i}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 384 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{4,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{6}}{32} & 0 & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & -\frac{1}{8} & 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{32} & 0 & 0 & -\frac{3}{16} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}}{32} & 0 & 0 & \frac{\sqrt{15}}{16} & 0 \\ \frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & \frac{3}{16} & 0 & 0 & -\frac{3\sqrt{10}}{32} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{16} \\ 0 & 0 & \frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & \frac{1}{8} & 0 & 0 & -\frac{\sqrt{10}}{32} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{32} & 0 & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 \end{bmatrix}$ |
| 385 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |
| | $\mathbb{T}_{4,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{32} & \frac{3}{16} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{10}i}{32} & \frac{\sqrt{15}}{16} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{32} & 0 & 0 & -\frac{3}{16} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}i}{32} & 0 & 0 & -\frac{\sqrt{15}}{16} \\ 0 & -\frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & \frac{1}{8} & 0 & 0 & -\frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{8} & \frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{8} & -\frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & 0 & \frac{\sqrt{10}i}{32} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 386 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |
| | $\mathbb{T}_{4,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{42}}{56} & 0 & -\frac{3\sqrt{42}i}{224} & -\frac{\sqrt{7}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & -\frac{\sqrt{70}i}{224} & \frac{\sqrt{105}}{112} & 0 \\ -\frac{\sqrt{42}}{56} & 0 & \frac{3\sqrt{42}i}{224} & 0 & 0 & \frac{\sqrt{7}}{112} & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & \frac{\sqrt{70}i}{224} & 0 & 0 & -\frac{\sqrt{105}}{112} \\ 0 & \frac{3\sqrt{42}i}{224} & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & \frac{3\sqrt{7}}{56} & 0 & 0 & -\frac{5\sqrt{70}i}{224} & 0 & \frac{\sqrt{70}}{56} & 0 & 0 \\ -\frac{3\sqrt{42}i}{224} & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{56} & \frac{5\sqrt{70}i}{224} & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & 0 \\ \frac{\sqrt{42}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{3\sqrt{7}i}{56} & -\frac{\sqrt{70}}{224} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{42}}{32} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & -\frac{3\sqrt{7}i}{56} & 0 & 0 & \frac{\sqrt{70}}{224} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 387 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |
| | $\mathbb{T}_{4,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{42}i}{56} & 0 & -\frac{3\sqrt{42}i}{224} & 0 & 0 & -\frac{3\sqrt{7}}{56} & 0 & 0 & \frac{\sqrt{70}i}{56} & 0 & -\frac{5\sqrt{70}}{224} & 0 & 0 \\ -\frac{\sqrt{42}i}{56} & 0 & -\frac{3\sqrt{42}i}{224} & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{56} & -\frac{\sqrt{70}i}{56} & 0 & -\frac{5\sqrt{70}}{224} & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{42}i}{224} & 0 & \frac{\sqrt{42}i}{56} & -\frac{\sqrt{7}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{224} & 0 & -\frac{\sqrt{70}i}{56} & -\frac{\sqrt{105}}{112} & 0 \\ \frac{3\sqrt{42}i}{224} & 0 & -\frac{\sqrt{42}i}{56} & 0 & 0 & \frac{\sqrt{7}}{112} & 0 & 0 & -\frac{\sqrt{70}}{224} & 0 & \frac{\sqrt{70}i}{56} & 0 & 0 & \frac{\sqrt{105}}{112} \\ 0 & 0 & \frac{\sqrt{42}}{32} & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{3\sqrt{7}}{56} & 0 & 0 & \frac{\sqrt{70}}{224} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{42}}{32} & \frac{\sqrt{7}i}{14} & 0 & \frac{3\sqrt{7}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{224} & 0 & 0 \end{bmatrix}$ |
| 388 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_2^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{84} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14i}}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{210i}}{84} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14i}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & 0 & \frac{\sqrt{210i}}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{210i}}{84} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21i}}{21} & 0 & \frac{\sqrt{21}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21i}}{21} & 0 & \frac{\sqrt{21}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 389 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & -\frac{\sqrt{70i}}{84} & 0 & \frac{\sqrt{70}}{84} & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & \frac{\sqrt{42i}}{84} \\ 0 & 0 & 0 & \frac{\sqrt{105}}{42} & \frac{\sqrt{70i}}{84} & 0 & \frac{\sqrt{70}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{42} & -\frac{\sqrt{42i}}{84} & 0 \\ \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{70i}}{84} & \frac{\sqrt{7}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{84} \\ 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70i}}{84} & 0 & 0 & -\frac{\sqrt{7}}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{42} & 0 & 0 & -\frac{\sqrt{7i}}{21} & 0 & \frac{\sqrt{7}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{42} & \frac{\sqrt{7i}}{21} & 0 & \frac{\sqrt{7}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 390 | symmetry | $\sqrt{3}xy$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{70i}}{84} & -\frac{\sqrt{7}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} \\ 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70i}}{84} & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & \frac{\sqrt{42}}{84} & 0 \\ 0 & 0 & \frac{\sqrt{105}}{42} & 0 & 0 & \frac{\sqrt{70i}}{84} & 0 & -\frac{\sqrt{70}}{84} & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & \frac{\sqrt{42i}}{84} \\ 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & -\frac{\sqrt{70i}}{84} & 0 & -\frac{\sqrt{70}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{42} & -\frac{\sqrt{42i}}{84} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{21} & 0 & -\frac{\sqrt{7i}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{42} & 0 & 0 & -\frac{\sqrt{7}}{21} & 0 & \frac{\sqrt{7i}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 391 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{105}}{84} & 0 & \frac{\sqrt{105i}}{84} & \frac{\sqrt{70}}{84} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}}{84} & 0 & -\frac{\sqrt{7i}}{84} & -\frac{\sqrt{42}}{84} & 0 \\ -\frac{\sqrt{105}}{84} & 0 & -\frac{\sqrt{105i}}{84} & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & 0 & -\frac{5\sqrt{7}}{84} & 0 & \frac{\sqrt{7i}}{84} & 0 & 0 & \frac{\sqrt{42}}{84} \\ 0 & -\frac{\sqrt{105i}}{84} & 0 & -\frac{\sqrt{105}}{84} & 0 & 0 & \frac{\sqrt{70}}{84} & 0 & 0 & -\frac{\sqrt{7i}}{84} & 0 & -\frac{\sqrt{7}}{12} & 0 & 0 \\ \frac{\sqrt{105i}}{84} & 0 & -\frac{\sqrt{105}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & \frac{\sqrt{7i}}{84} & 0 & -\frac{\sqrt{7}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & \frac{\sqrt{70i}}{84} & \frac{\sqrt{7}}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{70i}}{84} & 0 & 0 & -\frac{\sqrt{7}}{21} & 0 & 0 & -\frac{\sqrt{42}}{28} & 0 \end{bmatrix}$ |
| 392 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|----------------------------|---------------------------|
| | $\mathbb{T}_{2,2}^{(1,0;a)}(E)$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{7}i}{12}$ | 0 | $-\frac{\sqrt{7}}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | $\frac{\sqrt{7}i}{12}$ | 0 | $-\frac{\sqrt{7}}{84}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{84}$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | $\frac{\sqrt{42}}{84}$ | 0 |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{7}}{84}$ | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{7}}{21}$ | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{21}$ | $\frac{\sqrt{42}i}{28}$ | 0 |
| 393 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(A, 1)$ | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ |
| | | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | $\frac{\sqrt{10}}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | $\frac{\sqrt{10}}{16}$ | 0 | 0 | 0 | 0 |
| 394 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(A, 2)$ | 0 | 0 | $\frac{\sqrt{210}}{60}$ | 0 | 0 | $\frac{\sqrt{35}i}{280}$ | 0 | $-\frac{3\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}i}{168}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{60}$ | $-\frac{\sqrt{35}i}{280}$ | 0 | $-\frac{3\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}i}{168}$ | 0 |
| | | $\frac{\sqrt{210}}{60}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{280}$ | 0 | $-\frac{3\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{168}$ |
| | | 0 | $-\frac{\sqrt{210}}{60}$ | 0 | 0 | $-\frac{\sqrt{35}}{280}$ | 0 | $\frac{3\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{168}$ |
| | | 0 | $\frac{\sqrt{210}i}{240}$ | 0 | $-\frac{\sqrt{210}}{240}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}i}{112}$ | 0 | $\frac{5\sqrt{14}}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{240}$ | 0 | $-\frac{\sqrt{210}}{240}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}i}{112}$ | 0 | $\frac{5\sqrt{14}}{112}$ | 0 | 0 | 0 |
| 395 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(A, 3)$ | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | $-\frac{\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{10}$ | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}}{10}$ | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | $\frac{\sqrt{15}i}{40}$ | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 396 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_4^{(1,0;a)}(B, 1)$ | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105i}}{56}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{280}$ | $\frac{\sqrt{105i}}{56}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $-\frac{3\sqrt{7}i}{56}$ | 0 |
| | | $\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | $\frac{\sqrt{105i}}{140}$ | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | $-\frac{\sqrt{105i}}{140}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{80}$ | 0 | $-\frac{\sqrt{70}}{80}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{80}$ | 0 | $-\frac{\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $-\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | 0 | 0 |
| 397 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(B, 2)$ | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105i}}{56}$ | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105i}}{56}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | $\frac{\sqrt{105i}}{140}$ | 0 | $\frac{\sqrt{105}}{56}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{280}$ | $-\frac{\sqrt{105i}}{140}$ | 0 | $\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{3\sqrt{7}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{70}}{80}$ | 0 | $\frac{\sqrt{70}i}{80}$ | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{80}$ | 0 | $-\frac{\sqrt{70}i}{80}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $\frac{3\sqrt{42}i}{112}$ | 0 | 0 | 0 |
| 398 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{4,1}^{(1,0;a)}(E, 1)$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | $\frac{\sqrt{6}i}{8}$ | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 |
| | | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | $-\frac{\sqrt{6}i}{8}$ | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | $-\frac{1}{16}$ | 0 |
| | | $-\frac{\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{80}$ | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | $\frac{1}{16}$ |
| | | 0 | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | $-\frac{i}{4}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{160}$ | $-\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | $\frac{i}{4}$ | 0 |
| 399 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{4,2}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{160}$ | $-\frac{\sqrt{15}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | $-\frac{1}{16}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $\frac{1}{16}$ |
| | | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{\sqrt{6}}{8}$ | 0 | 0 |
| | | $\frac{3\sqrt{10}i}{160}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | $\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{\sqrt{6}}{8}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $-\frac{\sqrt{15}i}{40}$ | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | $\frac{1}{4}$ |
| | | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | $\frac{1}{4}$ | 0 |
| 400 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|----------------------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|-------------------------|
| | $\mathbb{T}_{4,1}^{(1,0;a)}(E, 2)$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $\frac{19\sqrt{70}i}{1120}$ | $\frac{11\sqrt{105}}{560}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{5\sqrt{42}i}{224}$ | $-\frac{\sqrt{7}}{112}$ | 0 | |
| | | $-\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{19\sqrt{70}i}{1120}$ | 0 | 0 | $-\frac{11\sqrt{105}}{560}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{5\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{7}}{112}$ | |
| | | 0 | $\frac{9\sqrt{70}i}{1120}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $-\frac{5\sqrt{42}i}{224}$ | 0 | 0 | 0 | |
| | | $-\frac{9\sqrt{70}i}{1120}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{56}$ | $\frac{5\sqrt{42}i}{224}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{70}}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{56}$ | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | |
| | | 0 | $-\frac{3\sqrt{70}}{160}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{56}$ | 0 | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | |
| 401 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{4,2}^{(1,0;a)}(E, 2)$ | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | $-\frac{9\sqrt{70}}{1120}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{70}$ | 0 | $-\frac{9\sqrt{70}}{1120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{19\sqrt{70}}{1120}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | $\frac{11\sqrt{105}}{560}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | $\frac{\sqrt{7}}{112}$ | 0 |
| | | $-\frac{19\sqrt{70}}{1120}$ | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{11\sqrt{105}}{560}$ | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{112}$ |
| | | 0 | 0 | $\frac{3\sqrt{70}}{160}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{160}$ | $-\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | $-\frac{\sqrt{7}i}{28}$ | 0 |
| 402 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |
| | $\mathbb{T}_2^{(1,1;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 403 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_2^{(1,1;a)}(B, 1)$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | $-\frac{\sqrt{21}i}{84}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{56}$ | 0 | $-\frac{\sqrt{210}}{56}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{56}$ | 0 | $-\frac{\sqrt{210}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | $\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 |
| 404 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_2^{(1,1;a)}(B, 2)$ | $\begin{bmatrix} -\frac{\sqrt{210}}{168} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{84} & 0 & \frac{\sqrt{35}i}{42} & -\frac{5\sqrt{14}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{84} \\ 0 & \frac{\sqrt{210}}{168} & 0 & 0 & -\frac{\sqrt{35}}{84} & 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 & \frac{\sqrt{21}}{84} & 0 \\ 0 & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & \frac{\sqrt{35}i}{84} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 & \frac{\sqrt{21}i}{84} \\ 0 & 0 & 0 & \frac{\sqrt{210}}{168} & -\frac{\sqrt{35}i}{84} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & -\frac{5\sqrt{14}}{168} & -\frac{\sqrt{21}i}{84} & 0 & 0 \\ 0 & \frac{\sqrt{210}}{56} & 0 & -\frac{\sqrt{210}i}{56} & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{168} & 0 & -\frac{\sqrt{14}i}{168} & 0 & 0 \\ \frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{210}i}{56} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{14}}{168} & 0 & \frac{\sqrt{14}i}{168} & 0 & 0 & 0 \end{bmatrix}$ |
| 405 | symmetry | $\sqrt{3}yz$ |
| | $\mathbb{T}_{2,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}}{168} & 0 & \frac{\sqrt{210}i}{168} & -\frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{168} & 0 & \frac{11\sqrt{14}i}{168} & -\frac{\sqrt{21}}{21} & 0 \\ -\frac{\sqrt{210}}{168} & 0 & -\frac{\sqrt{210}i}{168} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & -\frac{5\sqrt{14}}{168} & 0 & -\frac{11\sqrt{14}i}{168} & 0 & 0 & \frac{\sqrt{21}}{21} \\ 0 & -\frac{\sqrt{210}i}{168} & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{14}i}{168} & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 \\ \frac{\sqrt{210}i}{168} & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & \frac{\sqrt{14}i}{168} & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{42} & \frac{\sqrt{14}}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & -\frac{\sqrt{14}}{42} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 406 | symmetry | $\sqrt{3}xz$ |
| | $\mathbb{T}_{2,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{210}i}{168} & 0 & \frac{\sqrt{210}}{168} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{5\sqrt{14}i}{168} & 0 & -\frac{\sqrt{14}}{168} & 0 & 0 \\ -\frac{\sqrt{210}i}{168} & 0 & \frac{\sqrt{210}}{168} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & -\frac{5\sqrt{14}i}{168} & 0 & -\frac{\sqrt{14}}{168} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{210}}{168} & 0 & \frac{\sqrt{210}i}{168} & -\frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & \frac{11\sqrt{14}}{168} & 0 & -\frac{5\sqrt{14}i}{168} & \frac{\sqrt{21}}{21} & 0 \\ -\frac{\sqrt{210}}{168} & 0 & -\frac{\sqrt{210}i}{168} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{11\sqrt{14}}{168} & 0 & \frac{5\sqrt{14}i}{168} & 0 & 0 & -\frac{\sqrt{21}}{21} \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{14}}{42} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{42} & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{42} & 0 & 0 \end{bmatrix}$ |
| 407 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $\mathbb{M}_3^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 408 | symmetry | $\sqrt{15}xyz$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_3^{(a)}(B, 1)$ | $\begin{bmatrix} \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 409 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $M_3^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 \\ \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 410 | symmetry | $\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $M_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 \end{bmatrix}$ |
| 411 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $M_{3,2}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{16} & 0 & 0 \end{bmatrix}$ |
| 412 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & -\frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 \end{bmatrix}$ |
| 413 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |
| | $M_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 414 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $M_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & \frac{\sqrt{21}i}{42} & \frac{\sqrt{210}}{70} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{70} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & -\frac{\sqrt{210}}{70} & 0 & 0 & \frac{\sqrt{35}}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & \frac{\sqrt{210}}{70} & 0 & 0 & -\frac{\sqrt{35}i}{70} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{42} & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{70} & \frac{\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{105} & 0 & \frac{\sqrt{210}i}{105} & \frac{3\sqrt{35}}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{105} & 0 & -\frac{\sqrt{210}i}{105} & 0 & 0 & -\frac{3\sqrt{35}}{70} \end{bmatrix}$ |
| 415 | symmetry | $\sqrt{15}xyz$ |
| | $M_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{14}}{84} & 0 & 0 & \frac{\sqrt{21}i}{42} \\ 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & \frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{84} & -\frac{\sqrt{21}i}{42} & 0 \\ -\frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{42} & -\frac{\sqrt{14}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} \\ 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & \frac{\sqrt{14}}{84} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & -\frac{\sqrt{14}i}{21} & 0 & \frac{\sqrt{14}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & \frac{\sqrt{14}i}{21} & 0 & \frac{\sqrt{14}}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 416 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_3^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{210}}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{35}i}{42} & -\frac{\sqrt{14}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{42} \\ 0 & -\frac{\sqrt{210}}{84} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{35}i}{42} & 0 & 0 & \frac{\sqrt{14}}{84} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 \\ 0 & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & -\frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14}}{84} & 0 & 0 & -\frac{\sqrt{21}i}{42} \\ 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & \frac{\sqrt{35}i}{42} & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & -\frac{\sqrt{14}}{84} & \frac{\sqrt{21}i}{42} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{21} & 0 & \frac{\sqrt{14}i}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14}}{21} & 0 & -\frac{\sqrt{14}i}{21} & 0 & 0 & 0 \end{bmatrix}$ |
| 417 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $M_{3,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{14}i}{56} & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & \frac{\sqrt{210}i}{280} & 0 & \frac{\sqrt{210}}{420} & 0 & 0 \\ -\frac{3\sqrt{14}i}{56} & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} & -\frac{\sqrt{210}i}{280} & 0 & \frac{\sqrt{210}}{420} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}}{28} & 0 & \frac{3\sqrt{14}i}{56} & \frac{\sqrt{21}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{420} & 0 & \frac{3\sqrt{210}i}{280} & \frac{\sqrt{35}}{70} & 0 \\ \frac{\sqrt{14}}{28} & 0 & -\frac{3\sqrt{14}i}{56} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & \frac{\sqrt{210}}{420} & 0 & -\frac{3\sqrt{210}i}{280} & 0 & 0 & -\frac{\sqrt{35}}{70} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & -\frac{\sqrt{210}}{105} & 0 & 0 & \frac{3\sqrt{35}i}{140} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{105} & -\frac{3\sqrt{35}i}{140} & 0 \end{bmatrix}$ |
| 418 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |
| | $M_{3,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{3\sqrt{14}}{56} & 0 & \frac{\sqrt{14}i}{28} & -\frac{\sqrt{21}}{42} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{210}}{280} & 0 & -\frac{\sqrt{210}i}{420} & \frac{\sqrt{35}}{70} & 0 \\ \frac{3\sqrt{14}}{56} & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & -\frac{3\sqrt{210}}{280} & 0 & \frac{\sqrt{210}i}{420} & 0 & 0 & -\frac{\sqrt{35}}{70} \\ 0 & -\frac{\sqrt{14}i}{28} & 0 & \frac{3\sqrt{14}}{56} & 0 & 0 & -\frac{\sqrt{21}}{42} & 0 & 0 & -\frac{\sqrt{210}i}{420} & 0 & -\frac{\sqrt{210}}{280} & 0 & 0 \\ \frac{\sqrt{14}i}{28} & 0 & \frac{3\sqrt{14}}{56} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} & \frac{\sqrt{210}i}{420} & 0 & -\frac{\sqrt{210}}{280} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{42} & -\frac{\sqrt{210}}{105} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{35}}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & \frac{\sqrt{210}}{105} & 0 & 0 & -\frac{3\sqrt{35}}{140} & 0 \end{bmatrix}$ |
| 419 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |
| | $M_{3,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}}{168} & 0 & -\frac{\sqrt{210}i}{84} & -\frac{\sqrt{35}}{42} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{168} & 0 & \frac{\sqrt{14}i}{84} & \frac{\sqrt{21}}{42} & 0 \\ -\frac{\sqrt{210}}{168} & 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & \frac{\sqrt{35}}{42} & 0 & 0 & -\frac{5\sqrt{14}}{168} & 0 & -\frac{\sqrt{14}i}{84} & 0 & 0 & -\frac{\sqrt{21}}{42} \\ 0 & \frac{\sqrt{210}i}{84} & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & -\frac{\sqrt{35}}{42} & 0 & 0 & \frac{\sqrt{14}i}{84} & 0 & -\frac{\sqrt{14}}{24} & 0 & 0 \\ -\frac{\sqrt{210}i}{84} & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{42} & -\frac{\sqrt{14}i}{84} & 0 & -\frac{\sqrt{14}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{84} & 0 & -\frac{\sqrt{35}i}{42} & -\frac{\sqrt{14}}{21} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{84} & 0 & \frac{\sqrt{35}i}{42} & 0 & 0 & \frac{\sqrt{14}}{21} & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 \end{bmatrix}$ |
| 420 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|------------------------------------------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|-------------------------|--------------------------|
| | $M_{3,2}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | $\frac{\sqrt{14}i}{24}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | $\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{21}$ | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{21}$ | $\frac{\sqrt{21}i}{28}$ | 0 |
| 421 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $M_5^{(1,-1;a)}(A, 1)$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | $\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 422 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | | |
| | $M_5^{(1,-1;a)}(A, 2)$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21}i}{84}$ | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{84}$ | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{84}$ | $\frac{\sqrt{35}}{21}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | $-\frac{\sqrt{35}}{21}$ | 0 |
| 423 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | |
| | $M_5^{(1,-1;a)}(A, 3)$ | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | $-\frac{\sqrt{15}i}{20}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 424 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_5^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & -\frac{\sqrt{3}i}{12} & 0 \\ -\frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & \frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 \\ 0 & \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 \\ -\frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 \end{bmatrix}$ |
| 425 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |
| | $M_5^{(1,-1;a)}(B, 2)$ | $\begin{bmatrix} -\frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} \\ 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{120} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & -\frac{\sqrt{3}i}{12} & 0 \\ 0 & -\frac{\sqrt{30}}{120} & 0 & \frac{\sqrt{30}i}{120} & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 \\ -\frac{\sqrt{30}}{120} & 0 & -\frac{\sqrt{30}i}{120} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & 0 \end{bmatrix}$ |
| 426 | symmetry | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |
| | $M_{5,1}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & -\frac{5\sqrt{14}i}{112} & 0 & \frac{13\sqrt{14}}{336} & 0 & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & -\frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 \\ \frac{5\sqrt{14}i}{112} & 0 & \frac{13\sqrt{14}}{336} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{84} & \frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{14}}{112} & 0 & \frac{5\sqrt{14}i}{84} & \frac{5\sqrt{21}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{336} & 0 & \frac{\sqrt{210}i}{84} & \frac{\sqrt{35}}{56} & 0 \\ \frac{5\sqrt{14}}{112} & 0 & -\frac{5\sqrt{14}i}{84} & 0 & 0 & -\frac{5\sqrt{21}}{168} & 0 & 0 & \frac{\sqrt{210}}{336} & 0 & -\frac{\sqrt{210}i}{84} & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & 0 & \frac{\sqrt{14}}{48} & 0 & 0 & -\frac{5\sqrt{21}i}{168} & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & \frac{\sqrt{210}}{112} & 0 & 0 & -\frac{\sqrt{35}i}{56} \\ 0 & 0 & 0 & -\frac{\sqrt{14}}{48} & \frac{5\sqrt{21}i}{168} & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & \frac{\sqrt{35}i}{56} & 0 \end{bmatrix}$ |
| 427 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |
| | $M_{5,2}^{(1,-1;a)}(E, 1)$ | $\begin{bmatrix} 0 & \frac{5\sqrt{14}}{84} & 0 & \frac{5\sqrt{14}i}{112} & -\frac{5\sqrt{21}}{168} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{210}i}{336} & \frac{\sqrt{35}}{56} & 0 \\ \frac{5\sqrt{14}}{84} & 0 & -\frac{5\sqrt{14}i}{112} & 0 & 0 & \frac{5\sqrt{21}}{168} & 0 & 0 & -\frac{\sqrt{210}}{84} & 0 & \frac{\sqrt{210}i}{336} & 0 & 0 & -\frac{\sqrt{35}}{56} \\ 0 & \frac{13\sqrt{14}i}{336} & 0 & -\frac{5\sqrt{14}}{112} & 0 & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & -\frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 \\ -\frac{13\sqrt{14}i}{336} & 0 & -\frac{5\sqrt{14}}{112} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{84} & \frac{\sqrt{210}i}{336} & 0 & \frac{\sqrt{210}}{336} & 0 & 0 & 0 \\ -\frac{\sqrt{14}}{48} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{21}}{168} & 0 & -\frac{\sqrt{21}i}{84} & \frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{56} \\ 0 & \frac{\sqrt{14}}{48} & 0 & 0 & -\frac{5\sqrt{21}}{168} & 0 & \frac{\sqrt{21}i}{84} & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & \frac{\sqrt{35}}{56} & 0 \end{bmatrix}$ |
| 428 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{5,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{10}i}{80} & 0 & \frac{3\sqrt{10}}{80} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 \\ \frac{\sqrt{10}i}{80} & 0 & \frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & -\frac{\sqrt{6}i}{16} & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{80} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & \frac{1}{8} & 0 \\ \frac{\sqrt{10}}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & -\frac{1}{8} \\ 0 & 0 & -\frac{3\sqrt{10}}{80} & 0 & 0 & \frac{\sqrt{15}i}{40} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & -\frac{i}{8} \\ 0 & 0 & 0 & \frac{3\sqrt{10}}{80} & -\frac{\sqrt{15}i}{40} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & \frac{i}{8} & 0 \end{bmatrix}$ |
| 429 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |
| | $M_{5,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{10}i}{80} & \frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{16} & \frac{1}{8} & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{80} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & -\frac{1}{8} \\ 0 & \frac{3\sqrt{10}i}{80} & 0 & -\frac{\sqrt{10}}{80} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 \\ -\frac{3\sqrt{10}i}{80} & 0 & -\frac{\sqrt{10}}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & -\frac{\sqrt{6}i}{16} & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 \\ \frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & \frac{\sqrt{15}i}{20} & \frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & \frac{1}{8} \\ 0 & -\frac{3\sqrt{10}}{80} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & \frac{1}{8} & 0 \end{bmatrix}$ |
| 430 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |
| | $M_{5,1}^{(1,-1;a)}(E, 3)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}}{40} & 0 & -\frac{\sqrt{30}i}{30} & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}}{12} & 0 \\ -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} \\ 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}}{12} & 0 \end{bmatrix}$ |
| 431 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |
| | $M_{5,2}^{(1,-1;a)}(E, 3)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{30}i}{40} & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & -\frac{\sqrt{3}}{12} & 0 & 0 \\ \frac{\sqrt{30}}{30} & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & \frac{\sqrt{3}}{12} \\ 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{120} & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & -\frac{\sqrt{3}i}{12} & 0 & 0 \end{bmatrix}$ |
| 432 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix |
|-----|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_3^{(1,0;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & -\frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{24} & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{24} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{6}i}{24} & 0 & 0 & 0 \end{bmatrix}$ |
| 433 | symmetry | $\sqrt{15}xyz$ |
| | $M_3^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & \frac{i}{24} & 0 & -\frac{1}{6} & 0 & 0 & \frac{\sqrt{10}}{24} & 0 & 0 & \frac{\sqrt{15}i}{24} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{24} & -\frac{i}{24} & 0 & -\frac{1}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{24} & -\frac{\sqrt{15}i}{24} & 0 \\ -\frac{\sqrt{6}}{24} & 0 & 0 & 0 & 0 & \frac{1}{24} & 0 & \frac{i}{6} & \frac{\sqrt{10}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} \\ 0 & \frac{\sqrt{6}}{24} & 0 & 0 & \frac{1}{24} & 0 & -\frac{i}{6} & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 \\ 0 & \frac{\sqrt{6}i}{16} & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & -\frac{1}{6} & 0 & 0 & -\frac{\sqrt{10}i}{48} & 0 & \frac{\sqrt{10}}{48} & 0 & 0 \\ -\frac{\sqrt{6}i}{16} & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & \frac{1}{6} & \frac{\sqrt{10}i}{48} & 0 & \frac{\sqrt{10}}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 434 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |
| | $M_3^{(1,0;a)}(B, 2)$ | $\begin{bmatrix} \frac{\sqrt{6}}{24} & 0 & 0 & 0 & 0 & -\frac{1}{6} & 0 & -\frac{i}{24} & \frac{\sqrt{10}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} \\ 0 & -\frac{\sqrt{6}}{24} & 0 & 0 & -\frac{1}{6} & 0 & \frac{i}{24} & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & \frac{i}{6} & 0 & -\frac{1}{24} & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & 0 & -\frac{\sqrt{15}i}{24} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{24} & -\frac{i}{6} & 0 & -\frac{1}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{24} & \frac{\sqrt{15}i}{24} & 0 \\ 0 & \frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & -\frac{1}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{48} & 0 & \frac{\sqrt{10}i}{48} & 0 & 0 \\ \frac{\sqrt{6}}{16} & 0 & \frac{\sqrt{6}i}{16} & 0 & 0 & \frac{1}{6} & 0 & 0 & \frac{\sqrt{10}}{48} & 0 & -\frac{\sqrt{10}i}{48} & 0 & 0 & 0 \end{bmatrix}$ |
| 435 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |
| | $M_{3,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & \frac{11\sqrt{6}}{96} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & 0 & 0 & \frac{11\sqrt{6}}{96} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}}{32} & 0 & 0 & -\frac{\sqrt{15}}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{96} & 0 & 0 & -\frac{1}{16} & 0 \\ -\frac{\sqrt{10}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{48} & 0 & 0 & -\frac{\sqrt{6}}{96} & 0 & 0 & 0 & 0 & \frac{1}{16} \\ 0 & 0 & \frac{3\sqrt{10}}{32} & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & \frac{\sqrt{6}}{96} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{10}}{32} & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{96} & 0 & 0 \end{bmatrix}$ |
| 436 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------|-----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| | $M_{3,2}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | $\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | $-\frac{1}{16}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | $-\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | $\frac{1}{16}$ |
| | | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{11\sqrt{6}i}{96}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $\frac{11\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | $\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 |
| 437 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |
| | $M_{3,1}^{(1,0;a)}(E, 2)$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{96}$ | $-\frac{7}{48}$ | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{5\sqrt{10}i}{96}$ | $-\frac{\sqrt{15}}{48}$ | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | $\frac{7}{48}$ | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{5\sqrt{10}i}{96}$ | 0 | $\frac{\sqrt{15}}{48}$ |
| | | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{1}{24}$ | 0 | 0 | $-\frac{7\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 |
| | | $-\frac{\sqrt{6}i}{96}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | $-\frac{1}{24}$ | $\frac{7\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{1}{6}$ | 0 | $\frac{i}{24}$ | $\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{6}}{32}$ | 0 | 0 | $-\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 |
| 438 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |
| | $M_{3,2}^{(1,0;a)}(E, 2)$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $-\frac{1}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{7\sqrt{10}}{96}$ | 0 |
| | | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | $\frac{1}{24}$ | $\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{7\sqrt{10}}{96}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{96}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | $-\frac{7}{48}$ | 0 | 0 | 0 | $\frac{5\sqrt{10}}{96}$ | 0 | $\frac{\sqrt{10}i}{24}$ | $\frac{\sqrt{15}}{48}$ | 0 |
| | | $\frac{\sqrt{6}}{96}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $\frac{7}{48}$ | 0 | 0 | $\frac{5\sqrt{10}}{96}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{15}}{48}$ |
| | | 0 | 0 | $\frac{3\sqrt{6}}{32}$ | 0 | 0 | $\frac{i}{6}$ | 0 | $\frac{1}{24}$ | 0 | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{6}}{32}$ | $-\frac{i}{6}$ | 0 | $\frac{1}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{96}$ | 0 |
| 439 | symmetry | z | | | | | | | | | | | | |
| | $M_1^{(1,1;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{210}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | $-\frac{\sqrt{210}}{70}$ |
| 440 | symmetry | y | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix |
|-----|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{1,1}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{35}}{140} & 0 & 0 \\ -\frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & -\frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{35}}{140} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & -\frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{140} & 0 & \frac{3\sqrt{35}i}{140} & -\frac{\sqrt{210}}{140} & 0 \\ -\frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{35}}{140} & 0 & -\frac{3\sqrt{35}i}{140} & 0 & 0 & \frac{\sqrt{210}}{140} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{35}}{35} & 0 & 0 & \frac{\sqrt{210}i}{140} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{35} & -\frac{\sqrt{210}i}{140} & 0 \end{bmatrix}$ |
| 441 | symmetry | x |
| | $M_{1,2}^{(1,1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{21}i}{28} & \frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{35}}{140} & 0 & \frac{\sqrt{35}i}{140} & -\frac{\sqrt{210}}{140} & 0 \\ \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & -\frac{3\sqrt{35}}{140} & 0 & -\frac{\sqrt{35}i}{140} & 0 & 0 & \frac{\sqrt{210}}{140} \\ 0 & \frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{35}}{140} & 0 & 0 \\ -\frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & -\frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{35}}{140} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & -\frac{\sqrt{14}i}{28} & \frac{\sqrt{35}}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{140} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 & -\frac{\sqrt{210}}{140} & 0 \end{bmatrix}$ |
| 442 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $M_3^{(1,1;a)}(A)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{168} & 0 & \frac{\sqrt{105}i}{168} & -\frac{\sqrt{42}}{42} & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}}{84} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{168} & 0 & -\frac{\sqrt{105}i}{168} & 0 & 0 & \frac{\sqrt{42}}{42} & 0 & 0 & \frac{5\sqrt{7}}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{168} & 0 & -\frac{\sqrt{105}}{168} & 0 & 0 & -\frac{\sqrt{42}}{42} & 0 & 0 & -\frac{5\sqrt{7}i}{84} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{168} & 0 & -\frac{\sqrt{105}}{168} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{42} & \frac{5\sqrt{7}i}{84} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{168} & 0 & -\frac{5\sqrt{42}i}{168} & \frac{2\sqrt{7}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{168} & 0 & \frac{5\sqrt{42}i}{168} & 0 & 0 & -\frac{2\sqrt{7}}{21} \end{bmatrix}$ |
| 443 | symmetry | $\sqrt{15}xyz$ |
| | $M_3^{(1,1;a)}(B,1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{42}}{168} & 0 & 0 & \frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & \frac{\sqrt{105}i}{168} \\ 0 & 0 & 0 & \frac{\sqrt{42}}{168} & -\frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & -\frac{\sqrt{105}i}{168} & 0 \\ \frac{\sqrt{42}}{168} & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{7}i}{14} & \frac{\sqrt{70}}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{168} \\ 0 & -\frac{\sqrt{42}}{168} & 0 & 0 & \frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{105}}{168} & 0 \\ 0 & \frac{\sqrt{42}i}{48} & 0 & \frac{\sqrt{42}}{48} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{70}i}{112} & 0 & -\frac{\sqrt{70}}{112} & 0 & 0 \\ -\frac{\sqrt{42}i}{48} & 0 & \frac{\sqrt{42}}{48} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & -\frac{\sqrt{70}i}{112} & 0 & -\frac{\sqrt{70}}{112} & 0 & 0 & 0 \end{bmatrix}$ |
| 444 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|-----------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|--|
| | $M_3^{(1,1;a)}(B, 2)$ | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | |
| | | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | |
| | | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}}{168}$ | $\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{105}i}{168}$ | 0 | |
| | | 0 | $\frac{\sqrt{42}}{48}$ | 0 | $-\frac{\sqrt{42}i}{48}$ | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | |
| | | $\frac{\sqrt{42}}{48}$ | 0 | $\frac{\sqrt{42}i}{48}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | |
| 445 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |
| | $M_{3,1}^{(1,1;a)}(E, 1)$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{13\sqrt{70}}{672}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{5\sqrt{42}}{672}$ | 0 | |
| | | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{13\sqrt{70}}{672}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{5\sqrt{42}}{672}$ | 0 | 0 | |
| | | 0 | $-\frac{5\sqrt{70}}{224}$ | 0 | $\frac{\sqrt{70}i}{42}$ | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42}i}{42}$ | $-\frac{5\sqrt{7}}{112}$ | |
| | | $-\frac{5\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{42}$ | 0 | 0 | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | $-\frac{5\sqrt{42}}{672}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | $\frac{5\sqrt{7}}{112}$ | |
| | | 0 | 0 | $-\frac{\sqrt{70}}{96}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{96}$ | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{224}$ | $\frac{\sqrt{7}i}{28}$ | |
| 446 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |
| | $M_{3,2}^{(1,1;a)}(E, 1)$ | 0 | $\frac{\sqrt{70}}{42}$ | 0 | $-\frac{5\sqrt{70}i}{224}$ | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $\frac{5\sqrt{42}i}{672}$ | $-\frac{5\sqrt{7}}{112}$ | |
| | | $\frac{\sqrt{70}}{42}$ | 0 | $\frac{5\sqrt{70}i}{224}$ | 0 | 0 | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $-\frac{5\sqrt{42}i}{672}$ | 0 | $\frac{5\sqrt{7}}{112}$ | |
| | | 0 | $-\frac{13\sqrt{70}i}{672}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{5\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | |
| | | $\frac{13\sqrt{70}i}{672}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | $-\frac{5\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | |
| | | $\frac{\sqrt{70}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | $-\frac{5\sqrt{42}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | |
| | | 0 | $-\frac{\sqrt{70}}{96}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | 0 | $\frac{5\sqrt{42}}{224}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | |
| 447 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $M_{3,1}^{(1,1;a)}(E, 2)$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{11\sqrt{42}i}{672}$ | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{3\sqrt{70}i}{224}$ | $-\frac{5\sqrt{105}}{336}$ | |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{11\sqrt{42}i}{672}$ | 0 | 0 | $\frac{\sqrt{7}}{112}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{3\sqrt{70}i}{224}$ | 0 | $\frac{5\sqrt{105}}{336}$ | |
| | | 0 | $\frac{17\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{3\sqrt{70}i}{224}$ | 0 | 0 | 0 | |
| | | $-\frac{17\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | $-\frac{3\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{42}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | $-\frac{5\sqrt{70}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | |
| | | 0 | $\frac{\sqrt{42}}{96}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{5\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | |
| 448 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 7

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|------------------------|-------------------------|------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|
| $\mathbb{M}_{3,2}^{(1,1;a)}(E, 2)$ | | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{11\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | $\frac{5\sqrt{105}}{336}$ | 0 |
| | | $-\frac{11\sqrt{42}}{672}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{112}$ | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{5\sqrt{105}}{336}$ |
| | | 0 | 0 | $-\frac{\sqrt{42}}{96}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{5\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}}{96}$ | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{70}}{224}$ | $-\frac{\sqrt{105}i}{84}$ | 0 |

bra: = $\langle d_v, \uparrow |, \langle d_v, \downarrow |, \langle d_{xy}, \uparrow |, \langle d_{xy}, \downarrow |, \langle d_{xz}, \uparrow |, \langle d_{xz}, \downarrow |, \langle d_{yz}, \uparrow |, \langle d_{yz}, \downarrow |, \langle d_u, \uparrow |, \langle d_u, \downarrow |$
ket: = $|d_v, \uparrow \rangle, |d_v, \downarrow \rangle, |d_{xy}, \uparrow \rangle, |d_{xy}, \downarrow \rangle, |d_{xz}, \uparrow \rangle, |d_{xz}, \downarrow \rangle, |d_{yz}, \uparrow \rangle, |d_{yz}, \downarrow \rangle, |d_u, \uparrow \rangle, |d_u, \downarrow \rangle$

Table 8: (d,d) block.

| No. | multipole | matrix | | | | | | | | | |
|-----|-------------------------|----------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 449 | symmetry | 1 | | | | | | | | | |
| | $\mathbb{Q}_0^{(a)}(A)$ | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{10}$ |
| 450 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_2^{(a)}(A)$ | $\begin{bmatrix} -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} \end{bmatrix}$ |
| 451 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 \\ -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 452 | symmetry | $\sqrt{3}xy$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_2^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 453 | symmetry | $\begin{array}{c} \sqrt{3}yz \\ \left[\begin{array}{ccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} \\ 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \end{array} \right] \end{array}$ |
| 454 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{2,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 \\ \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 \\ 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} \\ 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 455 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ $\begin{bmatrix} \frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} \end{bmatrix}$ |
| 456 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_4^{(a)}(A, 2)$ | $\begin{bmatrix} -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} \end{bmatrix}$ |
| 457 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 458 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $Q_4^{(a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 \\ -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 459 | symmetry | $-\frac{\sqrt{5xy(x^2+y^2-6z^2)}}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 460 | symmetry | $-\frac{\sqrt{35xz(x-z)(x+z)}}{2}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{4,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 \\ 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 461 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 \\ 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & 0 \end{bmatrix}$ |
| 462 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{4,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 \\ 0 & \frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 \end{bmatrix}$ |
| 463 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 \\ -\frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 \\ 0 & -\frac{3\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} \\ 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 464 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $Q_2^{(1,-1;a)}(A)$ | 0 | 0 | $-\frac{\sqrt{30}i}{15}$ | 0 | 0 | $-\frac{\sqrt{30}}{60}$ | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{30}i}{15}$ | $\frac{\sqrt{30}}{60}$ | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{60}$ | 0 | $-\frac{\sqrt{30}}{60}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{30}i}{15}$ | 0 | 0 | $\frac{\sqrt{30}i}{60}$ | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}}{60}$ | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 | $-\frac{\sqrt{30}i}{30}$ | 0 | 0 | $-\frac{\sqrt{10}}{20}$ |
| | | $-\frac{\sqrt{30}}{60}$ | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{30}$ | $\frac{\sqrt{10}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{30}i}{60}$ | 0 | $\frac{\sqrt{30}}{60}$ | $\frac{\sqrt{30}i}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ |
| | | $\frac{\sqrt{30}i}{60}$ | 0 | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | $-\frac{\sqrt{30}i}{30}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| 465 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | |
| | $Q_2^{(1,-1;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{20}$ |
| | | $-\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{20}$ | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{20}$ | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 |
| 466 | symmetry | $\sqrt{3}xy$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{Q}_2^{(1,-1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{20}$ |
| | | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | $\frac{\sqrt{30}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | $-\frac{\sqrt{30}}{20}$ | 0 | 0 | 0 |
| 467 | symmetry | $\sqrt{3}yz$ | | | | | | | | | |
| | $\mathbb{Q}_{2,1}^{(1,-1;a)}(E)$ | 0 | 0 | 0 | $-\frac{\sqrt{10}}{10}$ | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | $\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 |
| 468 | symmetry | $\sqrt{3}xz$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------------|----------------------------------------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| | $\mathbb{Q}_{2,2}^{(1,-1;a)}(E)$ | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | 0 |
| 469 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 1)$ | 0 | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | $-\frac{\sqrt{15}}{60}$ | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ | $\frac{\sqrt{15}}{60}$ | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | $-\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}}{60}$ | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | $-\frac{\sqrt{15}}{60}$ | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | $\frac{\sqrt{5}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{15}i}{60}$ | 0 | $-\frac{\sqrt{15}}{15}$ | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | $\frac{\sqrt{15}i}{60}$ | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{20}$ | 0 | $-\frac{\sqrt{5}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{20}$ | 0 | $-\frac{\sqrt{5}i}{20}$ | 0 | 0 | 0 |
| 470 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|------------------------|
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 2)$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | $\frac{5\sqrt{21}i}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | $-\frac{5\sqrt{21}}{84}$ | 0 | $\frac{5\sqrt{21}i}{84}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ |
| | | $\frac{5\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{7}}{28}$ | 0 |
| | | 0 | $-\frac{5\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | $-\frac{5\sqrt{21}i}{84}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| 471 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 3)$ | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | $-\frac{1}{4}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | $\frac{1}{4}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{4}$ | 0 | $-\frac{i}{4}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{1}{4}$ | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{i}{4}$ | 0 | $\frac{1}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{i}{4}$ | 0 | $-\frac{1}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{1}{4}$ | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{1}{4}$ | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 472 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|---------------------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_4^{(1,-1;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{21}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ |
| | | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 |
| 473 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{Q}_4^{(1,-1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{21}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ |
| | | $\frac{\sqrt{7}i}{14}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 |
| | | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ |
| | | $-\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 |
| | | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}i}{14}$ | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 |
| 474 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{4,1}^{(1,-1;\alpha)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & \frac{i}{8} & 0 & 0 & -\frac{i}{8} & 0 & 0 & 0 \\ 0 & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & \frac{i}{8} & 0 & 0 \\ 0 & -\frac{i}{8} & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 \\ 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 \\ \frac{i}{8} & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 \\ 0 & -\frac{i}{8} & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 \end{bmatrix}$ |
| 475 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{1}{8} & \frac{i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{8} & 0 & 0 & -\frac{i}{8} & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & \frac{\sqrt{3}}{8} \\ -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & -\frac{\sqrt{3}}{8} & 0 \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & -\frac{\sqrt{3}i}{8} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & \frac{\sqrt{3}i}{8} \\ 0 & 0 & -\frac{i}{4} & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{4} & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & \frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{8} & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 476 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|-------------------------------------|---------------------------------------|--------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_{4,1}^{(1,-1;a)}(E, 2)$ | 0 | 0 | 0 | $-\frac{\sqrt{7}}{56}$ | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ |
| | | 0 | 0 | $\frac{\sqrt{7}}{56}$ | 0 | 0 | $-\frac{5\sqrt{7}i}{56}$ | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | 0 |
| | | 0 | $\frac{\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{3\sqrt{21}}{56}$ |
| | | $-\frac{\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{3\sqrt{21}}{56}$ | 0 |
| | | $-\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $-\frac{\sqrt{21}i}{56}$ | 0 |
| | | 0 | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{21}i}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | $\frac{3\sqrt{21}}{56}$ | $\frac{\sqrt{21}i}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{14}$ | 0 | $-\frac{3\sqrt{21}}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{56}$ | 0 | 0 | 0 | 0 |
| 477 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{Q}_{4,2}^{(1,-1;a)}(E, 2)$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 | 0 | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{14}$ |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{56}$ | $-\frac{\sqrt{21}}{14}$ | 0 |
| | | 0 | $\frac{\sqrt{7}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{21}i}{56}$ |
| | | $\frac{\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{3\sqrt{21}i}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | $-\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{21}i}{56}$ | 0 |
| | | 0 | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{56}$ |
| | | 0 | $-\frac{\sqrt{21}}{14}$ | 0 | $-\frac{3\sqrt{21}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{56}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{21}}{14}$ | 0 | $-\frac{3\sqrt{21}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{56}$ | 0 | 0 |
| 478 | symmetry | 1 | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|-----------------------------|----------------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_0^{(1,1;a)}(A)$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{15}}{30}$ | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | $-\frac{\sqrt{15}}{30}$ | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | $\frac{\sqrt{15}}{30}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | 0 | $\frac{\sqrt{5}}{10}$ |
| | | $\frac{\sqrt{15}}{30}$ | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{30}$ | $-\frac{\sqrt{5}}{10}$ | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | $-\frac{\sqrt{15}}{30}$ | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{10}$ |
| | | $-\frac{\sqrt{15}i}{30}$ | 0 | $\frac{\sqrt{15}}{30}$ | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 |
| 479 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | |
| | $\mathbb{Q}_2^{(1,1;a)}(A)$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | $\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{35}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ |
| | | $-\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{35}$ | $-\frac{\sqrt{35}}{35}$ | 0 |
| | | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | $\frac{\sqrt{105}i}{35}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ |
| | | $\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{35}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| 480 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|--------------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | $\mathbb{Q}_2^{(1,1;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}i}{70}$ | 0 | $-\frac{3\sqrt{35}}{70}$ | $-\frac{\sqrt{105}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}i}{70}$ | 0 | $\frac{3\sqrt{35}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{42}$ |
| | | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{210}$ |
| | | $\frac{\sqrt{35}}{35}$ | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 |
| | | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | $\frac{3\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{210}$ |
| | | $\frac{\sqrt{35}i}{35}$ | 0 | $-\frac{3\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{210}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105}i}{210}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | $\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105}i}{210}$ | 0 | 0 | 0 |
| 481 | symmetry | $\sqrt{3}xy$ | | | | | | | | | |
| | $\mathbb{Q}_2^{(1,1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 | $\frac{3\sqrt{35}}{70}$ | $\frac{\sqrt{105}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 | $-\frac{3\sqrt{35}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{35}i}{70}$ | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{210}$ |
| | | $-\frac{3\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{210}$ | 0 |
| | | 0 | $-\frac{3\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{210}$ |
| | | $\frac{3\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 |
| | | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{210}$ | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | $\frac{\sqrt{105}i}{210}$ | 0 | $\frac{\sqrt{105}}{210}$ | 0 | 0 | 0 |
| 482 | symmetry | $\sqrt{3}yz$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ |
| | | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 |
| | | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{105}}{42}$ |
| | | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | $-\frac{\sqrt{105}}{42}$ | 0 |
| | | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | $\frac{2\sqrt{105}i}{105}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{2\sqrt{105}i}{105}$ |
| | | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | $-\frac{\sqrt{105}}{42}$ | $-\frac{2\sqrt{105}i}{105}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{42}$ | 0 | $\frac{\sqrt{105}}{42}$ | 0 | 0 | $\frac{2\sqrt{105}i}{105}$ | 0 | 0 | 0 | 0 |
| 483 | symmetry | $\sqrt{3}xz$ | | | | | | | | | |
| | $\mathbb{Q}_{2,2}^{(1,1;a)}(E)$ | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{105}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | $-\frac{\sqrt{105}}{42}$ | 0 |
| | | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ |
| | | $\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{2\sqrt{105}i}{105}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{105}i}{105}$ |
| | | 0 | $-\frac{\sqrt{105}}{42}$ | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | $\frac{2\sqrt{105}i}{105}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{105}}{42}$ | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{105}i}{105}$ | 0 | 0 |
| 484 | symmetry | z | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| | $\mathbb{G}_1^{(1,0;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{20}$ |
| | | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | $-\frac{\sqrt{30}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | $\frac{\sqrt{30}}{20}$ | 0 | 0 | 0 |
| 485 | symmetry | y | | | | | | | | | |
| | $\mathbb{G}_{1,1}^{(1,0;a)}(E)$ | 0 | 0 | 0 | $\frac{\sqrt{10}i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | 0 |
| 486 | symmetry | x | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|--------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| | $\mathbb{G}_{1,2}^{(1,0;a)}(E)$ | 0 | 0 | 0 | $-\frac{\sqrt{10}}{10}$ | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | $-\frac{\sqrt{30}i}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{20}$ |
| | | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 |
| 487 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{G}_3^{(1,0;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{10}$ |
| | | $\frac{\sqrt{15}i}{20}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{10}$ | 0 |
| | | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ |
| | | $\frac{\sqrt{15}}{20}$ | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 |
| 488 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_3^{(1,0;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} \\ -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & \frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 489 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 & -\frac{i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & -\frac{i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \\ 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} \\ 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 \end{bmatrix}$ |
| 490 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------------------|----------------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|---------------------------|------------------------|-------------------------|
| | $\mathbb{G}_{3,1}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | $\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{15}i}{40}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{40}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{8}$ |
| | | $-\frac{\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | $-\frac{\sqrt{5}i}{8}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | $\frac{\sqrt{5}i}{40}$ | 0 |
| | | 0 | $\frac{3\sqrt{15}i}{40}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{40}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}i}{8}$ | 0 | 0 | $-\frac{\sqrt{5}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{5}i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{40}$ | 0 | 0 |
| 491 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{G}_{3,2}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | $-\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | $\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | 0 | 0 | $-\frac{\sqrt{5}}{8}$ |
| | | $-\frac{\sqrt{15}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | $\frac{\sqrt{5}}{8}$ | 0 |
| | | $\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ | $\frac{\sqrt{5}i}{40}$ | 0 |
| | | 0 | $-\frac{3\sqrt{15}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | $-\frac{\sqrt{5}i}{40}$ |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{20}$ | $\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}}{8}$ | $-\frac{\sqrt{5}i}{40}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{5}}{8}$ | 0 | 0 | $\frac{\sqrt{5}i}{40}$ | 0 | 0 | 0 | 0 |
| 492 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{3,1}^{(1,0;a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{1}{8} & \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & \frac{1}{8} & 0 & 0 & -\frac{i}{8} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & -\frac{\sqrt{3}}{24} \\ -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & \frac{\sqrt{3}}{24} & 0 \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & \frac{\sqrt{3}i}{24} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & -\frac{\sqrt{3}i}{24} \\ 0 & 0 & \frac{i}{4} & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{4} & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{24} & -\frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{24} & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 493 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{i}{8} & 0 & 0 & \frac{i}{8} & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & -\frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{8} & \frac{\sqrt{3}}{6} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} \\ \frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 \\ 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 \\ -\frac{i}{8} & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 \\ 0 & \frac{i}{8} & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} \\ 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{24} & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{24} & 0 & 0 \end{bmatrix}$ |
| 494 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|--------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_2^{(1,0;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ |
| | | $-\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ |
| | | $-\frac{\sqrt{42}}{28}$ | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 |
| 495 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | |
| | $\mathbb{T}_2^{(1,0;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{42}}{21}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{21}$ |
| | | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ |
| | | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | $\frac{\sqrt{42}i}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ |
| | | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{42}}{21}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{21}$ | $\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 496 | symmetry | $\sqrt{3}xy$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_2^{(1,0;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{42}}{21}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{21}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ |
| | | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | $\frac{\sqrt{42}i}{84}$ | 0 |
| | | $-\frac{\sqrt{42}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{21}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| 497 | symmetry | $\sqrt{3}yz$ | | | | | | | | | |
| | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ |
| | | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | $\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{42}}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{42}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ |
| | | $\frac{\sqrt{42}}{42}$ | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 |
| 498 | symmetry | $\sqrt{3}xz$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{2,2}^{(1,0;a)}(E)$ | $\begin{array}{ccccccccccc} 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{42}i}{42} \\ -\frac{\sqrt{14}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & \frac{\sqrt{42}i}{42} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & -\frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{42} \\ 0 & 0 & -\frac{\sqrt{14}i}{14} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{42}}{42} & 0 \\ 0 & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & 0 \\ \frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & -\frac{\sqrt{14}i}{14} & -\frac{\sqrt{42}}{84} & 0 \\ 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & \frac{\sqrt{42}}{84} \\ 0 & -\frac{\sqrt{42}i}{42} & 0 & -\frac{\sqrt{42}}{42} & 0 & 0 & -\frac{\sqrt{42}}{84} & 0 & 0 & -\frac{\sqrt{14}i}{14} \\ \frac{\sqrt{42}i}{42} & 0 & -\frac{\sqrt{42}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & \frac{\sqrt{14}i}{14} & 0 \end{array}$ |
| 499 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ \frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 \\ 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} \\ \frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 \end{bmatrix}$ |
| 500 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|--------------------------------|----------------------------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|
| | $\mathbb{T}_4^{(1,0;a)}(A, 2)$ | 0 | 0 | $\frac{\sqrt{105}}{30}$ | 0 | 0 | $\frac{\sqrt{105i}}{420}$ | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}}{30}$ | $-\frac{\sqrt{105i}}{420}$ | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{105}}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105i}}{70}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{30}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105i}}{70}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105i}}{420}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{28}$ |
| | | $-\frac{\sqrt{105i}}{420}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 |
| | | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | $-\frac{\sqrt{105i}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ |
| | | $-\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105i}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| 501 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(A, 3)$ | $\frac{\sqrt{5}}{5}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{20}$ | 0 | $-\frac{\sqrt{5i}}{20}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5}}{5}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ | 0 | $\frac{\sqrt{5i}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{5}}{5}$ | 0 | 0 | $-\frac{\sqrt{5i}}{20}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}}{5}$ | $\frac{\sqrt{5i}}{20}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5}}{20}$ | 0 | $-\frac{\sqrt{5i}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{5}}{20}$ | 0 | $\frac{\sqrt{5i}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5i}}{20}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5i}}{20}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 502 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|--------------------------------|---------------------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | $\mathbb{T}_4^{(1,0;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{70}$ | $\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| | | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | $\frac{3\sqrt{105}i}{140}$ |
| | | $\frac{\sqrt{35}i}{28}$ | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | $-\frac{3\sqrt{105}i}{140}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | $\frac{\sqrt{35}i}{70}$ | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ |
| | | $-\frac{\sqrt{35}}{28}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{3\sqrt{105}i}{140}$ | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $-\frac{3\sqrt{105}i}{140}$ | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | 0 | 0 |
| 503 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{T}_4^{(1,0;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{70}$ | $\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{28}$ | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ |
| | | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 |
| | | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{3\sqrt{105}i}{140}$ |
| | | $-\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | $\frac{3\sqrt{105}i}{140}$ | 0 |
| | | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | $-\frac{3\sqrt{105}i}{140}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | $\frac{3\sqrt{105}i}{140}$ | 0 | 0 | 0 |
| 504 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{4,1}^{(1,0;a)}(E, 1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & \frac{\sqrt{5}}{40} & 0 & 0 & \frac{\sqrt{15}i}{20} \\ \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{40} & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} \\ -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 \\ 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & -\frac{\sqrt{5}i}{5} & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 \\ \frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 \\ 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} \\ 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{40} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 & 0 & -\frac{3\sqrt{5}i}{20} \\ -\frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} & \frac{3\sqrt{5}i}{20} & 0 \end{bmatrix}$ |
| 505 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & \frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{5}i}{40} & -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} \\ \frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{5}i}{40} & 0 & 0 & \frac{\sqrt{5}}{40} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 \\ 0 & -\frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}i}{40} \\ \frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & \frac{\sqrt{15}i}{40} & 0 \\ -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & -\frac{\sqrt{15}}{40} & 0 \\ 0 & \frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{15}}{40} \\ 0 & 0 & \frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{5} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{20} & \frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{5}}{5} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{40} & -\frac{\sqrt{15}}{40} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{20} \\ \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{40} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & 0 & \frac{3\sqrt{5}}{20} & 0 \end{bmatrix}$ |
| 506 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------------------|---------------------------------------|----------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|
| | $\mathbb{T}_{4,1}^{(1,0;a)}(E, 2)$ | 0 | $-\frac{3\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{40}$ | $\frac{11\sqrt{35}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | $-\frac{3\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{40}$ | 0 | 0 | $-\frac{11\sqrt{35}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 |
| | | 0 | $\frac{\sqrt{35}i}{40}$ | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ |
| | | $-\frac{\sqrt{35}i}{40}$ | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | $\frac{\sqrt{105}i}{56}$ | 0 |
| | | $\frac{11\sqrt{35}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $-\frac{\sqrt{35}i}{28}$ | $-\frac{\sqrt{105}}{280}$ | 0 |
| | | 0 | $-\frac{11\sqrt{35}}{280}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | $\frac{\sqrt{105}}{280}$ |
| | | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{56}$ | $-\frac{\sqrt{105}}{280}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{140}$ |
| | | $-\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{280}$ | 0 | 0 | $\frac{3\sqrt{35}}{140}$ | 0 |
| 507 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | |
| | $\mathbb{T}_{4,2}^{(1,0;a)}(E, 2)$ | 0 | $-\frac{3\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{40}$ | 0 | 0 | $\frac{11\sqrt{35}}{280}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ |
| | | $\frac{3\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{40}$ | 0 | 0 | 0 | 0 | $-\frac{11\sqrt{35}}{280}$ | $-\frac{\sqrt{105}i}{140}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}}{40}$ | 0 | $\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{56}$ |
| | | $-\frac{\sqrt{35}}{40}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| | | $\frac{11\sqrt{35}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{105}}{280}$ | 0 |
| | | 0 | $-\frac{11\sqrt{35}}{280}$ | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{105}}{280}$ |
| | | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{280}$ | 0 | 0 | $\frac{3\sqrt{35}i}{140}$ |
| | | $-\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{280}$ | $-\frac{3\sqrt{35}i}{140}$ | 0 |
| 508 | symmetry | z | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{1,2}^{(a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 \end{bmatrix}$ |
| 511 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $M_3^{(a)}(A)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 512 | symmetry | $\sqrt{15}xyz$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_3^{(a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 513 | symmetry | $\frac{\sqrt{15z(x-y)(x+y)}}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 514 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{3,1}^{(a)}(E, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 \\ \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 \\ 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} \\ 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 515 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 \\ 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 \end{bmatrix}$ |
| 516 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{3,1}^{(a)}(E, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 \\ 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 \end{bmatrix}$ |
| 517 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 \\ 0 & \frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 518 | symmetry | z |

continued ...

Table 8

| No. | multipole | matrix |
|-----|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{1,2}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 \end{bmatrix}$ |
| 521 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |
| | $M_3^{(1,-1;a)}(A)$ | $\begin{bmatrix} -\frac{\sqrt{105}}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 & -\frac{\sqrt{105}i}{70} & 0 & 0 \\ 0 & \frac{\sqrt{105}}{35} & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 & \frac{\sqrt{105}i}{70} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{105}}{35} & 0 & 0 & \frac{\sqrt{105}i}{70} & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{105}}{35} & -\frac{\sqrt{105}i}{70} & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{105}}{70} & 0 & \frac{\sqrt{105}i}{70} & \frac{\sqrt{105}}{70} & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{70} \\ -\frac{\sqrt{105}}{70} & 0 & -\frac{\sqrt{105}i}{70} & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & -\frac{\sqrt{35}}{70} & 0 \\ 0 & -\frac{\sqrt{105}i}{70} & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & \frac{\sqrt{105}}{70} & 0 & 0 & \frac{\sqrt{35}i}{70} \\ \frac{\sqrt{105}i}{70} & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{70} & -\frac{\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{70} & 0 & \frac{\sqrt{35}i}{70} & \frac{\sqrt{105}}{35} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{70} & 0 & -\frac{\sqrt{35}i}{70} & 0 & 0 & -\frac{\sqrt{105}}{35} \end{bmatrix}$ |
| 522 | symmetry | $\sqrt{15}xyz$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{M}_3^{(1,-1;a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{21}}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}}{21} \\ 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{21}i}{42} \\ \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & \frac{\sqrt{21}i}{42} & 0 \\ 0 & -\frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{14} & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} \\ -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{21}}{42} & 0 \\ 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & -\frac{\sqrt{21}i}{42} & 0 & \frac{\sqrt{21}}{42} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{21} & \frac{\sqrt{21}i}{42} & 0 & \frac{\sqrt{21}}{42} & 0 & 0 & 0 \end{bmatrix}$ |
| 523 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{14} & -\frac{\sqrt{21}}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & \frac{\sqrt{21}}{21} \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{7}i}{14} & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} \\ \frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{21}}{42} & 0 \\ 0 & -\frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & \frac{\sqrt{21}i}{42} \\ \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & -\frac{\sqrt{21}i}{42} & 0 \\ -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{42} & 0 & \frac{\sqrt{21}i}{42} & 0 & 0 \\ 0 & \frac{\sqrt{21}}{21} & 0 & 0 & \frac{\sqrt{21}}{42} & 0 & -\frac{\sqrt{21}i}{42} & 0 & 0 & 0 \end{bmatrix}$ |
| 524 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------|----------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | $M_{3,1}^{(1,-1;a)}(E, 1)$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{35}i}{70}$ |
| | | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $\frac{3\sqrt{35}i}{70}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ |
| | | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{35}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | $-\frac{\sqrt{105}i}{35}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | $-\frac{\sqrt{35}}{70}$ | 0 |
| | | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ |
| | | 0 | $-\frac{3\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ |
| | | $\frac{3\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | $-\frac{\sqrt{105}i}{70}$ | 0 |
| 525 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | |
| | $M_{3,2}^{(1,-1;a)}(E, 1)$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}}{70}$ |
| | | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{35}}{70}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ |
| | | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | $\frac{\sqrt{35}i}{35}$ | 0 |
| | | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | $-\frac{\sqrt{35}}{70}$ | 0 |
| | | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ |
| | | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{\sqrt{105}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | $-\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{\sqrt{105}}{35}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{35}$ | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| | | $-\frac{3\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 |
| 526 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|
| | $M_{3,1}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{21}i}{21}$ |
| | | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | $-\frac{\sqrt{21}i}{21}$ | 0 |
| | | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{\sqrt{7}i}{14}$ | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{21}$ | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| 527 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | |
| | $M_{3,2}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ |
| | | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| 528 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------|------------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| | $M_5^{(1,-1;a)}(A, 1)$ | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | $\frac{\sqrt{5}i}{10}$ | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}i}{10}$ | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{5}}{10}$ | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}}{10}$ | 0 | $-\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 529 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | |
| | $M_5^{(1,-1;a)}(A, 2)$ | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $-\frac{\sqrt{7}i}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}}{42}$ | $\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $-\frac{\sqrt{7}i}{42}$ | $-\frac{2\sqrt{7}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ |
| | | $\frac{\sqrt{7}}{42}$ | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | 0 | $\frac{2\sqrt{7}}{21}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 |
| | | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{2\sqrt{7}}{21}$ | 0 | 0 | $\frac{\sqrt{21}i}{21}$ |
| | | $-\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{7}}{21}$ | $-\frac{\sqrt{21}i}{21}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | $\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{7}}{7}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{7}$ |
| 530 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_5^{(1,-1;a)}(A, 3)$ | $\begin{bmatrix} \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 531 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & -\frac{\sqrt{15}i}{30} & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \end{bmatrix}$ |
| 532 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |

continued ...

Table 8

| No. | multipole | matrix |
|-----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_5^{(1,-1;a)}(B, 2)$ | $\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & \frac{\sqrt{15}i}{30} & \frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \\ -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 \\ 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & -\frac{\sqrt{5}i}{10} & 0 \\ \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 \end{pmatrix}$ |
| 533 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ $\begin{pmatrix} 0 & -\frac{19\sqrt{7}i}{168} & 0 & \frac{\sqrt{7}}{12} & 0 & 0 & \frac{5\sqrt{7}}{84} & 0 & 0 & -\frac{5\sqrt{21}i}{168} \\ \frac{19\sqrt{7}i}{168} & 0 & \frac{\sqrt{7}}{12} & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}}{84} & \frac{5\sqrt{21}i}{168} & 0 \\ 0 & \frac{\sqrt{7}}{12} & 0 & \frac{2\sqrt{7}i}{21} & \frac{\sqrt{7}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{84} \\ \frac{\sqrt{7}}{12} & 0 & -\frac{2\sqrt{7}i}{21} & 0 & 0 & -\frac{\sqrt{7}}{42} & 0 & 0 & \frac{\sqrt{21}}{84} & 0 \\ 0 & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & -\frac{\sqrt{7}i}{42} & 0 & \frac{\sqrt{7}}{42} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{42} & \frac{\sqrt{7}i}{42} & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & 0 \\ \frac{5\sqrt{7}}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & \frac{2\sqrt{7}i}{21} & \frac{\sqrt{21}}{28} & 0 \\ 0 & -\frac{5\sqrt{7}}{84} & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & -\frac{2\sqrt{7}i}{21} & 0 & 0 & -\frac{\sqrt{21}}{28} \\ 0 & -\frac{5\sqrt{21}i}{168} & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & -\frac{3\sqrt{7}i}{56} \\ \frac{5\sqrt{21}i}{168} & 0 & \frac{\sqrt{21}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & \frac{3\sqrt{7}i}{56} & 0 \end{pmatrix}$ |
| 534 | symmetry | $\frac{x(8x^4 - 40x^2y^2 - 40x^2z^2 + 15y^4 + 30y^2z^2 + 15z^4)}{8}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------|---------------------------------------------------|---------------------------|-------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|---------------------------|---------------------------|
| | $M_{5,2}^{(1,-1;a)}(E, 1)$ | 0 | $\frac{19\sqrt{7}}{168}$ | 0 | $\frac{\sqrt{7}i}{12}$ | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}}{168}$ |
| | | $\frac{19\sqrt{7}}{168}$ | 0 | $-\frac{\sqrt{7}i}{12}$ | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | $-\frac{5\sqrt{21}}{168}$ | 0 |
| | | 0 | $\frac{\sqrt{7}i}{12}$ | 0 | $-\frac{2\sqrt{7}}{21}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ |
| | | $-\frac{\sqrt{7}i}{12}$ | 0 | $-\frac{2\sqrt{7}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{42}$ | $\frac{\sqrt{21}i}{84}$ | 0 |
| | | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{7}}{21}$ | 0 | $-\frac{\sqrt{7}i}{42}$ | $\frac{\sqrt{21}}{28}$ | 0 |
| | | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | $-\frac{2\sqrt{7}}{21}$ | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ |
| | | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}}{42}$ | $\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{21}}{168}$ | 0 | $-\frac{\sqrt{21}i}{84}$ | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ |
| | | $-\frac{5\sqrt{21}}{168}$ | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 |
| 535 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | |
| | $M_{5,1}^{(1,-1;a)}(E, 2)$ | 0 | $-\frac{\sqrt{5}i}{40}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | $\frac{\sqrt{5}i}{40}$ | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{20}$ | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{20}$ |
| | | $\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | $-\frac{\sqrt{5}i}{10}$ | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{5}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{5}}{20}$ | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{20}$ |
| | | 0 | $\frac{\sqrt{15}i}{40}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 | 0 | $-\frac{3\sqrt{5}i}{40}$ |
| | | $-\frac{\sqrt{15}i}{40}$ | 0 | $-\frac{\sqrt{15}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{20}$ | $\frac{3\sqrt{5}i}{40}$ | 0 |
| 536 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{5,2}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{5}}{40} & 0 & \frac{\sqrt{5}i}{20} & \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{40} \\ \frac{\sqrt{5}}{40} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 \\ 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}i}{20} \\ -\frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{15}i}{20} & 0 \\ \frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{15}}{20} & 0 \\ 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{15}}{20} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}}{40} & 0 & \frac{\sqrt{15}i}{20} & \frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{40} \\ \frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{3\sqrt{5}}{40} & 0 \end{bmatrix}$ |
| 537 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ $\begin{bmatrix} 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{15}i}{15} & -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{20} \\ -\frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{5}}{20} & 0 \\ 0 & -\frac{\sqrt{15}i}{15} & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}i}{15} & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 \\ 0 & \frac{\sqrt{15}}{30} & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} \\ -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 \end{bmatrix}$ |
| 538 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|
| | $M_{5,2}^{(1,-1;a)}(E, 3)$ | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | $\frac{\sqrt{15}i}{20}$ | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{30}$ | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{15}}{15}$ | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{15}}{15}$ | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | $-\frac{\sqrt{5}}{10}$ | 0 |
| | | 0 | $\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{5}}{10}$ |
| | | 0 | $\frac{\sqrt{5}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{10}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ |
| | | $-\frac{\sqrt{5}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | $-\frac{\sqrt{15}i}{20}$ | 0 |
| 539 | symmetry | z | | | | | | | | | |
| | $M_1^{(1,1;a)}(A)$ | $-\frac{\sqrt{70}}{35}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | $\frac{3\sqrt{70}i}{140}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}}{35}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | $-\frac{3\sqrt{70}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}}{35}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{35}$ | $\frac{3\sqrt{70}i}{140}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | $-\frac{3\sqrt{70}i}{140}$ | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ |
| | | $\frac{3\sqrt{70}}{140}$ | 0 | $\frac{3\sqrt{70}i}{140}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | $\frac{3\sqrt{70}i}{140}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | $-\frac{3\sqrt{70}i}{140}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | $\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | $-\frac{\sqrt{210}i}{140}$ | $\frac{\sqrt{70}}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | 0 | $-\frac{\sqrt{70}}{35}$ |
| 540 | symmetry | y | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | $M_{1,1}^{(1,1;a)}(E)$ | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ |
| | | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | $\frac{\sqrt{210}i}{70}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ |
| | | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{70}i}{35}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | $-\frac{\sqrt{70}i}{35}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | $-\frac{\sqrt{70}i}{70}$ | $\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | 0 | $\frac{\sqrt{70}i}{70}$ |
| | | $\frac{\sqrt{210}i}{70}$ | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | $-\frac{\sqrt{70}i}{70}$ | 0 |
| 541 | symmetry | x | | | | | | | | | |
| | $M_{1,2}^{(1,1;a)}(E)$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ |
| | | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{210}i}{70}$ |
| | | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | $-\frac{\sqrt{210}i}{70}$ | 0 |
| | | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $-\frac{3\sqrt{70}i}{140}$ | $\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $\frac{3\sqrt{70}i}{140}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ | 0 | $-\frac{\sqrt{70}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | $\frac{3\sqrt{70}i}{140}$ | 0 | $-\frac{\sqrt{70}}{35}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 | $\frac{\sqrt{210}i}{70}$ | $\frac{\sqrt{210}i}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ |
| | | $-\frac{\sqrt{210}i}{70}$ | 0 | $-\frac{\sqrt{210}i}{70}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 |
| 542 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|-----------------------|----------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
| | $M_3^{(1,1;a)}(A)$ | $\frac{\sqrt{35}}{105}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35}}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{35}}{105}$ | 0 | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}}{105}$ | $-\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35}i}{84}$ | $-\frac{4\sqrt{35}}{105}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ |
| | | $-\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | 0 | $\frac{4\sqrt{35}}{105}$ | 0 | 0 | $\frac{\sqrt{105}}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{4\sqrt{35}}{105}$ | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ |
| | | $\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $\frac{4\sqrt{35}}{105}$ | $\frac{\sqrt{105}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ | 0 | $-\frac{\sqrt{105}i}{42}$ | $\frac{2\sqrt{35}}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | $-\frac{2\sqrt{35}}{35}$ |
| 543 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | |
| | $M_3^{(1,1;a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | $-\frac{\sqrt{7}i}{28}$ | 0 |
| | | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ |
| | | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| 544 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| | $M_3^{(1,1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}}{21}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ |
| | | $\frac{\sqrt{21}}{21}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ |
| | | $\frac{\sqrt{21}i}{21}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | $\frac{\sqrt{7}i}{28}$ | 0 |
| | | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| 545 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | |
| | $M_{3,1}^{(1,1;a)}(E, 1)$ | 0 | $-\frac{19\sqrt{35}i}{420}$ | 0 | $-\frac{\sqrt{35}}{24}$ | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ |
| | | $\frac{19\sqrt{35}i}{420}$ | 0 | $-\frac{\sqrt{35}}{24}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35}}{168}$ | $\frac{\sqrt{105}i}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}}{24}$ | 0 | $\frac{4\sqrt{35}i}{105}$ | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ |
| | | $-\frac{\sqrt{35}}{24}$ | 0 | $-\frac{4\sqrt{35}i}{105}$ | 0 | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{35}i}{105}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}}{84}$ | $\frac{\sqrt{35}i}{105}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 |
| | | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $\frac{4\sqrt{35}i}{105}$ | $-\frac{\sqrt{105}}{56}$ | 0 |
| | | 0 | $\frac{5\sqrt{35}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $-\frac{4\sqrt{35}i}{105}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ |
| | | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $-\frac{3\sqrt{35}i}{140}$ |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{56}$ | $\frac{3\sqrt{35}i}{140}$ | 0 |
| 546 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------|-----------------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|----------------------------|---------------------------|
| | $M_{3,2}^{(1,1;a)}(E, 1)$ | 0 | $\frac{19\sqrt{35}}{420}$ | 0 | $-\frac{\sqrt{35}i}{24}$ | $\frac{5\sqrt{35}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ |
| | | $\frac{19\sqrt{35}}{420}$ | 0 | $\frac{\sqrt{35}i}{24}$ | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{24}$ | 0 | $-\frac{4\sqrt{35}}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{\sqrt{105}i}{168}$ |
| | | $\frac{\sqrt{35}i}{24}$ | 0 | $-\frac{4\sqrt{35}}{105}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{84}$ | $-\frac{\sqrt{105}i}{168}$ | 0 |
| | | $\frac{5\sqrt{35}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{4\sqrt{35}}{105}$ | 0 | $\frac{\sqrt{35}i}{84}$ | $-\frac{\sqrt{105}}{56}$ | 0 |
| | | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 | $-\frac{4\sqrt{35}}{105}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ |
| | | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | $\frac{\sqrt{35}}{105}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}}{84}$ | $-\frac{\sqrt{35}i}{84}$ | 0 | $\frac{\sqrt{35}}{105}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{140}$ |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ | 0 | 0 | $\frac{3\sqrt{35}}{140}$ | 0 |
| 547 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | |
| | $M_{3,1}^{(1,1;a)}(E, 2)$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{24}$ | $-\frac{\sqrt{21}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{24}$ | 0 | 0 | $\frac{\sqrt{21}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 |
| | | 0 | $\frac{\sqrt{21}i}{24}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ |
| | | $-\frac{\sqrt{21}i}{24}$ | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | $-\frac{3\sqrt{7}i}{56}$ | 0 |
| | | $-\frac{\sqrt{21}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | $\frac{\sqrt{21}i}{28}$ | $-\frac{5\sqrt{7}}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{21}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $\frac{5\sqrt{7}}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | $-\frac{5\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{5\sqrt{7}}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 |
| 548 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | |

continued ...

Table 8

| No. | multipole | matrix | | | | | | | | | |
|-----|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| | $M_{3,2}^{(1,1;a)}(E, 2)$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | 0 | $-\frac{\sqrt{21}}{168}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{168}$ | $-\frac{\sqrt{7}i}{28}$ | 0 |
| | | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | $\frac{\sqrt{21}i}{21}$ | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ |
| | | $-\frac{\sqrt{21}}{24}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{21}$ | $\frac{5\sqrt{7}}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{21}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{5\sqrt{7}}{56}$ |
| | | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{5\sqrt{7}}{56}$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{56}$ | $-\frac{\sqrt{21}i}{28}$ | 0 |

bra: = $\langle d_v, \uparrow |, \langle d_v, \downarrow |, \langle d_{xy}, \uparrow |, \langle d_{xy}, \downarrow |, \langle d_{xz}, \uparrow |, \langle d_{xz}, \downarrow |, \langle d_{yz}, \uparrow |, \langle d_{yz}, \downarrow |, \langle d_u, \uparrow |, \langle d_u, \downarrow |$

ket: = $|f_2, \uparrow \rangle, |f_2, \downarrow \rangle, |f_1, \uparrow \rangle, |f_1, \downarrow \rangle, |f_{bz}, \uparrow \rangle, |f_{bz}, \downarrow \rangle, |f_3, \uparrow \rangle, |f_3, \downarrow \rangle, |f_{3x}, \uparrow \rangle, |f_{3x}, \downarrow \rangle, |f_{3y}, \uparrow \rangle, |f_{3y}, \downarrow \rangle, |f_{az}, \uparrow \rangle, |f_{az}, \downarrow \rangle$

Table 9: (d,f) block.

| No. | multipole | matrix | | | | | | | | | | | |
|-----|----------------|--------|---|---|---|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|------------------------|-------------------------|
| 549 | symmetry | z | | | | | | | | | | | |
| | $Q_1^{(a)}(B)$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{70}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_3^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 \\ -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 553 | symmetry | $\frac{\sqrt{15z(x-y)(x+y)}}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 554 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $Q_3^{(a)}(B)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} \end{bmatrix} $ |
| 555 | symmetry | $ \frac{x(2x^2-3y^2-3z^2)}{2} $ |
| | $Q_{3,1}^{(a)}(E, 1)$ | $ \begin{bmatrix} \frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{11\sqrt{30}}{240} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{11\sqrt{30}}{240} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{240} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{240} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{40} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{40} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{6}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{5\sqrt{6}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 \end{bmatrix} $ |
| 556 | symmetry | $ -\frac{y(3x^2-2y^2+3z^2)}{2} $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-----------------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------|-----------------------|--------------------------|--------------------------|---------------------------|---------------------------|------------------------|------------------------|
| | $Q_{3,2}^{(a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{11\sqrt{30}}{240}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{11\sqrt{30}}{240}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{240}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{240}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{40}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{40}$ |
| | | 0 | 0 | $\frac{5\sqrt{6}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{80}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{6}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{80}$ | 0 | 0 |
| 557 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $Q_{3,1}^{(a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$ |
| | | 0 | 0 | $\frac{\sqrt{10}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 |
| 558 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{24} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{10}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 559 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 \\ -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 560 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_5^{(a)}(A, 2)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 561 | symmetry | $ \frac{3\sqrt{35}xyz(x-y)(x+y)}{2} $ |
| | $\mathbb{Q}_5^{(a)}(B, 1)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 562 | symmetry | $ \frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8} $ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_5^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{84} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{42} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{42} \end{bmatrix}$ |
| 563 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |
| | $\mathbb{Q}_5^{(a)}(B, 3)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 564 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|------------------------|------------------------|----------------------------|----------------------------|---------------------------|--------------------------|------------------------|--|
| | $\mathbb{Q}_{5,1}^{(a)}(E, 1)$ | $\frac{11\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{11\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $-\frac{5\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{21}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{112}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{21}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{112}$ | 0 | 0 | 0 | |
| 565 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,2}^{(a)}(E, 1)$ | 0 | 0 | $\frac{11\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{11\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | |
| | | $\frac{5\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{5\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | |
| | | 0 | 0 | $\frac{\sqrt{21}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{112}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{112}$ | 0 | 0 | |
| 566 | symmetry | $\frac{3\sqrt{35}x(y^2 - 2yz - z^2)(y^2 + 2yz - z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_{5,1}^{(a)}(E, 2)$ | $\begin{bmatrix} \frac{3\sqrt{5}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{5}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{15}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{15}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 567 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ $\begin{bmatrix} 0 & 0 & \frac{3\sqrt{5}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{5}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{16} & 0 & 0 \\ \frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} \\ 0 & 0 & -\frac{3\sqrt{15}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{15}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3}{16} & 0 & 0 \end{bmatrix}$ |
| 568 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|-------------------------------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|---|---|----------------------|-----------------------|-----------------------|------------------------|------------------------|
| | $\mathbb{Q}_{5,1}^{(a)}(E, 3)$ | 0 | 0 | $\frac{7\sqrt{15}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{7\sqrt{15}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 |
| | | $\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ |
| | | 0 | 0 | $-\frac{\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{8}$ | 0 | 0 |
| 569 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,2}^{(a)}(E, 3)$ | $-\frac{7\sqrt{15}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{7\sqrt{15}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{8}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{8}$ | 0 | 0 | 0 |
| 570 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_3^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | $-\frac{\sqrt{42}i}{84}$ | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}i}{84}$ |
| | | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{42}$ |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| 571 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_3^{(1,-1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{84}$ | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{42}i}{84}$ |
| | | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 |
| 572 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|--------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_3^{(1,-1;a)}(B)$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | $\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | $\frac{\sqrt{70}}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 |
| 573 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{3,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | $-\frac{\sqrt{70}}{140}$ | 0 |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ |
| | | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 |
| | | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{280}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | 0 | $\frac{\sqrt{105}}{140}$ | $\frac{\sqrt{70}i}{70}$ | 0 |
| | | $-\frac{3\sqrt{7}i}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{3\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{3\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | 0 |
| 574 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|-----------------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{3,2}^{(1,-1;a)}(E, 1)$ | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 | $\frac{\sqrt{70}i}{140}$ | |
| | | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 | $\frac{\sqrt{70}i}{140}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | $\frac{3\sqrt{70}}{280}$ | 0 |
| | | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}i}{56}$ | $-\frac{\sqrt{70}i}{70}$ | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $-\frac{\sqrt{105}i}{56}$ | 0 | 0 | $\frac{\sqrt{70}i}{70}$ |
| | | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{280}$ | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 |
| | | $-\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{280}$ | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | $\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 |
| 575 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{3,1}^{(1,-1;a)}(E, 2)$ | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | |
| | | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}i}{168}$ | 0 | |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}i}{56}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}i}{56}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | |
| | | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{168}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 |
| 576 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|--------------------------------------------------|---------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{3,2}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}i}{84}$ | 0 |
| | | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 |
| | | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | $\frac{\sqrt{105}i}{168}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| 577 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_5^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | $-\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}i}{40}$ | $-\frac{\sqrt{5}i}{10}$ | 0 |
| | | $\frac{\sqrt{2}i}{40}$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | 0 | $\frac{\sqrt{5}i}{10}$ |
| | | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}i}{40}$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | $\frac{\sqrt{3}i}{20}$ | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{20}$ |
| | | 0 | $\frac{3\sqrt{2}i}{40}$ | 0 | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{2}i}{40}$ | $\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | $\frac{i}{5}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{40}$ | 0 | $\frac{\sqrt{6}i}{40}$ | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| 578 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|------------------------------------------------------------|--------------------------|--------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|-------------------------|
| | $\mathbb{Q}_5^{(1,-1;a)}(A, 2)$ | 0 | $\frac{\sqrt{2}}{40}$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}}{40}$ | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{40}$ | 0 | $\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}}{40}$ | $-\frac{\sqrt{5}i}{10}$ | 0 |
| | | $-\frac{\sqrt{2}i}{40}$ | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | 0 | $\frac{\sqrt{5}i}{10}$ |
| | | 0 | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{2}i}{40}$ | $\frac{\sqrt{3}}{20}$ | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | $\frac{\sqrt{5}}{20}$ | 0 |
| | | $\frac{3\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | $-\frac{\sqrt{3}}{15}$ | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{20}$ |
| | | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}}{15}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{40}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}}{40}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{i}{5}$ | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| 579 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_5^{(1,-1;a)}(B, 1)$ | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{i}{20}$ | 0 | $\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{20}$ | 0 | 0 | $-\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{20}$ | 0 | 0 | $\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{20}$ | $-\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{2}i}{20}$ | 0 | $\frac{3\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{2}i}{20}$ | 0 | $-\frac{3\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 580 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|------------------------------------------------------------|---------------------------|----------------------------|----------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|-------------------------|
| | $\mathbb{Q}_5^{(1,-1;a)}(B, 2)$ | 0 | $\frac{\sqrt{210}}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{42}$ | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $-\frac{\sqrt{14}}{42}$ | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}i}{420}$ | 0 | $\frac{\sqrt{210}}{420}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | $\frac{\sqrt{14}}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{420}$ | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | $\frac{\sqrt{35}i}{60}$ | 0 | 0 | $-\frac{5\sqrt{14}i}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{60}$ | 0 | $\frac{\sqrt{35}i}{60}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}i}{84}$ | $\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{60}$ | 0 | $-\frac{\sqrt{35}}{60}$ | $\frac{5\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{60}$ | 0 | $\frac{\sqrt{35}}{60}$ | 0 | 0 | $-\frac{5\sqrt{14}i}{84}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| 581 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_5^{(1,-1;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{20}$ | 0 | 0 | $\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{20}$ | $-\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{20}$ | 0 | 0 | $\frac{i}{20}$ | 0 | $\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{2}}{20}$ | 0 | $\frac{3\sqrt{2}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{2}}{20}$ | 0 | $\frac{3\sqrt{2}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 582 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|----------------------------------------------------------------------|-------------------------------|------------------------------|------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{5,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | 0 | $\frac{\sqrt{14i}}{336}$ | 0 | 0 | $\frac{\sqrt{21}}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{560}$ | $\frac{\sqrt{35}}{60}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{336}$ | $-\frac{\sqrt{21}}{84}$ | 0 |
| | | $-\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35i}}{168}$ | 0 | $\frac{\sqrt{35}}{60}$ | $\frac{13\sqrt{14i}}{336}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21i}}{168}$ |
| | | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | $-\frac{5\sqrt{35i}}{168}$ | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | 0 | $-\frac{13\sqrt{14i}}{336}$ | 0 | 0 | $\frac{5\sqrt{21i}}{168}$ | 0 |
| | | 0 | $\frac{17\sqrt{210}}{1680}$ | 0 | $\frac{5\sqrt{210i}}{336}$ | 0 | 0 | $-\frac{\sqrt{35i}}{60}$ | 0 | 0 | $\frac{\sqrt{14}}{336}$ | 0 | $-\frac{5\sqrt{14i}}{336}$ | 0 | 0 |
| | | $-\frac{17\sqrt{210}}{1680}$ | 0 | $\frac{5\sqrt{210i}}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{60}$ | $-\frac{\sqrt{14}}{336}$ | 0 | $-\frac{5\sqrt{14i}}{336}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{11\sqrt{210}}{1680}$ | $\frac{\sqrt{35i}}{120}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{168}$ | 0 | $-\frac{\sqrt{14}}{336}$ | $-\frac{\sqrt{21i}}{56}$ | 0 |
| | | $\frac{\sqrt{210i}}{168}$ | 0 | $\frac{11\sqrt{210}}{1680}$ | 0 | 0 | $-\frac{\sqrt{35i}}{120}$ | 0 | 0 | $\frac{5\sqrt{14i}}{168}$ | 0 | $\frac{\sqrt{14}}{336}$ | 0 | 0 | $\frac{\sqrt{21i}}{56}$ |
| | | 0 | 0 | $-\frac{\sqrt{70i}}{80}$ | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | $\frac{\sqrt{42i}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70i}}{80}$ | $\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{112}$ | 0 | 0 |
| 583 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,2}^{(1,-1;a)}(E, 1)$ | $-\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{60}$ | 0 | $-\frac{\sqrt{35}}{84}$ | $\frac{\sqrt{14i}}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{84}$ |
| | | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | $\frac{\sqrt{35i}}{60}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{14i}}{336}$ | 0 | 0 | $\frac{\sqrt{21i}}{84}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210i}}{560}$ | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | $-\frac{\sqrt{35i}}{60}$ | 0 | 0 | $-\frac{13\sqrt{14i}}{336}$ | 0 | 0 | $-\frac{5\sqrt{21}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210i}}{560}$ | $\frac{5\sqrt{35}}{168}$ | 0 | $-\frac{\sqrt{35i}}{60}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{14i}}{336}$ | $\frac{5\sqrt{21}}{168}$ | 0 |
| | | 0 | $-\frac{11\sqrt{210i}}{1680}$ | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35i}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{336}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | $\frac{\sqrt{21i}}{56}$ | 0 |
| | | $-\frac{11\sqrt{210i}}{1680}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{120}$ | 0 | 0 | $\frac{\sqrt{14i}}{336}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21i}}{56}$ |
| | | 0 | $\frac{5\sqrt{210}}{336}$ | 0 | $\frac{17\sqrt{210i}}{1680}$ | 0 | 0 | $\frac{\sqrt{35i}}{60}$ | 0 | 0 | $\frac{5\sqrt{14}}{336}$ | 0 | $-\frac{\sqrt{14i}}{336}$ | 0 | 0 |
| | | $-\frac{5\sqrt{210}}{336}$ | 0 | $\frac{17\sqrt{210i}}{1680}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{60}$ | $-\frac{5\sqrt{14}}{336}$ | 0 | $-\frac{\sqrt{14i}}{336}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70i}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{210}$ | 0 | $\frac{\sqrt{105}}{84}$ | $-\frac{\sqrt{42i}}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70i}}{80}$ | 0 | 0 | $-\frac{\sqrt{105i}}{210}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{42i}}{112}$ | 0 | 0 | 0 | 0 |
| 584 | symmetry | $\frac{3\sqrt{35}x(y^2 - 2yz - z^2)(y^2 + 2yz - z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|---------------------------------------------------|--------------------------|-------------------------|--------------------------|------------------------|------------------------|------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{Q}_{5,1}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{6}i}{80}$ | 0 | 0 | $-\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{80}$ | $\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | $\frac{\sqrt{15}i}{20}$ | 0 |
| | | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{3i}{40}$ | 0 | $\frac{1}{20}$ | $-\frac{\sqrt{10}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ |
| | | 0 | $\frac{\sqrt{6}i}{80}$ | 0 | 0 | $-\frac{3i}{40}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | $-\frac{i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{80}$ | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{i}{20}$ | $\frac{\sqrt{10}i}{80}$ | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{40}$ | 0 | $-\frac{\sqrt{6}i}{16}$ | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{80}$ | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | $\frac{\sqrt{6}i}{40}$ | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | 0 | 0 | $\frac{9\sqrt{2}i}{80}$ | 0 | 0 | $\frac{\sqrt{3}}{10}$ | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{2}i}{80}$ | $-\frac{\sqrt{3}}{10}$ | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 |
| 585 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,2}^{(1,-1;a)}(E, 2)$ | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{i}{20}$ | 0 | $\frac{1}{20}$ | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ |
| | | 0 | $\frac{\sqrt{6}i}{80}$ | 0 | 0 | $\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | $-\frac{3}{40}$ | 0 | $-\frac{i}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{80}$ | $\frac{3}{40}$ | 0 | $-\frac{i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | $\frac{\sqrt{6}i}{40}$ | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | $\frac{\sqrt{15}i}{40}$ | 0 |
| | | $-\frac{\sqrt{6}i}{16}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ |
| | | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | $\frac{i}{20}$ | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{80}$ | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | 0 | $-\frac{i}{20}$ | $-\frac{3\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 | 0 | 0 |
| | | $\frac{9\sqrt{2}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | $-\frac{\sqrt{3}}{20}$ | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{9\sqrt{2}i}{80}$ | 0 | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | $\frac{\sqrt{3}}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 | 0 |
| 586 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------------------------|-------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------|------------------------|
| | $\mathbb{Q}_{5,1}^{(1,-1;a)}(E, 3)$ | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}}{10}$ | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{40}$ | 0 | 0 | $\frac{\sqrt{3}i}{15}$ | 0 | $\frac{\sqrt{3}}{10}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | $-\frac{\sqrt{3}}{60}$ | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | 0 | $\frac{\sqrt{5}}{20}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{40}$ | $\frac{\sqrt{3}}{60}$ | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{40}$ | $-\frac{\sqrt{5}}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{10}$ | 0 | $\frac{\sqrt{2}}{8}$ | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{40}$ | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | $-\frac{\sqrt{2}i}{10}$ | 0 | $-\frac{\sqrt{2}}{8}$ | 0 | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | $\frac{\sqrt{2}}{20}$ | 0 | $\frac{\sqrt{2}i}{10}$ | 0 | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{2}}{20}$ | 0 | $\frac{\sqrt{2}i}{10}$ | 0 | 0 | 0 | $\frac{\sqrt{3}i}{15}$ | $\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{10}$ | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 |
| 587 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,2}^{(1,-1;a)}(E, 3)$ | 0 | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | $\frac{\sqrt{3}}{15}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{40}$ | $-\frac{\sqrt{3}}{15}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 |
| | | $-\frac{\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{60}$ | 0 | $-\frac{\sqrt{3}}{15}$ | $\frac{\sqrt{30}i}{40}$ | 0 | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | $\frac{\sqrt{2}i}{40}$ | 0 | 0 | $\frac{\sqrt{3}i}{60}$ | 0 | $\frac{\sqrt{3}}{15}$ | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{2}}{10}$ | 0 | $-\frac{\sqrt{2}i}{20}$ | 0 | 0 | $-\frac{\sqrt{3}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 |
| | | $\frac{\sqrt{2}}{10}$ | 0 | $-\frac{\sqrt{2}i}{20}$ | 0 | 0 | 0 | $\frac{\sqrt{3}i}{15}$ | 0 | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | $\frac{\sqrt{2}}{10}$ | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | 0 | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | $-\frac{\sqrt{2}i}{8}$ | 0 | $-\frac{\sqrt{2}}{10}$ | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{40}$ | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| 588 | symmetry | z | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|
| | $Q_1^{(1,0;a)}(B)$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 |
| 589 | symmetry | x | | | | | | | | | | | | | |
| | $Q_{1,1}^{(1,0;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | $\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | $-\frac{3\sqrt{70}}{140}$ | 0 |
| 590 | symmetry | y | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|
| | $Q_{1,2}^{(1,0;a)}(E)$ | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ | 0 |
| 591 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | |
| | $Q_3^{(1,0;a)}(A, 1)$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | $-\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | $-\frac{\sqrt{6}}{48}$ | $-\frac{i}{6}$ | 0 | 0 |
| | | $\frac{\sqrt{10}i}{48}$ | 0 | $\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 | $\frac{i}{6}$ | 0 |
| | | 0 | $\frac{\sqrt{10}}{48}$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{16}$ | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}}{48}$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{i}{24}$ |
| | | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | $-\frac{i}{24}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | $\frac{1}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | $-\frac{1}{24}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}i}{48}$ | 0 | $\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}i}{48}$ | 0 | $-\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 |
| 592 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_3^{(1,0;a)}(A, 2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{10}}{48} & 0 & -\frac{\sqrt{10}i}{48} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 \\ \frac{\sqrt{10}}{48} & 0 & -\frac{\sqrt{10}i}{48} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{48} & 0 & -\frac{\sqrt{10}}{48} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{48} & 0 & \frac{\sqrt{6}}{48} & \frac{i}{6} & 0 \\ \frac{\sqrt{10}i}{48} & 0 & \frac{\sqrt{10}}{48} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{48} & 0 & -\frac{\sqrt{6}}{48} & 0 & 0 & -\frac{i}{6} \\ 0 & 0 & -\frac{\sqrt{10}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & \frac{1}{24} \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{24} & 0 & 0 & \frac{\sqrt{15}i}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{24} & -\frac{1}{24} & 0 \\ \frac{\sqrt{10}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{24} & -\frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & \frac{i}{24} \\ 0 & -\frac{\sqrt{10}i}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{24} & 0 & 0 & \frac{\sqrt{6}i}{24} & 0 & 0 & \frac{i}{24} & 0 \\ 0 & \frac{\sqrt{30}}{48} & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{16} & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 \\ -\frac{\sqrt{30}}{48} & 0 & -\frac{\sqrt{30}i}{48} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 \end{bmatrix}$ |
| 593 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ $\begin{bmatrix} 0 & \frac{\sqrt{6}}{24} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 \\ -\frac{\sqrt{6}}{24} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}i}{24} & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 \\ \frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{6}}{24} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{8} & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{60} \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{8} & 0 & \frac{i}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{8} & 0 & -\frac{1}{8} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{8} & 0 & \frac{1}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 \end{bmatrix}$ |
| 594 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|-----------------------------------|--------------------------|-------------------------|--------------------------|------------------|-----------------|----------------|----------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | $\frac{\sqrt{15}}{24}$ | 0 |
| | | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | $\frac{7\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $-\frac{7\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | $-\frac{3i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{10}}{160}$ | $\frac{\sqrt{15}i}{240}$ | 0 |
| | | 0 | 0 | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 | $\frac{3i}{16}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{240}$ |
| | | 0 | 0 | $\frac{5\sqrt{2}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{160}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{2}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{160}$ | $\frac{\sqrt{5}}{20}$ | 0 |
| 595 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 1)$ | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ |
| | | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{7\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}i}{160}$ | 0 | 0 |
| | | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | $-\frac{3i}{16}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{240}$ | 0 |
| | | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $\frac{3i}{16}$ | 0 | 0 | $\frac{7\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{240}$ |
| | | 0 | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{2}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | $-\frac{5\sqrt{2}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{160}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ | 0 |
| 596 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|-----------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|
| | $\mathbb{Q}_{3,1}^{(1,0;a)}(E, 2)$ | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | $\frac{i}{24}$ |
| | | 0 | $\frac{\sqrt{10}i}{96}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | $-\frac{5\sqrt{6}i}{96}$ | 0 | 0 | $\frac{i}{24}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | $\frac{1}{6}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{96}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | $-\frac{1}{6}$ | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | $-\frac{\sqrt{15}i}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | $\frac{i}{48}$ | 0 |
| | | $-\frac{\sqrt{10}i}{96}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{48}$ | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{i}{48}$ |
| | | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ |
| | | 0 | $-\frac{\sqrt{30}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{32}$ | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ | 0 |
| 597 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{3,2}^{(1,0;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6}i}{96}$ | 0 | $-\frac{1}{24}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{96}$ | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | $\frac{1}{24}$ |
| | | $\frac{\sqrt{10}i}{96}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $\frac{i}{6}$ |
| | | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | $\frac{i}{6}$ |
| | | 0 | $\frac{\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 |
| | | $-\frac{\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | $\frac{\sqrt{6}i}{96}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}i}{96}$ | $\frac{\sqrt{15}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}i}{32}$ | $\frac{i}{48}$ |
| | | $\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | 0 | $-\frac{\sqrt{15}i}{48}$ | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{i}{48}$ |
| | | 0 | 0 | $-\frac{\sqrt{30}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{32}$ | 0 | $-\frac{\sqrt{3}i}{12}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{30}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{32}$ | $\frac{\sqrt{3}i}{12}$ |
| 598 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{Q}_5^{(1,0;a)}(A, 1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}i}{120} & 0 & -\frac{\sqrt{2}}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & -\frac{\sqrt{5}i}{30} & 0 \\ \frac{\sqrt{2}i}{120} & 0 & \frac{\sqrt{2}}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}i}{30} \\ 0 & \frac{\sqrt{2}}{120} & 0 & \frac{\sqrt{2}i}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{40} & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 \\ -\frac{\sqrt{2}}{120} & 0 & \frac{\sqrt{2}i}{120} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{30} & 0 & \frac{\sqrt{3}}{10} & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{15} \\ 0 & -\frac{\sqrt{2}i}{60} & 0 & 0 & \frac{\sqrt{3}i}{30} & 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{5}i}{15} & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{60} & 0 & 0 & \frac{\sqrt{3}}{30} & 0 & -\frac{\sqrt{3}i}{10} & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{5}}{15} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{60} & -\frac{\sqrt{3}}{30} & 0 & -\frac{\sqrt{3}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{60} & \frac{\sqrt{5}}{15} & 0 \\ 0 & \frac{\sqrt{6}i}{30} & 0 & \frac{\sqrt{6}}{30} & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 \\ \frac{\sqrt{6}i}{30} & 0 & -\frac{\sqrt{6}}{30} & 0 & 0 & \frac{i}{10} & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 599 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ $\begin{bmatrix} 0 & \frac{\sqrt{2}}{120} & 0 & \frac{\sqrt{2}i}{120} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 \\ -\frac{\sqrt{2}}{120} & 0 & \frac{\sqrt{2}i}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{120} & 0 & \frac{\sqrt{2}}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & -\frac{\sqrt{5}i}{30} & 0 \\ -\frac{\sqrt{2}i}{120} & 0 & -\frac{\sqrt{2}}{120} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}i}{30} \\ 0 & 0 & \frac{\sqrt{2}i}{60} & 0 & 0 & -\frac{\sqrt{3}}{10} & 0 & \frac{\sqrt{3}i}{30} & 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{5}}{15} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{60} & \frac{\sqrt{3}}{10} & 0 & \frac{\sqrt{3}i}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & -\frac{\sqrt{5}}{15} & 0 \\ -\frac{\sqrt{2}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{10} & 0 & \frac{\sqrt{3}}{30} & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{15} \\ 0 & \frac{\sqrt{2}i}{60} & 0 & 0 & \frac{\sqrt{3}i}{10} & 0 & -\frac{\sqrt{3}}{30} & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & \frac{\sqrt{5}i}{15} & 0 \\ 0 & -\frac{\sqrt{6}}{30} & 0 & \frac{\sqrt{6}i}{30} & 0 & 0 & -\frac{i}{10} & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 \\ \frac{\sqrt{6}}{30} & 0 & \frac{\sqrt{6}i}{30} & 0 & 0 & 0 & 0 & \frac{i}{10} & -\frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 \end{bmatrix}$ |
| 600 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|------------------------------------------------------------|----------------------------|---------------------------|---------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | $\mathbb{Q}_5^{(1,0;a)}(B, 1)$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | $\frac{i}{5}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{i}{5}$ | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{15}$ | 0 | 0 | $-\frac{i}{10}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{15}$ | 0 | 0 | $\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{15}$ | $-\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{20}$ | 0 | $\frac{\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{2}i}{20}$ | 0 | $-\frac{\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 601 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_5^{(1,0;a)}(B, 2)$ | 0 | $-\frac{\sqrt{210}}{840}$ | 0 | $\frac{\sqrt{210}i}{840}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{840}$ | 0 | $\frac{\sqrt{210}i}{840}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{840}$ | 0 | $-\frac{\sqrt{210}}{840}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{840}$ | 0 | $\frac{\sqrt{210}}{840}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{21}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{21}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 |
| 602 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|------------------------------------------------------------|-----------------------------|-------------------------------|------------------------------|----------------------------|----------------------------|--------------------------|-------------------------|------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|
| | $\mathbb{Q}_5^{(1,0;a)}(B, 3)$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | $\frac{i}{5}$ | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $-\frac{i}{5}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{15}$ | 0 | 0 | $\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{15}$ | $-\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{15}$ | 0 | 0 | $\frac{i}{10}$ | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2}}{20}$ | 0 | $\frac{\sqrt{2}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{2}}{20}$ | 0 | $\frac{\sqrt{2}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 603 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,1}^{(1,0;a)}(E, 1)$ | 0 | 0 | $-\frac{53\sqrt{210}i}{3360}$ | 0 | 0 | $\frac{13\sqrt{35}}{560}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}i}{224}$ | 0 | 0 | $-\frac{\sqrt{21}}{48}$ |
| | | 0 | 0 | 0 | $\frac{53\sqrt{210}i}{3360}$ | $-\frac{13\sqrt{35}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{224}$ | $\frac{\sqrt{21}}{48}$ | 0 |
| | | $-\frac{13\sqrt{210}i}{840}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{13\sqrt{210}i}{840}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}}{120}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | $\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{240}$ | $\frac{3\sqrt{35}i}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{112}$ | $-\frac{\sqrt{21}i}{168}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{210}}{240}$ | 0 | 0 | $-\frac{3\sqrt{35}i}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 | $\frac{\sqrt{21}i}{168}$ |
| | | 0 | 0 | $\frac{\sqrt{70}i}{160}$ | 0 | 0 | $-\frac{\sqrt{105}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{224}$ | 0 | 0 | $\frac{5\sqrt{7}}{112}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{160}$ | $\frac{\sqrt{105}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | $-\frac{5\sqrt{7}}{112}$ | 0 |
| 604 | symmetry | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{5,2}^{(1,0;a)}(E, 1)$ | $\frac{53\sqrt{210i}}{3360}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{35i}}{560}$ | 0 | 0 | $\frac{3\sqrt{14i}}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{48}$ |
| | | 0 | $-\frac{53\sqrt{210i}}{3360}$ | 0 | 0 | $-\frac{13\sqrt{35i}}{560}$ | 0 | 0 | 0 | $-\frac{3\sqrt{14i}}{224}$ | 0 | 0 | $-\frac{\sqrt{21i}}{48}$ | 0 |
| | | 0 | 0 | $-\frac{13\sqrt{210i}}{840}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{70}$ | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{13\sqrt{210i}}{840}$ | 0 | 0 | $\frac{\sqrt{35i}}{70}$ | 0 | 0 | 0 | $\frac{\sqrt{14i}}{56}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210i}}{240}$ | 0 | 0 | $\frac{3\sqrt{35i}}{280}$ | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | 0 | 0 | $\frac{\sqrt{21i}}{168}$ | 0 |
| | | $-\frac{\sqrt{210i}}{240}$ | 0 | 0 | 0 | $-\frac{3\sqrt{35i}}{280}$ | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210i}}{120}$ | 0 | 0 | $-\frac{\sqrt{35i}}{70}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{210i}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{70}$ | 0 | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70i}}{160}$ | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{80}$ | 0 | 0 | $\frac{\sqrt{42i}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7i}}{112}$ |
| | | 0 | $-\frac{\sqrt{70i}}{160}$ | 0 | 0 | $-\frac{\sqrt{105i}}{80}$ | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{224}$ | 0 | 0 | 0 | $-\frac{5\sqrt{7i}}{112}$ |
| 605 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,1}^{(1,0;a)}(E, 2)$ | 0 | 0 | $-\frac{13\sqrt{6i}}{480}$ | 0 | 0 | $-\frac{3}{80}$ | 0 | $\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10i}}{32}$ | 0 | $\frac{\sqrt{15i}}{240}$ |
| | | 0 | 0 | 0 | $\frac{13\sqrt{6i}}{480}$ | $\frac{3}{80}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{32}$ | $-\frac{\sqrt{15i}}{240}$ |
| | | $-\frac{\sqrt{6i}}{40}$ | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | 0 | $\frac{1}{10}$ | $-\frac{\sqrt{10i}}{40}$ | 0 | 0 | 0 | $\frac{\sqrt{15i}}{30}$ |
| | | 0 | $\frac{\sqrt{6i}}{40}$ | 0 | 0 | $\frac{i}{10}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10i}}{40}$ | 0 | 0 | $\frac{\sqrt{15i}}{30}$ |
| | | 0 | $-\frac{\sqrt{6i}}{40}$ | 0 | $\frac{\sqrt{6i}}{60}$ | 0 | 0 | $-\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10i}}{40}$ | 0 | $\frac{\sqrt{10i}}{20}$ | 0 |
| | | $\frac{\sqrt{6i}}{40}$ | 0 | $\frac{\sqrt{6i}}{60}$ | 0 | 0 | 0 | $\frac{i}{10}$ | $\frac{\sqrt{10i}}{40}$ | 0 | $\frac{\sqrt{10i}}{20}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6i}}{20}$ | 0 | $\frac{\sqrt{6i}}{48}$ | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{20}$ | 0 | $-\frac{3\sqrt{10i}}{80}$ | $-\frac{\sqrt{15i}}{120}$ |
| | | $\frac{\sqrt{6i}}{20}$ | 0 | $-\frac{\sqrt{6i}}{48}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10i}}{20}$ | 0 | $\frac{3\sqrt{10i}}{80}$ | 0 | $\frac{\sqrt{15i}}{120}$ |
| | | 0 | 0 | $-\frac{9\sqrt{2i}}{160}$ | 0 | 0 | $\frac{\sqrt{3i}}{80}$ | 0 | $\frac{\sqrt{3i}}{10}$ | 0 | 0 | $-\frac{\sqrt{30i}}{160}$ | 0 | $\frac{\sqrt{5i}}{16}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{2i}}{160}$ | $-\frac{\sqrt{3i}}{80}$ | 0 | $\frac{\sqrt{3i}}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{160}$ | $-\frac{\sqrt{5i}}{16}$ |
| 606 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|-------------------------------------------------|----------------------------|----------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
| | $\mathbb{Q}_{5,2}^{(1,0;a)}(E, 2)$ | $\frac{13\sqrt{6}i}{480}$ | 0 | 0 | 0 | 0 | $\frac{3i}{80}$ | 0 | $\frac{1}{10}$ | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{240}$ |
| | | 0 | $-\frac{13\sqrt{6}i}{480}$ | 0 | 0 | $\frac{3i}{80}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | $\frac{\sqrt{15}i}{240}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $\frac{1}{10}$ | 0 | $-\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | $-\frac{\sqrt{15}i}{30}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{40}$ | $-\frac{1}{10}$ | 0 | $-\frac{i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | $\frac{\sqrt{15}i}{30}$ | 0 |
| | | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}i}{20}$ | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | $\frac{\sqrt{15}i}{120}$ | 0 |
| | | $\frac{\sqrt{6}i}{48}$ | 0 | $-\frac{\sqrt{6}i}{20}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{15}i}{120}$ |
| | | 0 | $\frac{\sqrt{6}i}{60}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $\frac{i}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{60}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{2}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{80}$ | 0 | $-\frac{\sqrt{3}i}{10}$ | $\frac{\sqrt{30}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{16}$ |
| | | 0 | $\frac{9\sqrt{2}i}{160}$ | 0 | 0 | $\frac{\sqrt{3}i}{80}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $-\frac{\sqrt{30}i}{160}$ | 0 | 0 | $-\frac{\sqrt{5}i}{16}$ | 0 |
| 607 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_{5,1}^{(1,0;a)}(E, 3)$ | $\frac{37\sqrt{2}i}{240}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{120}$ | 0 | $\frac{\sqrt{3}i}{20}$ | $-\frac{\sqrt{30}i}{240}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{24}$ |
| | | 0 | $-\frac{37\sqrt{2}i}{240}$ | 0 | 0 | $\frac{\sqrt{3}i}{120}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{240}$ | 0 | 0 | $\frac{\sqrt{5}i}{24}$ | 0 |
| | | 0 | 0 | $-\frac{19\sqrt{2}i}{120}$ | 0 | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}i}{60}$ |
| | | 0 | 0 | 0 | $\frac{19\sqrt{2}i}{120}$ | $-\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}i}{60}$ | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{30}$ | 0 | $\frac{\sqrt{2}i}{24}$ | $-\frac{\sqrt{3}i}{60}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}i}{60}$ | 0 |
| | | $-\frac{\sqrt{2}i}{30}$ | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | 0 | $\frac{\sqrt{3}i}{60}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}i}{60}$ |
| | | 0 | $\frac{7\sqrt{2}i}{120}$ | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 |
| | | $-\frac{7\sqrt{2}i}{120}$ | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{30}$ | $-\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | $\frac{1}{20}$ | $-\frac{\sqrt{10}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ |
| | | 0 | $\frac{\sqrt{6}i}{80}$ | 0 | 0 | $\frac{i}{8}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 |
| 608 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-------------------------|-------------------------|-------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_{5,2}^{(1,0;a)}(E, 3)$ | 0 | 0 | $\frac{37\sqrt{2}i}{240}$ | 0 | 0 | $\frac{\sqrt{3}}{120}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}i}{240}$ | 0 | 0 | $-\frac{\sqrt{5}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{37\sqrt{2}i}{240}$ | $-\frac{\sqrt{3}}{120}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{240}$ | $\frac{\sqrt{5}}{24}$ | 0 |
| | | $\frac{19\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}}{30}$ | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{60}$ |
| | | 0 | $-\frac{19\sqrt{2}i}{120}$ | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $-\frac{\sqrt{3}}{30}$ | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}i}{60}$ | 0 |
| | | 0 | $\frac{\sqrt{2}}{120}$ | 0 | $-\frac{7\sqrt{2}i}{120}$ | 0 | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}}{120}$ | 0 | $-\frac{7\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{30}$ | $\frac{\sqrt{30}}{24}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | $\frac{\sqrt{2}}{30}$ | $\frac{\sqrt{3}i}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $-\frac{\sqrt{5}i}{60}$ | 0 |
| | | $-\frac{\sqrt{2}i}{24}$ | 0 | $-\frac{\sqrt{2}}{30}$ | 0 | 0 | $-\frac{\sqrt{3}i}{60}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{60}$ |
| | | 0 | 0 | $\frac{\sqrt{6}i}{80}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | $\frac{i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{80}$ | $\frac{1}{8}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{80}$ | $-\frac{\sqrt{15}}{24}$ | 0 |
| 609 | symmetry | z | | | | | | | | | | | | | |
| | $\mathbb{Q}_1^{(1,1;a)}(B)$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $-\frac{3\sqrt{70}}{280}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | $-\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | 0 | 0 |
| 610 | symmetry | x | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | $\mathbb{Q}_{1,1}^{(1,1;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | $\frac{3\sqrt{70i}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70i}}{280}$ | $\frac{\sqrt{105}}{140}$ | 0 |
| | | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | 0 | $-\frac{3\sqrt{70i}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{140}$ |
| | | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70i}}{280}$ | 0 | 0 | $\frac{\sqrt{105i}}{140}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 |
| | | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | $-\frac{\sqrt{105i}}{70}$ | 0 |
| | | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | $\frac{\sqrt{105i}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | $\frac{\sqrt{210i}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{140}$ | 0 | 0 |
| 611 | symmetry | y | | | | | | | | | | | | | |
| | $\mathbb{Q}_{1,2}^{(1,1;a)}(E)$ | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $\frac{3\sqrt{70i}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{140}$ |
| | | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{3\sqrt{70i}}{280}$ | 0 | 0 | $-\frac{\sqrt{105i}}{140}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70i}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70i}}{280}$ | $\frac{\sqrt{105}}{140}$ | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70i}}{280}$ | 0 | $\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{105i}}{70}$ | 0 |
| | | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70i}}{280}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{280}$ | 0 | $-\frac{3\sqrt{70i}}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | $-\frac{3\sqrt{70i}}{280}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | $-\frac{\sqrt{210i}}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{\sqrt{210i}}{140}$ | 0 | 0 | 0 | 0 |
| 612 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|-------------------------|
| | $\mathbb{Q}_3^{(1,1;a)}(A, 1)$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{42}i}{112}$ | 0 | $\frac{3\sqrt{42}}{112}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | $\frac{\sqrt{70}i}{560}$ | 0 | $\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | 0 | $\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ |
| | | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70}i}{280}$ | $\frac{\sqrt{105}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | $-\frac{\sqrt{7}}{56}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{80}$ | 0 | $-\frac{\sqrt{210}}{80}$ | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{80}$ | 0 | $\frac{\sqrt{210}}{80}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | 0 | 0 |
| 613 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{Q}_3^{(1,1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{3\sqrt{42}}{112}$ | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | $\frac{\sqrt{70}i}{560}$ | 0 | $\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | $\frac{3\sqrt{42}}{112}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | $-\frac{\sqrt{7}}{56}$ | 0 |
| | | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{120}$ | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{56}$ |
| | | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | $\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}}{80}$ | 0 | $\frac{\sqrt{210}i}{80}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{80}$ | 0 | $\frac{\sqrt{210}i}{80}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 |
| 614 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|--------------------------------|----------------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| | $Q_3^{(1,1;a)}(B)$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42i}}{168}$ | 0 | 0 | $\frac{\sqrt{7i}}{21}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70i}}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{21}$ | $\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70i}}{84}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{168}$ | 0 | $-\frac{\sqrt{42}}{168}$ | $-\frac{\sqrt{7i}}{21}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{84}$ | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{42i}}{168}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $\frac{\sqrt{7i}}{21}$ | 0 | 0 | $\frac{\sqrt{70i}}{84}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7i}}{24}$ | 0 | 0 | $-\frac{\sqrt{70i}}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{42}$ | $-\frac{\sqrt{105}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{24}$ | 0 | $\frac{\sqrt{7}}{24}$ | $\frac{\sqrt{70i}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{24}$ | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | 0 | $-\frac{\sqrt{70i}}{42}$ | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 |
| 615 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |
| | $Q_{3,1}^{(1,1;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{42i}}{224}$ | 0 | 0 | $\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7i}}{42}$ | 0 | 0 | $-\frac{\sqrt{70i}}{672}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42i}}{224}$ | $-\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7i}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{672}$ | $\frac{\sqrt{105}}{168}$ | 0 |
| | | $\frac{\sqrt{42i}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7i}}{84}$ | 0 | $-\frac{\sqrt{7}}{24}$ | $-\frac{13\sqrt{70i}}{672}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{84}$ |
| | | 0 | $-\frac{\sqrt{42i}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7i}}{84}$ | 0 | $\frac{\sqrt{7}}{24}$ | 0 | 0 | $\frac{13\sqrt{70i}}{672}$ | 0 | 0 | $\frac{\sqrt{105i}}{84}$ | 0 |
| | | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | $\frac{\sqrt{7i}}{24}$ | 0 | 0 | $-\frac{\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{70i}}{168}$ | 0 | 0 |
| | | $\frac{17\sqrt{42}}{672}$ | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{24}$ | $\frac{\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{70i}}{168}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | $\frac{11\sqrt{42}}{672}$ | $-\frac{\sqrt{7i}}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{84}$ | 0 | $\frac{\sqrt{70}}{672}$ | $\frac{\sqrt{105i}}{112}$ | 0 |
| | | $\frac{\sqrt{42i}}{84}$ | 0 | $-\frac{11\sqrt{42}}{672}$ | 0 | 0 | $\frac{\sqrt{7i}}{48}$ | 0 | 0 | $\frac{\sqrt{70i}}{84}$ | 0 | $-\frac{\sqrt{70}}{672}$ | 0 | 0 | $-\frac{\sqrt{105i}}{112}$ |
| | | 0 | 0 | $\frac{\sqrt{14i}}{32}$ | 0 | 0 | $\frac{\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21i}}{42}$ | 0 | 0 | $-\frac{\sqrt{210i}}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{32}$ | $-\frac{\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21i}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{224}$ | 0 | 0 |
| 616 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|
| | $\mathbb{Q}_{3,2}^{(1,1;a)}(E, 1)$ | $\frac{\sqrt{42}i}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{24}$ | 0 | $-\frac{\sqrt{7}}{42}$ | $-\frac{\sqrt{70}i}{672}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ |
| | | 0 | $-\frac{\sqrt{42}i}{224}$ | 0 | 0 | $-\frac{\sqrt{7}i}{24}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $\frac{\sqrt{70}i}{672}$ | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ |
| | | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | $\frac{\sqrt{7}i}{24}$ | 0 | 0 | $\frac{13\sqrt{70}i}{672}$ | 0 | $-\frac{\sqrt{105}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{224}$ | $\frac{5\sqrt{7}}{84}$ | 0 | $\frac{\sqrt{7}i}{24}$ | 0 | 0 | 0 | $-\frac{13\sqrt{70}i}{672}$ | $\frac{\sqrt{105}i}{84}$ | 0 |
| | | 0 | $\frac{11\sqrt{42}i}{672}$ | 0 | $\frac{\sqrt{42}}{84}$ | $-\frac{\sqrt{7}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{672}$ | 0 | $-\frac{\sqrt{70}}{84}$ | $-\frac{\sqrt{105}i}{112}$ |
| | | $\frac{11\sqrt{42}i}{672}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | $\frac{\sqrt{7}i}{48}$ | 0 | 0 | $-\frac{\sqrt{70}i}{672}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{105}i}{112}$ |
| | | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{17\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{\sqrt{7}i}{24}$ | 0 | 0 | $\frac{\sqrt{70}}{168}$ | 0 | $\frac{\sqrt{70}i}{672}$ | 0 |
| | | $-\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{17\sqrt{42}i}{672}$ | 0 | 0 | 0 | $\frac{\sqrt{7}i}{24}$ | $-\frac{\sqrt{70}}{168}$ | 0 | $\frac{\sqrt{70}i}{672}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{14}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{210}i}{224}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}i}{32}$ | 0 | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{210}i}{224}$ | 0 | 0 | 0 | 0 |
| 617 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{Q}_{3,1}^{(1,1;a)}(E, 2)$ | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | $-\frac{\sqrt{105}}{70}$ | $-\frac{17\sqrt{42}i}{672}$ | 0 | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ |
| | | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{17\sqrt{42}i}{672}$ | 0 | 0 | $\frac{3\sqrt{7}i}{56}$ |
| | | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | $-\frac{\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{7}}{28}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | $\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | $-\frac{\sqrt{7}}{28}$ |
| | | 0 | $\frac{23\sqrt{70}i}{1120}$ | 0 | $\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{105}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{5\sqrt{7}i}{112}$ |
| | | $\frac{23\sqrt{70}i}{1120}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{80}$ | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{5\sqrt{7}i}{112}$ |
| | | 0 | $\frac{\sqrt{70}}{140}$ | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{224}$ | 0 |
| | | $-\frac{\sqrt{70}}{140}$ | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{224}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{210}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{70}$ | $-\frac{5\sqrt{14}i}{224}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{160}$ | 0 | 0 | $-\frac{3\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{5\sqrt{14}i}{224}$ | 0 | 0 | 0 |
| 618 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|--------------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|--------------------------|---------------------------|
| | $\mathbb{Q}_{3,2}^{(1,1;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{17\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | $\frac{\sqrt{105}}{120}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{42}i}{672}$ | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | $\frac{\sqrt{105}}{120}$ | $-\frac{\sqrt{42}i}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $\frac{\sqrt{42}i}{224}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 |
| | | 0 | $\frac{\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | 0 | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | $\frac{\sqrt{42}}{224}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{23\sqrt{70}}{1120}$ | $-\frac{\sqrt{105}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{224}$ | $\frac{5\sqrt{7}i}{112}$ | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{23\sqrt{70}}{1120}$ | 0 | 0 | $\frac{\sqrt{105}i}{80}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{210}i}{160}$ | 0 | 0 | $\frac{3\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{5\sqrt{14}i}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}i}{160}$ | $-\frac{3\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}i}{224}$ | 0 | 0 |
| 619 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(a)}(A, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ |
| | | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 620 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_2^{(a)}(A, 2)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 621 | symmetry | $ -\frac{x^2}{2} - \frac{y^2}{2} + z^2 $ $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 622 | symmetry | $\sqrt{3}xz$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{2,1}^{(a)}(E)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 \\ -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 \end{array} $ |
| 623 | symmetry | $ \begin{array}{c} \sqrt{3}yz \\ \left[\begin{array}{cccccccccccccccc} -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 \end{array} \right] \end{array} $ |
| 624 | symmetry | $ \frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4} $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|------------------------------------------------------------|----------------------------|----------------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| | $\mathbb{G}_4^{(a)}(A, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{14}$ |
| | | 0 | 0 | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | $\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{35}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{35}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 625 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{35}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{35}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 626 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_4^{(a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & 0 \\ -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 627 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |
| | $\mathbb{G}_4^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{35} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{35} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{210} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{210} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{70}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{168} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{168} & 0 & 0 \\ \frac{\sqrt{70}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{168} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{70}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{168} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 628 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_4^{(a)}(B, 3)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 629 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\begin{bmatrix} -\frac{\sqrt{30}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{10}}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 630 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|---------------------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-----------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|-------------------------|
| | $\mathbb{G}_{4,2}^{(a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{10}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{5}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{8}$ |
| | | 0 | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 |
| 631 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_{4,1}^{(a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{14}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{14}}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{112}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{56}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{56}$ |
| | | 0 | 0 | $\frac{3\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 |
| 632 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|-------------------------|------------------------|-------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
| | $\mathbb{G}_{4,2}^{(a)}(E, 2)$ | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{14}}{112}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{14}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}}{112}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}}{112}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{56}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{56}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 |
| 633 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{140}$ | 0 |
| | | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 |
| 634 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|
| | $\mathbb{G}_2^{(1,-1;a)}(A, 2)$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 |
| 635 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(1,-1;a)}(B)$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | $\frac{\sqrt{105}}{420}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ | $-\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | $\frac{2\sqrt{105}i}{105}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | $-\frac{2\sqrt{105}i}{105}$ | 0 | 0 | $\frac{\sqrt{70}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | $\frac{2\sqrt{105}i}{105}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | $-\frac{2\sqrt{105}i}{105}$ | $-\frac{\sqrt{70}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | $-\frac{\sqrt{35}}{70}$ | $\frac{\sqrt{210}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $-\frac{\sqrt{210}i}{70}$ |
| 636 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|----------------------------------|----------------------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| | $\mathbb{G}_{2,1}^{(1,-1;a)}(E)$ | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{3\sqrt{70}i}{140}$ | 0 |
| 637 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | $\mathbb{G}_{2,2}^{(1,-1;a)}(E)$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | $\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | $-\frac{3\sqrt{70}}{140}$ | 0 |
| 638 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|------------------------------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|-------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{48}$ | 0 | $-\frac{\sqrt{42}}{48}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | $\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{48}$ | 0 | $\frac{\sqrt{42}}{48}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | 0 | $\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | $\frac{\sqrt{105}}{84}$ | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ |
| | | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | $\frac{\sqrt{105}}{168}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{336}$ | 0 | $-\frac{\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{112}$ | 0 | $\frac{3\sqrt{14}}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{112}$ | 0 | $-\frac{3\sqrt{14}}{112}$ | 0 | 0 | 0 |
| 639 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(1,-1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{48}$ | 0 | $\frac{\sqrt{42}}{48}$ | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | $\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{48}$ | 0 | $-\frac{\sqrt{42}}{48}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{56}$ | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{56}$ |
| | | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{112}$ | 0 | $\frac{3\sqrt{14}i}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{112}$ | 0 | $\frac{3\sqrt{14}i}{112}$ | 0 | 0 | 0 |
| 640 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|--------------------------|-------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(B, 1)$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{11\sqrt{10}i}{240}$ | 0 | $\frac{11\sqrt{10}}{240}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{48}$ | 0 | $-\frac{\sqrt{6}}{48}$ | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{11\sqrt{10}i}{240}$ | 0 | $-\frac{11\sqrt{10}}{240}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{10}}{240}$ | 0 | $-\frac{\sqrt{10}i}{240}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | $\frac{i}{6}$ | $\frac{\sqrt{10}}{240}$ | 0 | $-\frac{\sqrt{10}i}{240}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{24}$ | 0 | $-\frac{1}{6}$ | $\frac{\sqrt{10}i}{60}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{120}$ |
| | | 0 | 0 | 0 | 0 | $\frac{i}{24}$ | 0 | $\frac{1}{6}$ | 0 | $-\frac{\sqrt{10}i}{60}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{120}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{24}$ | 0 | $-\frac{i}{6}$ | 0 | 0 | $\frac{\sqrt{10}i}{60}$ | 0 | 0 | $-\frac{\sqrt{15}}{120}$ |
| | | 0 | 0 | 0 | 0 | $\frac{1}{24}$ | 0 | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{60}$ | $\frac{\sqrt{15}}{120}$ | 0 |
| | | 0 | $-\frac{5\sqrt{2}i}{48}$ | 0 | $\frac{5\sqrt{2}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | $-\frac{\sqrt{30}}{80}$ | $\frac{\sqrt{5}i}{15}$ | 0 |
| | | $-\frac{5\sqrt{2}i}{48}$ | 0 | $-\frac{5\sqrt{2}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | $\frac{\sqrt{30}}{80}$ | 0 | 0 | $-\frac{\sqrt{5}i}{15}$ |
| 641 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(1,-1;a)}(B, 2)$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{336}$ | 0 | $-\frac{\sqrt{14}}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{336}$ | 0 | $-\frac{\sqrt{210}}{336}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{336}$ | 0 | $\frac{\sqrt{14}}{336}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{13\sqrt{14}}{336}$ | 0 | $-\frac{13\sqrt{14}i}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | $\frac{13\sqrt{14}}{336}$ | 0 | $-\frac{13\sqrt{14}i}{336}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}i}{168}$ | 0 | $\frac{\sqrt{35}}{84}$ | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}i}{168}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{168}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35}}{168}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ | $\frac{\sqrt{21}}{168}$ | 0 |
| | | 0 | $\frac{\sqrt{70}i}{48}$ | 0 | $-\frac{\sqrt{70}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{112}$ | 0 | $-\frac{\sqrt{42}}{112}$ | $\frac{\sqrt{7}i}{21}$ | 0 |
| | | $\frac{\sqrt{70}i}{48}$ | 0 | $\frac{\sqrt{70}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{112}$ | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 | $-\frac{\sqrt{7}i}{21}$ |
| 642 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|------------------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-----------------------|------------------------|
| | $\mathbb{G}_4^{(1,-1;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 643 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{6}i}{96}$ | 0 | 0 | $\frac{1}{8}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{6}i}{96}$ | $-\frac{1}{8}$ | 0 |
| | | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $-\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | $\frac{\sqrt{15}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{96}$ | $-\frac{i}{16}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $-\frac{\sqrt{15}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $\frac{i}{16}$ |
| | | 0 | 0 | $\frac{\sqrt{30}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2}i}{32}$ | 0 | 0 | $-\frac{\sqrt{3}}{12}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}i}{32}$ | $\frac{\sqrt{3}}{12}$ | 0 |
| 644 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|---------------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|--------------------------|
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 1)$ | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15i}}{24}$ | 0 | 0 | $\frac{7\sqrt{6i}}{96}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | $\frac{\sqrt{10i}}{32}$ | 0 | 0 | $-\frac{\sqrt{15i}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{6i}}{96}$ | 0 | 0 | $\frac{i}{8}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15i}}{24}$ | 0 | 0 | $\frac{5\sqrt{6i}}{96}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10i}}{32}$ | 0 | 0 | $-\frac{\sqrt{15i}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6i}}{96}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | $\frac{\sqrt{15i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{96}$ | 0 | 0 | $\frac{i}{16}$ | 0 |
| | | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15i}}{48}$ | 0 | 0 | $-\frac{\sqrt{6i}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{i}{16}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | $\frac{\sqrt{15i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6i}}{96}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10i}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15i}}{24}$ | 0 | 0 | $\frac{5\sqrt{6i}}{96}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30i}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2i}}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3i}}{12}$ |
| | | 0 | $-\frac{\sqrt{30i}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2i}}{32}$ | 0 | 0 | $\frac{\sqrt{3i}}{12}$ | 0 |
| 645 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_{4,1}^{(1,-1;a)}(E, 2)$ | $\frac{\sqrt{70i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{42i}}{672}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ |
| | | 0 | $-\frac{\sqrt{70i}}{224}$ | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{672}$ | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{70i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $-\frac{13\sqrt{42i}}{672}$ | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{224}$ | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{42i}}{672}$ | $\frac{\sqrt{7i}}{14}$ | 0 |
| | | 0 | $-\frac{3\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70i}}{56}$ | $-\frac{5\sqrt{105i}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{11\sqrt{42i}}{672}$ | 0 | $\frac{\sqrt{42i}}{56}$ | $-\frac{\sqrt{7i}}{112}$ | 0 |
| | | $-\frac{3\sqrt{70i}}{224}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | $\frac{5\sqrt{105i}}{336}$ | 0 | 0 | $-\frac{11\sqrt{42i}}{672}$ | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | $\frac{\sqrt{7i}}{112}$ |
| | | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{3\sqrt{70i}}{224}$ | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42i}}{96}$ | 0 | 0 |
| | | $\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{3\sqrt{70i}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42i}}{96}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{210i}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ |
| | | 0 | $-\frac{\sqrt{210i}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14i}}{224}$ | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ | 0 |
| 646 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|-----------------------------------------------------------------------|--------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|-------------------------|
| | $\mathbb{G}_{4,2}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{672}$ | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | $-\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | $-\frac{13\sqrt{42}i}{672}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{13\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | $\frac{\sqrt{42}}{96}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 |
| | | $-\frac{3\sqrt{70}}{224}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ | $-\frac{\sqrt{42}}{96}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{3\sqrt{70}}{224}$ | $\frac{5\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{11\sqrt{42}}{672}$ | $-\frac{\sqrt{7}i}{112}$ | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | $-\frac{5\sqrt{105}i}{336}$ | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{11\sqrt{42}}{672}$ | 0 | 0 | $\frac{\sqrt{7}i}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{210}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{224}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}i}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}i}{224}$ | $\frac{\sqrt{21}}{84}$ | 0 |
| 647 | symmetry | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_6^{(1,-1;a)}(A, 1)$ | 0 | $\frac{7\sqrt{5}i}{120}$ | 0 | $-\frac{7\sqrt{5}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{24}$ | 0 | $\frac{\sqrt{3}}{24}$ | $-\frac{\sqrt{2}i}{12}$ | 0 | 0 |
| | | $\frac{7\sqrt{5}i}{120}$ | 0 | $\frac{7\sqrt{5}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{24}$ | 0 | $-\frac{\sqrt{3}}{24}$ | 0 | 0 | $\frac{\sqrt{2}i}{12}$ |
| | | 0 | $-\frac{\sqrt{5}}{15}$ | 0 | $-\frac{\sqrt{5}i}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}}{15}$ | 0 | $-\frac{\sqrt{5}i}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}i}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{60}$ | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ |
| | | 0 | $-\frac{\sqrt{5}i}{60}$ | 0 | 0 | $\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 | $\frac{\sqrt{3}i}{12}$ | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{5}i}{60}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{12}$ | 0 | 0 | $\frac{\sqrt{2}}{12}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{60}$ | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ | $-\frac{\sqrt{2}}{12}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}i}{120}$ | 0 | $\frac{\sqrt{15}}{120}$ | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | $\frac{1}{8}$ | 0 | 0 |
| | | $\frac{\sqrt{15}i}{120}$ | 0 | $-\frac{\sqrt{15}}{120}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 |
| 648 | symmetry | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_6^{(1,-1;a)}(A, 2)$ | $ \begin{array}{cccccccccccccccc} 0 & \frac{17\sqrt{11}i}{264} & 0 & -\frac{17\sqrt{11}}{264} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}i}{264} & 0 & -\frac{\sqrt{165}}{264} & \frac{\sqrt{110}i}{132} & 0 \\ \frac{17\sqrt{11}i}{264} & 0 & \frac{17\sqrt{11}}{264} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}i}{264} & 0 & \frac{\sqrt{165}}{264} & 0 & 0 & -\frac{\sqrt{110}i}{132} \\ 0 & -\frac{2\sqrt{11}}{33} & 0 & -\frac{2\sqrt{11}i}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2\sqrt{11}}{33} & 0 & -\frac{2\sqrt{11}i}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{11}i}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{66}i}{132} & 0 & 0 & \frac{\sqrt{165}i}{132} & 0 & 0 & 0 & 0 & \frac{\sqrt{110}i}{132} \\ 0 & \frac{\sqrt{11}i}{132} & 0 & 0 & -\frac{\sqrt{66}i}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}i}{132} & 0 & 0 & \frac{\sqrt{110}i}{132} & 0 \\ 0 & 0 & -\frac{\sqrt{11}i}{132} & 0 & 0 & -\frac{\sqrt{66}}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}i}{132} & 0 & 0 & -\frac{\sqrt{110}}{132} \\ 0 & 0 & 0 & \frac{\sqrt{11}i}{132} & \frac{\sqrt{66}}{132} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{165}i}{132} & \frac{\sqrt{110}}{132} & 0 \\ 0 & -\frac{\sqrt{33}i}{264} & 0 & -\frac{\sqrt{33}}{264} & \frac{\sqrt{22}i}{44} & 0 & 0 & 0 & 0 & \frac{\sqrt{55}i}{88} & 0 & -\frac{\sqrt{55}}{88} & 0 & 0 \\ -\frac{\sqrt{33}i}{264} & 0 & \frac{\sqrt{33}}{264} & 0 & 0 & -\frac{\sqrt{22}i}{44} & 0 & 0 & \frac{\sqrt{55}i}{88} & 0 & \frac{\sqrt{55}}{88} & 0 & 0 & 0 \end{array} $ |
| 649 | symmetry | $ \frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16} $ $ \begin{bmatrix} 0 & \frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{4} & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $ |
| 650 | symmetry | $ \frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16} $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|
| | $\mathbb{G}_6^{(1,-1;a)}(A, 4)$ | 0 | $\frac{\sqrt{55}}{660}$ | 0 | $\frac{\sqrt{55i}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{55}}{660}$ | 0 | $\frac{\sqrt{55i}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{55i}}{660}$ | 0 | $\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33i}}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | $\frac{\sqrt{22i}}{33}$ | 0 |
| | | $-\frac{\sqrt{55i}}{660}$ | 0 | $-\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33i}}{66}$ | 0 | $\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{22i}}{33}$ |
| | | 0 | 0 | $-\frac{\sqrt{55i}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330i}}{165}$ | 0 | 0 | $\frac{\sqrt{33i}}{33}$ | 0 | $\frac{\sqrt{22}}{33}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{55i}}{165}$ | 0 | 0 | $-\frac{\sqrt{330i}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33i}}{33}$ | $-\frac{\sqrt{22}}{33}$ |
| | | $\frac{\sqrt{55i}}{165}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{165}$ | $\frac{\sqrt{33i}}{33}$ | 0 | 0 | 0 | $\frac{\sqrt{22i}}{33}$ |
| | | 0 | $-\frac{\sqrt{55i}}{165}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{165}$ | 0 | 0 | $-\frac{\sqrt{33i}}{33}$ | 0 | 0 | $\frac{\sqrt{22i}}{33}$ |
| | | 0 | $\frac{\sqrt{165}}{330}$ | 0 | $-\frac{\sqrt{165i}}{330}$ | 0 | 0 | $\frac{\sqrt{110i}}{55}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | $\frac{\sqrt{11i}}{22}$ | 0 |
| | | $-\frac{\sqrt{165}}{330}$ | 0 | $-\frac{\sqrt{165i}}{330}$ | 0 | 0 | 0 | $-\frac{\sqrt{110i}}{55}$ | $-\frac{\sqrt{11}}{22}$ | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 |
| 651 | symmetry | $\frac{\sqrt{2}(2x^6 - 15x^4y^2 - 15x^4z^2 - 15x^2y^4 + 180x^2y^2z^2 - 15x^2z^4 + 2y^6 - 15y^4z^2 - 15y^2z^4 + 2z^6)}{8}$ | | | | | | | | | | | | |
| | $\mathbb{G}_6^{(1,-1;a)}(B, 1)$ | 0 | $\frac{\sqrt{231i}}{616}$ | 0 | $\frac{\sqrt{231}}{616}$ | $-\frac{3\sqrt{154i}}{308}$ | 0 | 0 | 0 | $-\frac{3\sqrt{385i}}{616}$ | 0 | $\frac{3\sqrt{385}}{616}$ | 0 | 0 |
| | | $\frac{\sqrt{231i}}{616}$ | 0 | $-\frac{\sqrt{231}}{616}$ | 0 | 0 | $\frac{3\sqrt{154i}}{308}$ | 0 | 0 | $-\frac{3\sqrt{385i}}{616}$ | 0 | $-\frac{3\sqrt{385}}{616}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{231}}{462}$ | 0 | $-\frac{\sqrt{231i}}{462}$ | 0 | 0 | $\frac{\sqrt{154i}}{77}$ | 0 | 0 | $\frac{\sqrt{385}}{154}$ | 0 | $\frac{\sqrt{385i}}{154}$ | 0 |
| | | $-\frac{\sqrt{231}}{462}$ | 0 | $-\frac{\sqrt{231i}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154i}}{77}$ | $-\frac{\sqrt{385}}{154}$ | 0 | $\frac{\sqrt{385i}}{154}$ | 0 | 0 |
| | | $-\frac{\sqrt{231i}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154i}}{308}$ | 0 | $\frac{\sqrt{154}}{77}$ | $-\frac{\sqrt{385i}}{308}$ | 0 | 0 | 0 | $-\frac{\sqrt{2310i}}{924}$ |
| | | 0 | $\frac{\sqrt{231i}}{132}$ | 0 | 0 | $-\frac{3\sqrt{154i}}{308}$ | 0 | $-\frac{\sqrt{154}}{77}$ | 0 | 0 | $\frac{\sqrt{385i}}{308}$ | 0 | 0 | $-\frac{\sqrt{2310i}}{924}$ |
| | | 0 | 0 | $\frac{\sqrt{231i}}{132}$ | 0 | 0 | $\frac{3\sqrt{154}}{308}$ | 0 | $\frac{\sqrt{154i}}{77}$ | 0 | 0 | $-\frac{\sqrt{385i}}{308}$ | 0 | $-\frac{\sqrt{2310}}{924}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231i}}{132}$ | $-\frac{3\sqrt{154}}{308}$ | 0 | $\frac{\sqrt{154i}}{77}$ | 0 | 0 | 0 | $\frac{\sqrt{385i}}{308}$ | $\frac{\sqrt{2310}}{924}$ | 0 |
| | | 0 | $-\frac{\sqrt{77i}}{88}$ | 0 | $\frac{\sqrt{77}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{616}$ | 0 | $-\frac{\sqrt{1155}}{616}$ | $\frac{\sqrt{770i}}{308}$ | 0 |
| | | $-\frac{\sqrt{77i}}{88}$ | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{616}$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | $-\frac{\sqrt{770i}}{308}$ |
| 652 | symmetry | $-\frac{\sqrt{14}(x^6 - 15x^4z^2 + 15x^2z^4 + y^6 - 15y^4z^2 + 15y^2z^4 - 2z^6)}{8}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|---------------------------------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--------------------------|-------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|
| | $\mathbb{G}_6^{(1,-1;a)}(B, 2)$ | 0 | $-\frac{\sqrt{33i}}{264}$ | 0 | $-\frac{\sqrt{33}}{264}$ | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55i}}{88}$ | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{33i}}{264}$ | 0 | $\frac{\sqrt{33}}{264}$ | 0 | 0 | $-\frac{\sqrt{22i}}{44}$ | 0 | 0 | $\frac{\sqrt{55i}}{88}$ | 0 | $\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{33i}}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | $-\frac{\sqrt{55i}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330i}}{132}$ |
| | | 0 | $-\frac{\sqrt{33i}}{132}$ | 0 | 0 | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | $\frac{\sqrt{55i}}{44}$ | 0 | 0 | 0 | $-\frac{\sqrt{330i}}{132}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{33i}}{132}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55i}}{44}$ | 0 | 0 | $-\frac{\sqrt{330}}{132}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{33i}}{132}$ | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55i}}{44}$ | $\frac{\sqrt{330}}{132}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{11i}}{88}$ | 0 | $-\frac{\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{88}$ | 0 | $-\frac{\sqrt{165}}{88}$ | $\frac{\sqrt{110i}}{44}$ | 0 | 0 |
| | | $\frac{\sqrt{11i}}{88}$ | 0 | $\frac{\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{88}$ | 0 | $\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | $-\frac{\sqrt{110i}}{44}$ |
| 653 | symmetry | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_6^{(1,-1;a)}(B, 3)$ | 0 | $\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110i}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11i}}{22}$ | $-\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110i}}{88}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | $-\frac{\sqrt{66}}{264}$ | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110i}}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66i}}{264}$ | 0 | $\frac{\sqrt{66}}{264}$ | 0 | 0 | $-\frac{\sqrt{11i}}{22}$ | 0 | 0 | $\frac{\sqrt{110i}}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{66i}}{66}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{66i}}{66}$ | $-\frac{\sqrt{11}}{22}$ | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{66i}}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66i}}{66}$ | 0 | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 654 | symmetry | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-------------------------------------|----------------------------|--------------------------------------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|
| $\mathbb{G}_{6,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $-\frac{5\sqrt{66}i}{528}$ | 0 | 0 | $-\frac{3\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{\sqrt{110}i}{176}$ | 0 | 0 | $-\frac{\sqrt{165}}{264}$ |
| | 0 | 0 | 0 | $\frac{5\sqrt{66}i}{528}$ | $\frac{3\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | $\frac{\sqrt{110}i}{176}$ | $\frac{\sqrt{165}}{264}$ | 0 | 0 |
| | $-\frac{\sqrt{66}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | $\frac{\sqrt{11}}{22}$ | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{132}$ |
| | 0 | $\frac{\sqrt{66}i}{88}$ | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 |
| | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 |
| | $\frac{\sqrt{66}}{88}$ | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}i}{22}$ | $\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{66}i}{88}$ | 0 | $\frac{\sqrt{66}}{66}$ | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | 0 |
| | $-\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{132}$ |
| | 0 | 0 | $-\frac{3\sqrt{22}i}{176}$ | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | 0 | 0 | $\frac{\sqrt{330}i}{176}$ | 0 | 0 | $\frac{\sqrt{55}}{88}$ |
| 0 | 0 | 0 | $\frac{3\sqrt{22}i}{176}$ | $\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{176}$ | $-\frac{\sqrt{55}}{88}$ | 0 | |
| 655 | symmetry | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ | | | | | | | | | | | | |
| $\mathbb{G}_{6,2}^{(1,-1;a)}(E, 1)$ | $\frac{5\sqrt{66}i}{528}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | $-\frac{\sqrt{11}}{44}$ | $-\frac{\sqrt{110}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{264}$ |
| | 0 | $-\frac{5\sqrt{66}i}{528}$ | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | $\frac{\sqrt{110}i}{176}$ | 0 | 0 | $-\frac{\sqrt{165}i}{264}$ | 0 |
| | 0 | 0 | $-\frac{\sqrt{66}i}{88}$ | 0 | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | $\frac{\sqrt{165}}{132}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{66}i}{88}$ | $\frac{\sqrt{11}}{44}$ | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | $-\frac{\sqrt{165}}{132}$ | 0 |
| | 0 | $\frac{\sqrt{66}i}{66}$ | 0 | $-\frac{\sqrt{66}}{88}$ | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{88}$ | $-\frac{\sqrt{165}i}{132}$ | 0 |
| | $\frac{\sqrt{66}i}{66}$ | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | $\frac{\sqrt{165}i}{132}$ |
| | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66}i}{88}$ | 0 | 0 | $\frac{\sqrt{11}i}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 |
| | $\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{22}$ | $-\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 |
| | $-\frac{3\sqrt{22}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{88}$ | 0 | $\frac{\sqrt{33}}{44}$ | $-\frac{\sqrt{330}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ |
| 0 | $\frac{3\sqrt{22}i}{176}$ | 0 | 0 | $-\frac{\sqrt{33}i}{88}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | $\frac{\sqrt{330}i}{176}$ | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ | 0 | |
| 656 | symmetry | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{G}_{6,1}^{(1,-1;a)}(E, 2)$ | $\begin{array}{cccccccccccc} \frac{i}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{32} & 0 & 0 & -\frac{\sqrt{15}i}{32} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{32} \\ 0 & -\frac{i}{32} & 0 & 0 & \frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{32} & 0 & 0 & -\frac{\sqrt{10}i}{32} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{16} & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{16} & 0 & 0 & \frac{\sqrt{10}i}{16} \\ \frac{i}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & 0 & -\frac{\sqrt{15}i}{16} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{32} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}i}{32} & 0 & 0 & \frac{3\sqrt{5}i}{32} & 0 & 0 & 0 & \frac{\sqrt{30}i}{32} \\ 0 & \frac{\sqrt{3}i}{32} & 0 & 0 & -\frac{3\sqrt{2}i}{32} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}i}{32} & 0 & 0 & \frac{\sqrt{30}i}{32} \end{array}$ |
| 657 | symmetry | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ $\begin{array}{cccccccccccc} 0 & 0 & \frac{i}{32} & 0 & 0 & \frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{32} & 0 & 0 & \frac{\sqrt{10}}{32} \\ 0 & 0 & 0 & -\frac{i}{32} & -\frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{32} & -\frac{\sqrt{10}}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{16} & \frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{16} & \frac{\sqrt{10}i}{16} & 0 \\ 0 & 0 & \frac{1}{16} & 0 & 0 & -\frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{16} & 0 & 0 & -\frac{\sqrt{10}i}{16} \\ 0 & 0 & \frac{\sqrt{3}i}{32} & 0 & 0 & \frac{3\sqrt{2}}{32} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}i}{32} & 0 & 0 & \frac{\sqrt{30}}{32} \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{32} & -\frac{3\sqrt{2}}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}i}{32} & -\frac{\sqrt{30}}{32} & 0 \end{array}$ |
| 658 | symmetry | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-------------------------------------|-----------|--------------------------------------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| $\mathbb{G}_{6,1}^{(1,-1;a)}(E, 3)$ | | $\frac{17\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 | $\frac{37\sqrt{330}i}{5280}$ | 0 | $-\frac{\sqrt{330}}{110}$ | $\frac{\sqrt{33}i}{96}$ | 0 | 0 | 0 | $\frac{\sqrt{22}i}{96}$ | |
| | | 0 | $-\frac{17\sqrt{55}i}{1056}$ | 0 | 0 | $\frac{37\sqrt{330}i}{5280}$ | 0 | $\frac{\sqrt{330}}{110}$ | 0 | 0 | $-\frac{\sqrt{33}i}{96}$ | 0 | 0 | $\frac{\sqrt{22}i}{96}$ | |
| | | 0 | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | 0 | $-\frac{\sqrt{330}}{110}$ | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | $-\frac{\sqrt{22}}{66}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{55}i}{66}$ | $\frac{\sqrt{330}}{110}$ | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{66}$ | $\frac{\sqrt{22}}{66}$ | 0 |
| | | 0 | $\frac{29\sqrt{55}i}{2640}$ | 0 | $-\frac{\sqrt{55}}{66}$ | $\frac{\sqrt{330}i}{240}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{176}$ | 0 | $-\frac{\sqrt{33}}{66}$ | $\frac{5\sqrt{22}i}{528}$ | 0 |
| | | $\frac{29\sqrt{55}i}{2640}$ | 0 | $\frac{\sqrt{55}}{66}$ | 0 | 0 | $-\frac{\sqrt{330}i}{240}$ | 0 | 0 | 0 | $\frac{\sqrt{33}i}{176}$ | 0 | $\frac{\sqrt{33}}{66}$ | 0 | $-\frac{5\sqrt{22}i}{528}$ |
| | | 0 | $-\frac{7\sqrt{55}}{330}$ | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 |
| | | $\frac{7\sqrt{55}}{330}$ | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{165}$ | $\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 |
| | | $\frac{9\sqrt{165}i}{1760}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{160}$ | 0 | $-\frac{\sqrt{110}}{110}$ | $\frac{5\sqrt{11}i}{352}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{66}i}{1056}$ |
| | | 0 | $-\frac{9\sqrt{165}i}{1760}$ | 0 | 0 | $\frac{\sqrt{110}i}{160}$ | 0 | $\frac{\sqrt{110}}{110}$ | 0 | 0 | $-\frac{5\sqrt{11}i}{352}$ | 0 | 0 | $\frac{5\sqrt{66}i}{1056}$ | 0 |
| 659 | symmetry | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ | | | | | | | | | | | | | |
| $\mathbb{G}_{6,2}^{(1,-1;a)}(E, 3)$ | | 0 | 0 | $\frac{17\sqrt{55}i}{1056}$ | 0 | 0 | $\frac{37\sqrt{330}}{5280}$ | 0 | $\frac{\sqrt{330}i}{110}$ | 0 | 0 | $-\frac{\sqrt{33}i}{96}$ | 0 | 0 | $-\frac{\sqrt{22}}{96}$ |
| | | 0 | 0 | 0 | $-\frac{17\sqrt{55}i}{1056}$ | $-\frac{37\sqrt{330}}{5280}$ | 0 | $\frac{\sqrt{330}i}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{96}$ | $\frac{\sqrt{22}}{96}$ | 0 |
| | | $\frac{\sqrt{55}i}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{110}$ | 0 | $-\frac{\sqrt{330}}{165}$ | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{66}$ |
| | | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | 0 | $\frac{\sqrt{330}i}{110}$ | 0 | $\frac{\sqrt{330}}{165}$ | 0 | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{66}$ |
| | | 0 | $\frac{\sqrt{55}}{66}$ | 0 | $\frac{7\sqrt{55}i}{330}$ | 0 | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 |
| | | $-\frac{\sqrt{55}}{66}$ | 0 | $\frac{7\sqrt{55}i}{330}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{165}$ | $\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{55}i}{66}$ | 0 | $-\frac{29\sqrt{55}}{2640}$ | $-\frac{\sqrt{330}i}{240}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | $\frac{\sqrt{33}}{176}$ | $\frac{5\sqrt{22}i}{528}$ | 0 |
| | | $\frac{\sqrt{55}i}{66}$ | 0 | $\frac{29\sqrt{55}}{2640}$ | 0 | 0 | $\frac{\sqrt{330}i}{240}$ | 0 | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{176}$ | 0 | 0 | $-\frac{5\sqrt{22}i}{528}$ |
| | | 0 | 0 | $-\frac{9\sqrt{165}i}{1760}$ | 0 | 0 | $-\frac{\sqrt{110}}{160}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | $\frac{5\sqrt{11}i}{352}$ | 0 | 0 | $\frac{5\sqrt{66}}{1056}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{165}i}{1760}$ | $\frac{\sqrt{110}}{160}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}i}{352}$ | $-\frac{5\sqrt{66}}{1056}$ | 0 |
| 660 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{G}_2^{(1,0;a)}(A, 1)$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ |
| | | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 661 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(1,0;a)}(A, 2)$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ |
| | | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ |
| | | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| 662 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{G}_2^{(1,0;a)}(B)$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 |
| 663 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |
| | $\mathbb{G}_{2,1}^{(1,0;a)}(E)$ | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ |
| | | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | $\frac{\sqrt{21}}{84}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | $-\frac{\sqrt{21}i}{42}$ | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 |
| 664 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------|----------------------------|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | $\mathbb{G}_{2,2}^{(1,0;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | $\frac{\sqrt{14i}}{56}$ | 0 | 0 | $\frac{\sqrt{21i}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | $-\frac{\sqrt{21i}}{84}$ | 0 |
| | | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ |
| | | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{56}$ | 0 | 0 | $-\frac{\sqrt{21i}}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{56}$ | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | $\frac{\sqrt{14i}}{56}$ | $-\frac{\sqrt{21i}}{42}$ | 0 |
| | | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | $-\frac{\sqrt{14i}}{56}$ | 0 | 0 | $\frac{\sqrt{21i}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 |
| 665 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(1,0;a)}(A, 1)$ | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | $-\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{560}$ | 0 | $-\frac{\sqrt{70i}}{560}$ | $\frac{\sqrt{105i}}{70}$ | 0 |
| | | $\frac{3\sqrt{42i}}{560}$ | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{560}$ | 0 | $\frac{\sqrt{70i}}{560}$ | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ |
| | | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{70i}}{560}$ | 0 | $\frac{13\sqrt{70i}}{560}$ | 0 | 0 |
| | | $-\frac{3\sqrt{42i}}{560}$ | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{13\sqrt{70i}}{560}$ | 0 | $\frac{13\sqrt{70i}}{560}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{42i}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{40}$ | 0 | $\frac{\sqrt{7i}}{20}$ | $\frac{\sqrt{70i}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{105i}}{280}$ |
| | | 0 | $-\frac{3\sqrt{42i}}{280}$ | 0 | 0 | $-\frac{\sqrt{7i}}{40}$ | 0 | $-\frac{\sqrt{7i}}{20}$ | 0 | 0 | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 | $-\frac{3\sqrt{105i}}{280}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{42i}}{280}$ | 0 | 0 | $-\frac{\sqrt{7i}}{40}$ | 0 | $-\frac{\sqrt{7i}}{20}$ | 0 | 0 | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 | $\frac{3\sqrt{105i}}{280}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{42i}}{280}$ | $\frac{\sqrt{7i}}{40}$ | 0 | $-\frac{\sqrt{7i}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{280}$ | $-\frac{3\sqrt{105i}}{280}$ | 0 |
| | | 0 | $\frac{3\sqrt{14i}}{80}$ | 0 | $\frac{3\sqrt{14i}}{80}$ | $-\frac{\sqrt{21i}}{35}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{210i}}{560}$ | 0 | $-\frac{3\sqrt{210i}}{560}$ | 0 | 0 |
| | | $\frac{3\sqrt{14i}}{80}$ | 0 | $-\frac{3\sqrt{14i}}{80}$ | 0 | 0 | $\frac{\sqrt{21i}}{35}$ | 0 | 0 | $\frac{3\sqrt{210i}}{560}$ | 0 | $\frac{3\sqrt{210i}}{560}$ | 0 | 0 | 0 |
| 666 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|
| | $\mathbb{G}_4^{(1,0;a)}(A, 2)$ | 0 | $-\frac{3\sqrt{42}}{560}$ | 0 | $-\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{70}}{560}$ | 0 | $\frac{13\sqrt{70i}}{560}$ | 0 | 0 |
| | | $\frac{3\sqrt{42}}{560}$ | 0 | $-\frac{3\sqrt{42i}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{13\sqrt{70}}{560}$ | 0 | $\frac{13\sqrt{70i}}{560}$ | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{42i}}{560}$ | 0 | $-\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{560}$ | 0 | $\frac{\sqrt{70}}{560}$ | $-\frac{\sqrt{105i}}{70}$ | 0 |
| | | $\frac{3\sqrt{42i}}{560}$ | 0 | $\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{560}$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | 0 | $\frac{\sqrt{105i}}{70}$ |
| | | 0 | 0 | $-\frac{3\sqrt{42i}}{280}$ | 0 | 0 | $\frac{\sqrt{7}}{20}$ | 0 | $\frac{\sqrt{7i}}{40}$ | 0 | 0 | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 | $\frac{3\sqrt{105}}{280}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{42i}}{280}$ | $-\frac{\sqrt{7}}{20}$ | 0 | $\frac{\sqrt{7i}}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{280}$ | $-\frac{3\sqrt{105}}{280}$ | 0 |
| | | $\frac{3\sqrt{42i}}{280}$ | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{20}$ | 0 | $\frac{\sqrt{7}}{40}$ | $-\frac{\sqrt{70i}}{280}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{105i}}{280}$ |
| | | 0 | $-\frac{3\sqrt{42i}}{280}$ | 0 | 0 | $-\frac{\sqrt{7i}}{20}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | $\frac{\sqrt{70i}}{280}$ | 0 | 0 | $\frac{3\sqrt{105i}}{280}$ | 0 |
| | | 0 | $\frac{3\sqrt{14}}{80}$ | 0 | $-\frac{3\sqrt{14i}}{80}$ | 0 | 0 | $\frac{\sqrt{21i}}{35}$ | 0 | 0 | $-\frac{3\sqrt{210}}{560}$ | 0 | $-\frac{3\sqrt{210i}}{560}$ | 0 | 0 |
| | | $-\frac{3\sqrt{14}}{80}$ | 0 | $-\frac{3\sqrt{14i}}{80}$ | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{35}$ | $\frac{3\sqrt{210}}{560}$ | 0 | $-\frac{3\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 |
| 667 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(1,0;a)}(B, 1)$ | 0 | $-\frac{\sqrt{10i}}{80}$ | 0 | $-\frac{\sqrt{10}}{80}$ | $-\frac{\sqrt{15i}}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 |
| | | $-\frac{\sqrt{10i}}{80}$ | 0 | $\frac{\sqrt{10}}{80}$ | 0 | 0 | $\frac{\sqrt{15i}}{30}$ | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ | 0 | $-\frac{\sqrt{6}}{48}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{80}$ | 0 | $-\frac{\sqrt{10i}}{80}$ | 0 | 0 | $\frac{\sqrt{15i}}{30}$ | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}}{80}$ | 0 | $-\frac{\sqrt{10i}}{80}$ | 0 | 0 | 0 | $-\frac{\sqrt{15i}}{30}$ | $\frac{\sqrt{6}}{16}$ | 0 | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10i}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15i}}{40}$ | 0 | $\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | $-\frac{\sqrt{10i}}{20}$ | 0 | 0 | $\frac{\sqrt{15i}}{40}$ | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | 0 | $-\frac{\sqrt{10i}}{20}$ | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | $\frac{\sqrt{15i}}{30}$ | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10i}}{20}$ | $\frac{\sqrt{15}}{40}$ | 0 | $\frac{\sqrt{15i}}{30}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ |
| | | 0 | $-\frac{\sqrt{30i}}{80}$ | 0 | $\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{16}$ | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{30i}}{80}$ | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{16}$ | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 |
| 668 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|-----------------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|-------------------------|-------------------------|
| | $\mathbb{G}_4^{(1,0;a)}(B, 2)$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | $-\frac{\sqrt{14}}{112}$ | $\frac{\sqrt{21}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{210}i}{1680}$ | 0 | $\frac{17\sqrt{210}}{1680}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | 0 | $-\frac{\sqrt{21}i}{30}$ | 0 | 0 | $-\frac{17\sqrt{210}i}{1680}$ | 0 | $-\frac{17\sqrt{210}}{1680}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | 0 | $-\frac{\sqrt{21}i}{30}$ | 0 | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | $-\frac{\sqrt{210}i}{560}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{30}$ | $\frac{\sqrt{210}}{560}$ | 0 | $-\frac{\sqrt{210}i}{560}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{14}i}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{40}$ | 0 | $\frac{\sqrt{21}}{60}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{56}$ |
| | | 0 | $\frac{\sqrt{14}i}{20}$ | 0 | 0 | $\frac{\sqrt{21}i}{40}$ | 0 | $-\frac{\sqrt{21}}{60}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{14}i}{20}$ | 0 | 0 | $-\frac{\sqrt{21}}{40}$ | 0 | $\frac{\sqrt{21}i}{60}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{20}$ | $\frac{\sqrt{21}}{40}$ | 0 | $\frac{\sqrt{21}i}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{42}i}{80}$ | 0 | $-\frac{\sqrt{42}}{80}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{80}$ | 0 | $\frac{\sqrt{42}}{80}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 |
| 669 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_4^{(1,0;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{5}$ | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{i}{5}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{5}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{10}$ | 0 | 0 | $-\frac{1}{40}$ | 0 | $-\frac{i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{10}$ | $\frac{1}{40}$ | 0 | $-\frac{i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{i}{40}$ | 0 | $\frac{1}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{10}$ | 0 | 0 | $-\frac{i}{40}$ | 0 | $-\frac{1}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{2}}{40}$ | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{2}}{40}$ | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 670 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------------------|--------------------------|---------------------------|--------------------------|-------------------------|-------------------------|------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{G}_{4,1}^{(1,0;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{6}i}{160}$ | 0 | 0 | $\frac{1}{40}$ | 0 | $\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | $\frac{\sqrt{15}}{40}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{160}$ | $-\frac{1}{40}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | $-\frac{\sqrt{15}}{40}$ | 0 |
| | | $\frac{\sqrt{6}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{3i}{20}$ | 0 | $-\frac{1}{40}$ | $\frac{\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ |
| | | 0 | $-\frac{\sqrt{6}i}{160}$ | 0 | 0 | $-\frac{3i}{20}$ | 0 | $\frac{1}{40}$ | 0 | 0 | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{160}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $\frac{i}{40}$ | 0 | 0 | $\frac{\sqrt{10}}{160}$ | 0 | $-\frac{3\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}}{160}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | 0 | 0 | $-\frac{i}{40}$ | $-\frac{\sqrt{10}}{160}$ | 0 | $-\frac{3\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{20}$ | 0 | $\frac{\sqrt{6}}{32}$ | $-\frac{i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{160}$ | $\frac{\sqrt{15}i}{80}$ | 0 |
| | | $\frac{\sqrt{6}i}{20}$ | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | 0 | $\frac{i}{16}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{80}$ |
| | | 0 | 0 | $-\frac{9\sqrt{2}i}{160}$ | 0 | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $-\frac{\sqrt{30}i}{160}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{9\sqrt{2}i}{160}$ | $\frac{\sqrt{3}}{20}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{160}$ | 0 | 0 |
| 671 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_{4,2}^{(1,0;a)}(E, 1)$ | $\frac{\sqrt{6}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{i}{40}$ | 0 | $\frac{1}{10}$ | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | 0 | $-\frac{\sqrt{6}i}{160}$ | 0 | 0 | $-\frac{i}{40}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{160}$ | 0 | 0 | $-\frac{3}{20}$ | 0 | $\frac{i}{40}$ | 0 | 0 | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{160}$ | $\frac{3}{20}$ | 0 | $\frac{i}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{160}$ | $-\frac{\sqrt{15}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | $\frac{\sqrt{6}}{20}$ | $-\frac{i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{160}$ | 0 | $-\frac{\sqrt{10}}{20}$ | $-\frac{\sqrt{15}i}{80}$ | 0 |
| | | $\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{\sqrt{6}}{20}$ | 0 | 0 | $\frac{i}{16}$ | 0 | 0 | $\frac{\sqrt{10}i}{160}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $\frac{\sqrt{15}i}{80}$ |
| | | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | $\frac{\sqrt{6}i}{160}$ | 0 | 0 | $-\frac{i}{40}$ | 0 | 0 | $\frac{3\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{40}$ | 0 | $\frac{\sqrt{6}i}{160}$ | 0 | 0 | 0 | $\frac{i}{40}$ | $-\frac{3\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{2}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $-\frac{\sqrt{3}}{10}$ | $\frac{\sqrt{30}i}{160}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{9\sqrt{2}i}{160}$ | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}}{10}$ | 0 | 0 | $-\frac{\sqrt{30}i}{160}$ | 0 | 0 | 0 | 0 |
| 672 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|------------------------------------------|----------------------------|------------------------------|------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|--|
| | $\mathbb{G}_{4,1}^{(1,0;a)}(E, 2)$ | $-\frac{\sqrt{42}i}{1120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | $-\frac{3\sqrt{7}}{70}$ | $\frac{19\sqrt{70}i}{1120}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | |
| | | 0 | $\frac{\sqrt{42}i}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | $\frac{3\sqrt{7}}{70}$ | 0 | 0 | $-\frac{19\sqrt{70}i}{1120}$ | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ | |
| | | 0 | 0 | $-\frac{\sqrt{42}i}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}}{140}$ | 0 | $\frac{\sqrt{7}i}{40}$ | 0 | 0 | $-\frac{23\sqrt{70}i}{1120}$ | 0 | $\frac{\sqrt{105}}{140}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{1120}$ | $\frac{\sqrt{7}}{140}$ | 0 | $\frac{\sqrt{7}i}{40}$ | 0 | 0 | 0 | 0 | $\frac{23\sqrt{70}i}{1120}$ | $-\frac{\sqrt{105}}{140}$ | |
| | | 0 | $-\frac{\sqrt{42}i}{1120}$ | 0 | $\frac{\sqrt{42}}{56}$ | $-\frac{\sqrt{7}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | $\frac{3\sqrt{70}}{280}$ | $\frac{\sqrt{105}i}{560}$ | |
| | | $-\frac{\sqrt{42}i}{1120}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{80}$ | 0 | 0 | $-\frac{\sqrt{70}i}{224}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{105}i}{560}$ | |
| | | 0 | $\frac{\sqrt{42}}{140}$ | 0 | $-\frac{29\sqrt{42}i}{1120}$ | 0 | 0 | $\frac{\sqrt{7}i}{40}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | |
| | | $-\frac{\sqrt{42}}{140}$ | 0 | $-\frac{29\sqrt{42}i}{1120}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | $\frac{\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | 0 | |
| | | $-\frac{9\sqrt{14}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{70}$ | $-\frac{\sqrt{210}i}{1120}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{9\sqrt{14}i}{160}$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{70}$ | 0 | 0 | $\frac{\sqrt{210}i}{1120}$ | 0 | 0 | 0 | |
| 673 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_{4,2}^{(1,0;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{42}i}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | $\frac{3\sqrt{7}i}{70}$ | 0 | 0 | $-\frac{19\sqrt{70}i}{1120}$ | 0 | $\frac{\sqrt{105}}{56}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{1120}$ | $\frac{\sqrt{7}}{40}$ | 0 | $\frac{3\sqrt{7}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{70}i}{1120}$ | $-\frac{\sqrt{105}}{56}$ | |
| | | $\frac{\sqrt{42}i}{1120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{140}$ | 0 | $\frac{\sqrt{7}}{40}$ | $-\frac{23\sqrt{70}i}{1120}$ | 0 | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | |
| | | 0 | $-\frac{\sqrt{42}i}{1120}$ | 0 | 0 | $\frac{\sqrt{7}i}{140}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | $\frac{23\sqrt{70}i}{1120}$ | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | |
| | | 0 | $\frac{29\sqrt{42}}{1120}$ | 0 | $-\frac{\sqrt{42}i}{140}$ | 0 | 0 | $\frac{\sqrt{7}i}{40}$ | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | |
| | | $-\frac{29\sqrt{42}}{1120}$ | 0 | $-\frac{\sqrt{42}i}{140}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | $-\frac{\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{1120}$ | $\frac{\sqrt{7}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{224}$ | $\frac{\sqrt{105}i}{560}$ | |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}i}{80}$ | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | $\frac{\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{105}i}{560}$ | |
| | | 0 | 0 | $\frac{9\sqrt{14}i}{160}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{70}$ | 0 | 0 | $-\frac{\sqrt{210}i}{1120}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{14}i}{160}$ | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{1120}$ | 0 | |
| 674 | symmetry | 1 | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------|----------------------------|---------------------------|----------------------------|-------------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{G}_0^{(1,1;a)}(B)$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | $\frac{\sqrt{210}}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{210}i}{105}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{70}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | $\frac{\sqrt{35}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | $\frac{\sqrt{70}}{70}$ | $\frac{\sqrt{105}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ |
| 675 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(1,1;a)}(A, 1)$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | $-\frac{\sqrt{210}}{120}$ | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | $\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}}{120}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ |
| | | 0 | $\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{280}$ | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{280}$ | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{28}$ | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{420}$ |
| | | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{420}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{420}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{35}}{420}$ | 0 |
| | | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42}i}{168}$ | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 |
| 676 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------|---------------------------|----------------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{G}_2^{(1,1;a)}(A, 2)$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{280}$ | 0 | $-\frac{\sqrt{210}i}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{280}$ | 0 | $-\frac{\sqrt{210}i}{280}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | $-\frac{\sqrt{210}}{120}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}i}{168}$ | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}}{120}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{420}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{14}i}{168}$ | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | $\frac{\sqrt{35}}{420}$ | 0 |
| | | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{420}$ |
| | | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{420}$ | 0 |
| | | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 | 0 |
| 677 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |
| | $\mathbb{G}_2^{(1,1;a)}(B)$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $-\frac{\sqrt{70}}{70}$ | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{70}i}{140}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{210}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | 0 | 0 | $\frac{\sqrt{105}i}{210}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{70}i}{140}$ | 0 | 0 | $\frac{\sqrt{105}}{210}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{140}$ | $-\frac{\sqrt{105}}{210}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | $\frac{\sqrt{210}}{140}$ | $\frac{\sqrt{35}i}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ |
| 678 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$ | $-\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{105}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{105}$ | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | $\frac{\sqrt{35}i}{42}$ | 0 |
| | | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | $\frac{\sqrt{210}i}{168}$ | $\frac{\sqrt{35}i}{105}$ | 0 |
| | | $\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{35}i}{105}$ |
| | | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | 0 |
| | | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{105}$ | 0 |
| 679 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | | 0 | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | 0 | $\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}i}{42}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{105}$ | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | $\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}i}{105}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{105}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 |
| | | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}i}{280}$ | $\frac{\sqrt{35}i}{105}$ |
| | | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}i}{280}$ | 0 | $-\frac{\sqrt{35}i}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}i}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | $\frac{\sqrt{105}i}{105}$ | 0 |
| 680 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|------------------------------------------------------------|----------------------------|----------------------------|----------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|----------------------------|----------------------------|
| $\mathbb{G}_4^{(1,1;a)}(A, 1)$ | | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | 0 | $-\frac{17\sqrt{1155}}{4620}$ | $-\frac{\sqrt{770}i}{220}$ | 0 |
| | | $\frac{\sqrt{77}i}{1540}$ | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | 0 | $\frac{17\sqrt{1155}}{4620}$ | 0 | 0 | $\frac{\sqrt{770}i}{220}$ |
| | | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{420}$ | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{77}}{1540}$ | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{77}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{462}i}{2310}$ | 0 | $-\frac{\sqrt{462}}{210}$ | $-\frac{\sqrt{1155}i}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | $-\frac{\sqrt{77}i}{220}$ | 0 | 0 | $-\frac{17\sqrt{462}i}{2310}$ | 0 | $\frac{\sqrt{462}}{210}$ | 0 | 0 | $\frac{\sqrt{1155}i}{220}$ | 0 | 0 | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | 0 | $\frac{\sqrt{77}i}{220}$ | 0 | 0 | $-\frac{17\sqrt{462}}{2310}$ | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | 0 | $\frac{\sqrt{1155}i}{220}$ | 0 | 0 | $-\frac{\sqrt{770}}{385}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{220}$ | $\frac{17\sqrt{462}}{2310}$ | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{220}$ | $\frac{\sqrt{770}}{385}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{231}i}{165}$ | 0 | $-\frac{\sqrt{231}}{165}$ | $-\frac{3\sqrt{154}i}{220}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{385}i}{770}$ | 0 | $-\frac{3\sqrt{385}}{770}$ | 0 | 0 |
| | | $-\frac{\sqrt{231}i}{165}$ | 0 | $\frac{\sqrt{231}}{165}$ | 0 | 0 | $\frac{3\sqrt{154}i}{220}$ | 0 | 0 | $\frac{3\sqrt{385}i}{770}$ | 0 | $\frac{3\sqrt{385}}{770}$ | 0 | 0 | 0 |
| 681 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| $\mathbb{G}_4^{(1,1;a)}(A, 2)$ | | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{420}$ | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{77}}{1540}$ | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{1155}i}{4620}$ | 0 | $\frac{17\sqrt{1155}}{4620}$ | $\frac{\sqrt{770}i}{220}$ | 0 |
| | | $\frac{\sqrt{77}i}{1540}$ | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{1155}i}{4620}$ | 0 | $-\frac{17\sqrt{1155}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}i}{220}$ |
| | | 0 | 0 | $-\frac{\sqrt{77}i}{220}$ | 0 | 0 | $-\frac{\sqrt{462}}{210}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $\frac{\sqrt{1155}i}{220}$ | 0 | 0 | $-\frac{\sqrt{770}}{385}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}i}{220}$ | $\frac{\sqrt{462}}{210}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{220}$ | $\frac{\sqrt{770}}{385}$ | 0 | 0 |
| | | $\frac{\sqrt{77}i}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | $\frac{\sqrt{1155}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{385}$ |
| | | 0 | $-\frac{\sqrt{77}i}{220}$ | 0 | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | $-\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{220}$ | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{385}$ |
| | | 0 | $-\frac{\sqrt{231}}{165}$ | 0 | $\frac{\sqrt{231}i}{165}$ | 0 | 0 | $\frac{3\sqrt{154}i}{220}$ | 0 | 0 | $-\frac{3\sqrt{385}}{770}$ | 0 | $-\frac{3\sqrt{385}i}{770}$ | 0 | 0 |
| | | $\frac{\sqrt{231}}{165}$ | 0 | $\frac{\sqrt{231}i}{165}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}i}{220}$ | $\frac{3\sqrt{385}}{770}$ | 0 | $-\frac{3\sqrt{385}i}{770}$ | 0 | 0 | 0 |
| 682 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|--------------------------------|-----------------------------|----------------------------------------------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|
| $\mathbb{G}_4^{(1,1;a)}(B, 1)$ | 0 | $\frac{2\sqrt{165}i}{165}$ | 0 | $\frac{2\sqrt{165}}{165}$ | $\frac{7\sqrt{110}i}{660}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{66}$ | 0 | $\frac{\sqrt{11}}{66}$ | 0 | 0 |
| | $\frac{2\sqrt{165}i}{165}$ | 0 | $-\frac{2\sqrt{165}}{165}$ | 0 | 0 | $-\frac{7\sqrt{110}i}{660}$ | 0 | 0 | $-\frac{\sqrt{11}i}{66}$ | 0 | $-\frac{\sqrt{11}}{66}$ | 0 | 0 | 0 |
| | 0 | $\frac{7\sqrt{165}}{660}$ | 0 | $-\frac{7\sqrt{165}i}{660}$ | 0 | 0 | $-\frac{\sqrt{110}i}{330}$ | 0 | 0 | $-\frac{\sqrt{11}}{132}$ | 0 | $-\frac{\sqrt{11}i}{132}$ | 0 | 0 |
| | $-\frac{7\sqrt{165}}{660}$ | 0 | $-\frac{7\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{330}$ | $\frac{\sqrt{11}}{132}$ | 0 | $-\frac{\sqrt{11}i}{132}$ | 0 | 0 | 0 |
| | $\frac{\sqrt{165}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{165}$ | 0 | $-\frac{\sqrt{110}}{330}$ | $-\frac{5\sqrt{11}i}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}i}{66}$ |
| | 0 | $-\frac{\sqrt{165}i}{220}$ | 0 | 0 | $-\frac{\sqrt{110}i}{165}$ | 0 | $\frac{\sqrt{110}}{330}$ | 0 | 0 | $\frac{5\sqrt{11}i}{132}$ | 0 | 0 | $\frac{\sqrt{66}i}{66}$ | 0 |
| | 0 | 0 | $-\frac{\sqrt{165}i}{220}$ | 0 | 0 | $\frac{\sqrt{110}}{165}$ | 0 | $-\frac{\sqrt{110}i}{330}$ | 0 | 0 | $-\frac{5\sqrt{11}i}{132}$ | 0 | 0 | $\frac{\sqrt{66}}{66}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{165}i}{220}$ | $-\frac{\sqrt{110}}{165}$ | 0 | $-\frac{\sqrt{110}i}{330}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}i}{132}$ | $-\frac{\sqrt{66}}{66}$ | 0 |
| | 0 | $-\frac{\sqrt{55}i}{660}$ | 0 | $\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{44}$ | 0 | $\frac{\sqrt{33}}{44}$ | $\frac{5\sqrt{22}i}{132}$ | 0 |
| | $-\frac{\sqrt{55}i}{660}$ | 0 | $-\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{44}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | $-\frac{5\sqrt{22}i}{132}$ |
| 683 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | |
| $\mathbb{G}_4^{(1,1;a)}(B, 2)$ | 0 | $-\frac{5\sqrt{231}i}{462}$ | 0 | $-\frac{5\sqrt{231}}{462}$ | $-\frac{19\sqrt{154}i}{4620}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}i}{1155}$ | 0 | $\frac{\sqrt{385}}{1155}$ | 0 | 0 |
| | $-\frac{5\sqrt{231}i}{462}$ | 0 | $\frac{5\sqrt{231}}{462}$ | 0 | 0 | $\frac{19\sqrt{154}i}{4620}$ | 0 | 0 | $-\frac{\sqrt{385}i}{1155}$ | 0 | $-\frac{\sqrt{385}}{1155}$ | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{231}}{84}$ | 0 | $\frac{\sqrt{231}i}{84}$ | 0 | 0 | $\frac{\sqrt{154}i}{105}$ | 0 | 0 | $-\frac{\sqrt{385}}{420}$ | 0 | $-\frac{\sqrt{385}i}{420}$ | 0 | 0 |
| | $\frac{\sqrt{231}}{84}$ | 0 | $\frac{\sqrt{231}i}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{154}i}{105}$ | $\frac{\sqrt{385}}{420}$ | 0 | $-\frac{\sqrt{385}i}{420}$ | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{231}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154}i}{1155}$ | 0 | $-\frac{\sqrt{154}}{210}$ | $-\frac{5\sqrt{385}i}{924}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}i}{462}$ |
| | 0 | $\frac{\sqrt{231}i}{220}$ | 0 | 0 | $-\frac{2\sqrt{154}i}{1155}$ | 0 | $\frac{\sqrt{154}}{210}$ | 0 | 0 | $\frac{5\sqrt{385}i}{924}$ | 0 | 0 | $\frac{\sqrt{2310}i}{462}$ | 0 |
| | 0 | 0 | $\frac{\sqrt{231}i}{220}$ | 0 | 0 | $\frac{2\sqrt{154}}{1155}$ | 0 | $-\frac{\sqrt{154}i}{210}$ | 0 | 0 | $-\frac{5\sqrt{385}i}{924}$ | 0 | 0 | $\frac{\sqrt{2310}}{462}$ |
| | 0 | 0 | 0 | $-\frac{\sqrt{231}i}{220}$ | $-\frac{2\sqrt{154}}{1155}$ | 0 | $-\frac{\sqrt{154}i}{210}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{385}i}{924}$ | $-\frac{\sqrt{2310}}{462}$ | 0 |
| | 0 | $\frac{\sqrt{77}i}{660}$ | 0 | $-\frac{\sqrt{77}}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{308}$ | 0 | $\frac{\sqrt{1155}}{308}$ | $\frac{5\sqrt{770}i}{924}$ | 0 |
| | $\frac{\sqrt{77}i}{660}$ | 0 | $\frac{\sqrt{77}}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{308}$ | 0 | $-\frac{\sqrt{1155}}{308}$ | 0 | 0 | $-\frac{5\sqrt{770}i}{924}$ |
| 684 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | | |
|------------------------------------|-----------|------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|---|
| $\mathbb{G}_4^{(1,1;a)}(B, 3)$ | | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | 0 | $\frac{3\sqrt{66}i}{220}$ | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | |
| | | $\frac{3\sqrt{11}}{44}$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{66}i}{220}$ | $\frac{\sqrt{165}}{660}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | $\frac{3\sqrt{11}}{44}$ | $\frac{3\sqrt{66}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $\frac{\sqrt{165}}{660}$ | 0 | 0 | |
| | | $\frac{3\sqrt{11}i}{44}$ | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | $-\frac{3\sqrt{66}i}{220}$ | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $\frac{3\sqrt{11}i}{110}$ | 0 | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{11}i}{110}$ | $\frac{\sqrt{66}}{330}$ | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{11}i}{110}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | $\frac{\sqrt{66}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{11}i}{110}$ | 0 | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{33}}{330}$ | 0 | $-\frac{\sqrt{33}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{33}}{330}$ | 0 | $-\frac{\sqrt{33}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 685 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | | |
| $\mathbb{G}_{4,1}^{(1,1;a)}(E, 1)$ | | 0 | 0 | $-\frac{\sqrt{11}i}{220}$ | 0 | 0 | $\frac{7\sqrt{66}}{660}$ | 0 | $-\frac{3\sqrt{66}i}{440}$ | 0 | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{11}i}{220}$ | $-\frac{7\sqrt{66}}{660}$ | 0 | $-\frac{3\sqrt{66}i}{440}$ | 0 | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | $-\frac{\sqrt{110}}{110}$ | 0 | 0 | |
| | | $\frac{\sqrt{11}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{66}i}{440}$ | 0 | $-\frac{\sqrt{66}}{330}$ | $\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{440}$ | |
| | | 0 | $-\frac{\sqrt{11}i}{220}$ | 0 | 0 | $-\frac{3\sqrt{66}i}{440}$ | 0 | $\frac{\sqrt{66}}{330}$ | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{440}$ | 0 | |
| | | 0 | $\frac{\sqrt{11}}{220}$ | 0 | $-\frac{3\sqrt{11}i}{440}$ | 0 | 0 | $\frac{\sqrt{66}i}{330}$ | 0 | 0 | $\frac{\sqrt{165}}{660}$ | 0 | $-\frac{3\sqrt{165}i}{440}$ | 0 | 0 | |
| | | $-\frac{\sqrt{11}}{220}$ | 0 | $-\frac{3\sqrt{11}i}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{330}$ | $-\frac{\sqrt{165}}{660}$ | 0 | $-\frac{3\sqrt{165}i}{440}$ | 0 | 0 | 0 | |
| | | 0 | $-\frac{9\sqrt{11}i}{440}$ | 0 | $-\frac{\sqrt{11}}{44}$ | $-\frac{\sqrt{66}i}{66}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{165}}{60}$ | $-\frac{\sqrt{110}i}{55}$ | 0 | |
| | | $-\frac{9\sqrt{11}i}{440}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | $\frac{\sqrt{66}i}{66}$ | 0 | 0 | $-\frac{3\sqrt{165}i}{440}$ | 0 | $\frac{\sqrt{165}}{60}$ | 0 | 0 | $\frac{\sqrt{110}i}{55}$ | |
| | | 0 | 0 | $-\frac{\sqrt{33}i}{165}$ | 0 | 0 | $\frac{3\sqrt{22}}{110}$ | 0 | $-\frac{9\sqrt{22}i}{440}$ | 0 | 0 | $-\frac{3\sqrt{55}i}{110}$ | 0 | 0 | $\frac{\sqrt{330}}{132}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}i}{165}$ | $-\frac{3\sqrt{22}}{110}$ | 0 | $-\frac{9\sqrt{22}i}{440}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{55}i}{110}$ | $-\frac{\sqrt{330}}{132}$ | 0 | |
| 686 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|---------------------------------------|----------------------------|----------------------------|---------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|--------------------------------|----------------------------|----------------------------|
| $\mathbb{G}_{4,2}^{(1,1;a)}(E, 1)$ | | $\frac{\sqrt{11}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{66}i}{660}$ | 0 | $-\frac{3\sqrt{66}}{440}$ | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{110}i}{110}$ | |
| | | 0 | $-\frac{\sqrt{11}i}{220}$ | 0 | 0 | $-\frac{7\sqrt{66}i}{660}$ | 0 | $\frac{3\sqrt{66}}{440}$ | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | 0 | 0 | $\frac{\sqrt{110}i}{110}$ | |
| | | 0 | 0 | $\frac{\sqrt{11}i}{220}$ | 0 | 0 | $-\frac{3\sqrt{66}}{440}$ | 0 | $\frac{\sqrt{66}i}{330}$ | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $\frac{3\sqrt{110}}{440}$ | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{220}$ | $\frac{3\sqrt{66}}{440}$ | 0 | $\frac{\sqrt{66}i}{330}$ | 0 | 0 | 0 | $\frac{\sqrt{165}i}{660}$ | $-\frac{3\sqrt{110}}{440}$ | 0 | |
| | | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{9\sqrt{11}}{440}$ | $-\frac{\sqrt{66}i}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{60}$ | 0 | $\frac{3\sqrt{165}}{440}$ | $\frac{\sqrt{110}i}{55}$ | |
| | | $-\frac{\sqrt{11}i}{44}$ | 0 | $\frac{9\sqrt{11}}{440}$ | 0 | 0 | $\frac{\sqrt{66}i}{66}$ | 0 | 0 | $\frac{\sqrt{165}i}{60}$ | 0 | $-\frac{3\sqrt{165}}{440}$ | 0 | $-\frac{\sqrt{110}i}{55}$ | |
| | | 0 | $-\frac{3\sqrt{11}}{440}$ | 0 | $\frac{\sqrt{11}i}{220}$ | 0 | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | 0 | $\frac{3\sqrt{165}}{440}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 |
| | | $\frac{3\sqrt{11}}{440}$ | 0 | $\frac{\sqrt{11}i}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}i}{330}$ | $-\frac{3\sqrt{165}}{440}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{33}i}{165}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}i}{110}$ | 0 | $\frac{9\sqrt{22}}{440}$ | $\frac{3\sqrt{55}i}{110}$ | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{132}$ | |
| | | 0 | $\frac{\sqrt{33}i}{165}$ | 0 | 0 | $\frac{3\sqrt{22}i}{110}$ | 0 | $-\frac{9\sqrt{22}}{440}$ | 0 | 0 | $-\frac{3\sqrt{55}i}{110}$ | 0 | 0 | $-\frac{\sqrt{330}i}{132}$ | 0 |
| 687 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |
| $\mathbb{G}_{4,1}^{(1,1;a)}(E, 2)$ | | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | $-\frac{29\sqrt{462}i}{4620}$ | 0 | $-\frac{3\sqrt{462}}{440}$ | $-\frac{\sqrt{1155}i}{420}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | $-\frac{29\sqrt{462}i}{4620}$ | 0 | $\frac{3\sqrt{462}}{440}$ | 0 | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | $-\frac{3\sqrt{462}}{440}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $\frac{17\sqrt{1155}i}{4620}$ | 0 | $-\frac{\sqrt{770}}{440}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}i}{1540}$ | $\frac{3\sqrt{462}}{440}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | $\frac{\sqrt{770}}{440}$ | 0 |
| | | 0 | $-\frac{3\sqrt{77}i}{220}$ | 0 | $-\frac{\sqrt{77}}{88}$ | $-\frac{\sqrt{462}i}{210}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{\sqrt{1155}}{440}$ | $-\frac{\sqrt{770}i}{385}$ | 0 |
| | | $-\frac{3\sqrt{77}i}{220}$ | 0 | $\frac{\sqrt{77}}{88}$ | 0 | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | $\frac{\sqrt{1155}}{440}$ | 0 | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | $-\frac{7\sqrt{77}}{440}$ | 0 | $\frac{3\sqrt{77}i}{220}$ | 0 | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $-\frac{\sqrt{1155}}{440}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | 0 |
| | | $\frac{7\sqrt{77}}{440}$ | 0 | $\frac{3\sqrt{77}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{462}i}{2310}$ | $\frac{\sqrt{1155}}{440}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{231}i}{165}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{440}$ | $-\frac{3\sqrt{385}i}{770}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}i}{924}$ |
| | | 0 | $\frac{\sqrt{231}i}{165}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{440}$ | 0 | 0 | $\frac{3\sqrt{385}i}{770}$ | 0 | 0 | $\frac{\sqrt{2310}i}{924}$ | 0 |
| 688 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|
| 689 | $\mathbb{G}_{4,2}^{(1,1;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | $-\frac{29\sqrt{462}}{4620}$ | 0 | $\frac{3\sqrt{462}i}{440}$ | 0 | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}i}{1540}$ | $\frac{29\sqrt{462}}{4620}$ | 0 | $\frac{3\sqrt{462}i}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}i}{440}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | $\frac{17\sqrt{1155}i}{4620}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{440}$ |
| | | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | $\frac{3\sqrt{462}i}{440}$ | 0 | $-\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}i}{440}$ | 0 |
| | | 0 | $-\frac{3\sqrt{77}}{220}$ | 0 | $\frac{7\sqrt{77}i}{440}$ | 0 | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{440}$ | 0 | 0 |
| | | $\frac{3\sqrt{77}}{220}$ | 0 | $\frac{7\sqrt{77}i}{440}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{462}i}{2310}$ | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{440}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}i}{88}$ | 0 | $\frac{3\sqrt{77}}{220}$ | $\frac{\sqrt{462}i}{210}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{440}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | $-\frac{\sqrt{770}i}{385}$ | 0 |
| | | $\frac{\sqrt{77}i}{88}$ | 0 | $-\frac{3\sqrt{77}}{220}$ | 0 | 0 | $-\frac{\sqrt{462}i}{210}$ | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{440}$ | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | 0 | $\frac{\sqrt{231}i}{165}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}i}{440}$ | 0 | 0 | $-\frac{3\sqrt{385}i}{770}$ | 0 | 0 | $\frac{\sqrt{2310}}{924}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231}i}{165}$ | 0 | 0 | $-\frac{3\sqrt{154}i}{440}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{385}i}{770}$ | $-\frac{\sqrt{2310}}{924}$ | 0 |
| 689 | symmetry | z | | | | | | | | | | | | | |
| 690 | $\mathbb{T}_1^{(a)}(B)$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{35}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{35}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{70}$ | 0 |
| | | 690 | symmetry | x | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | $\mathbb{T}_{1,1}^{(a)}(E)$ | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{70}$ | 0 | 0 | 0 |
| 691 | symmetry | y | | | | | | | | | | | | |
| | $\mathbb{T}_{1,2}^{(a)}(E)$ | 0 | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{70}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{70}$ | 0 | 0 |
| 692 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_3^{(a)}(A, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 \\ -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 693 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 694 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_3^{(a)}(B)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{15} \end{bmatrix}$ |
| 695 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ $\begin{bmatrix} \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{11\sqrt{30}i}{240} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{11\sqrt{30}i}{240} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{240} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{240} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{40} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{24} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{40} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{6}i}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{5\sqrt{6}i}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 696 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|-----------------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-------------------------|-------------------------|
| | $\mathbb{T}_{3,2}^{(a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{11\sqrt{30}i}{240}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{11\sqrt{30}i}{240}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{240}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{240}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{40}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{40}$ |
| | | 0 | 0 | $\frac{5\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 |
| 697 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{3,1}^{(a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}i}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{24}$ |
| | | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 |
| 698 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{3,2}^{(a)}(E, 2)$ | $\begin{bmatrix} \frac{\sqrt{30i}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30i}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2i}}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30i}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2i}}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30i}}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2i}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5i}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3i}}{24} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5i}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3i}}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{10i}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10i}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 699 | symmetry | $\frac{\sqrt{105xyz(x^2+y^2-2z^2)}}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6i}}{12} \\ 0 & 0 & \frac{\sqrt{15i}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15i}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 \\ -\frac{\sqrt{15i}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15i}}{60} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 700 | symmetry | $-\frac{\sqrt{105z(x-y)(x+y)(x^2+y^2-2z^2)}}{4}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-----|----------------------------|------------------------------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------|----------------|----------------|------------------------|------------------------|--|
| | $\mathbb{T}_5^{(a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 701 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | | |
| | $\mathbb{T}_5^{(a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{5}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 702 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_5^{(a)}(B, 2)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42i}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105i}}{42} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{42} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210i}}{42} & 0 \end{array} $ |
| 703 | symmetry | $ \frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8} $ |
| | $\mathbb{T}_5^{(a)}(B, 3)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30i}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5i}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5i}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5i}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5i}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 704 | symmetry | $ \frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8} $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------------------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-------------------------|-------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|-------------------------|-------------------------|
| | $\mathbb{T}_{5,1}^{(a)}(E, 1)$ | $\frac{11\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{11\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{105}i}{336}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $-\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{112}$ | 0 | 0 | 0 | 0 |
| 705 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{5,2}^{(a)}(E, 1)$ | 0 | 0 | $\frac{11\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{105}i}{336}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{11\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{105}i}{336}$ | 0 | 0 | |
| | | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{5\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{21}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{112}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}i}{112}$ | 0 | 0 | |
| 706 | symmetry | $\frac{3\sqrt{35}x(y^2 - 2yz - z^2)(y^2 + 2yz - z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_{5,1}^{(a)}(E, 2)$ | $\begin{bmatrix} \frac{3\sqrt{5}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{5}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{15}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{15}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3i}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 707 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ $\begin{bmatrix} 0 & 0 & \frac{3\sqrt{5}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{5}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{16} & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} \\ 0 & 0 & -\frac{3\sqrt{15}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{15}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3i}{16} & 0 & 0 & 0 \end{bmatrix}$ |
| 708 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------|---------------------------|--------------------------|---------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_3^{(1,-1;a)}(A,1)$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}}{84}$ | 0 |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| 711 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{T}_3^{(1,-1;a)}(A,2)$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | $-\frac{\sqrt{42}}{84}$ | 0 |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{84}$ |
| | | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{42}$ | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| 712 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|--------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{T}_3^{(1,-1;a)}(B)$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | $\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $\frac{\sqrt{70}i}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 |
| 713 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{3,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 | $\frac{\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | $-\frac{\sqrt{70}i}{140}$ | 0 |
| | | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 |
| | | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{280}$ | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{56}$ | 0 | $\frac{\sqrt{105}i}{140}$ | $-\frac{\sqrt{70}}{70}$ | 0 |
| | | $\frac{3\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{56}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | 0 | 0 | $\frac{\sqrt{70}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 |
| 714 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------------------------|-----------------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
| | $\mathbb{T}_{3,2}^{(1,-1;a)}(E, 1)$ | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | $\frac{\sqrt{105}}{140}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}}{140}$ |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $-\frac{3\sqrt{70i}}{280}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | $\frac{3\sqrt{70i}}{280}$ |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105i}}{56}$ | $\frac{\sqrt{70}}{70}$ |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105i}}{56}$ | 0 | $-\frac{\sqrt{70}}{70}$ |
| | | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{280}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 |
| | | $-\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{280}$ | 0 | $-\frac{\sqrt{105}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{3\sqrt{14i}}{56}$ | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 |
| 715 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{3,1}^{(1,-1;a)}(E, 2)$ | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ |
| | | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{42i}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42i}}{168}$ | 0 |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7i}}{56}$ | $-\frac{\sqrt{42}}{42}$ |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{56}$ | 0 | $\frac{\sqrt{42}}{42}$ |
| | | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 |
| | | $-\frac{\sqrt{105i}}{168}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| 716 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|--------------------------------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_{3,2}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42i}}{84}$ | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{168}$ |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 |
| | | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{105i}}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{7i}}{28}$ | $-\frac{\sqrt{42}}{42}$ | 0 |
| | | $-\frac{\sqrt{105}}{168}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{84}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{84}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 |
| 717 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_5^{(1,-1;a)}(A, 1)$ | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | $-\frac{\sqrt{2i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | $\frac{\sqrt{30i}}{40}$ | $\frac{\sqrt{5}}{10}$ | 0 |
| | | $-\frac{\sqrt{2}}{40}$ | 0 | $\frac{\sqrt{2i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | $-\frac{\sqrt{30i}}{40}$ | 0 | 0 | $-\frac{\sqrt{5}}{10}$ |
| | | 0 | $\frac{\sqrt{2i}}{40}$ | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{120}$ | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 |
| | | $-\frac{\sqrt{2i}}{40}$ | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{120}$ | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{15}$ | 0 | $\frac{\sqrt{3i}}{20}$ | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{20}$ |
| | | 0 | $-\frac{3\sqrt{2}}{40}$ | 0 | 0 | $\frac{\sqrt{3}}{15}$ | 0 | $-\frac{\sqrt{3i}}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | $\frac{\sqrt{5}}{20}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{2}}{40}$ | 0 | 0 | $-\frac{\sqrt{3i}}{15}$ | 0 | $\frac{\sqrt{3}}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | $\frac{\sqrt{5i}}{20}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{2}}{40}$ | $\frac{\sqrt{3i}}{15}$ | 0 | $\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | $-\frac{\sqrt{5i}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{40}$ | 0 | $-\frac{\sqrt{6i}}{40}$ | $-\frac{1}{5}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10i}}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{40}$ | 0 | $\frac{\sqrt{6i}}{40}$ | 0 | 0 | $\frac{1}{5}$ | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10i}}{40}$ | 0 | 0 | 0 |
| 718 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_5^{(1,-1;a)}(A, 2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}i}{40} & 0 & -\frac{\sqrt{2}}{40} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 \\ -\frac{\sqrt{2}i}{40} & 0 & -\frac{\sqrt{2}}{40} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{40} & 0 & \frac{\sqrt{2}i}{40} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{30}i}{40} & \frac{\sqrt{5}}{10} & 0 \\ \frac{\sqrt{2}}{40} & 0 & -\frac{\sqrt{2}i}{40} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{40} & 0 & -\frac{\sqrt{30}i}{40} & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & 0 & \frac{3\sqrt{2}}{40} & 0 & 0 & -\frac{\sqrt{3}i}{20} & 0 & \frac{\sqrt{3}}{15} & 0 & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{5}i}{20} \\ 0 & 0 & 0 & -\frac{3\sqrt{2}}{40} & \frac{\sqrt{3}i}{20} & 0 & \frac{\sqrt{3}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{120} & \frac{\sqrt{5}i}{20} & 0 \\ -\frac{3\sqrt{2}}{40} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{20} & 0 & -\frac{\sqrt{3}i}{15} & \frac{\sqrt{30}}{120} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{20} \\ 0 & \frac{3\sqrt{2}}{40} & 0 & 0 & -\frac{\sqrt{3}}{20} & 0 & \frac{\sqrt{3}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 \\ 0 & \frac{\sqrt{6}i}{40} & 0 & \frac{\sqrt{6}}{40} & 0 & 0 & -\frac{1}{5} & 0 & 0 & \frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 \\ -\frac{\sqrt{6}i}{40} & 0 & \frac{\sqrt{6}}{40} & 0 & 0 & 0 & 0 & \frac{1}{5} & -\frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 & 0 \end{bmatrix}$ |
| 719 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{10} & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{10} & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{10} & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 & \frac{1}{20} & 0 & \frac{i}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{20} & 0 & 0 & \frac{1}{20} & 0 & -\frac{i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{20} & 0 & 0 & \frac{i}{20} & 0 & -\frac{1}{20} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{20} & -\frac{i}{20} & 0 & -\frac{1}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{2}}{20} & 0 & \frac{3\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{2}}{20} & 0 & -\frac{3\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 720 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|------------------------------------------------------------|---------------------------|----------------------------|---------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_5^{(1,-1;a)}(B, 2)$ | 0 | $\frac{\sqrt{210}i}{420}$ | 0 | $\frac{\sqrt{210}}{420}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{420}$ | 0 | $\frac{\sqrt{210}}{420}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | $-\frac{\sqrt{14}i}{42}$ | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | $\frac{\sqrt{210}i}{420}$ | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{42}$ | 0 | $\frac{\sqrt{14}i}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{42}$ | 0 | $-\frac{\sqrt{14}i}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{60}$ | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | 0 | $\frac{5\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{60}$ | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{84}$ | $\frac{\sqrt{21}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{60}$ | 0 | $-\frac{\sqrt{35}i}{60}$ | $-\frac{5\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{60}$ | 0 | $\frac{\sqrt{35}i}{60}$ | 0 | 0 | $\frac{5\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 721 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_5^{(1,-1;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{10}$ | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}}{20}$ | 0 | 0 | $\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{20}$ | $-\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{1}{20}$ | 0 | $-\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{20}$ | 0 | 0 | $-\frac{1}{20}$ | 0 | $\frac{i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{2}i}{20}$ | 0 | $-\frac{3\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{2}i}{20}$ | 0 | $-\frac{3\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 722 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|------------------------------------------------------------|------------------------------|------------------------------|-------------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | $\mathbb{T}_{5,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | $-\frac{\sqrt{35}i}{60}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{14}}{336}$ | 0 | 0 | $\frac{\sqrt{21}i}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{560}$ | $\frac{\sqrt{35}i}{60}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{336}$ | $-\frac{\sqrt{21}i}{84}$ | 0 |
| | | $\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35}}{168}$ | 0 | $\frac{\sqrt{35}i}{60}$ | $-\frac{13\sqrt{14}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}}{168}$ |
| | | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | $\frac{5\sqrt{35}}{168}$ | 0 | $-\frac{\sqrt{35}i}{60}$ | 0 | 0 | $\frac{13\sqrt{14}}{336}$ | 0 | 0 | $-\frac{5\sqrt{21}}{168}$ | 0 |
| | | 0 | $\frac{17\sqrt{210}i}{1680}$ | 0 | $-\frac{5\sqrt{210}}{336}$ | 0 | 0 | $\frac{\sqrt{35}}{60}$ | 0 | 0 | $\frac{\sqrt{14}i}{336}$ | 0 | $\frac{5\sqrt{14}}{336}$ | 0 | 0 |
| | | $-\frac{17\sqrt{210}i}{1680}$ | 0 | $-\frac{5\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | $-\frac{\sqrt{14}i}{336}$ | 0 | $\frac{5\sqrt{14}}{336}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{11\sqrt{210}i}{1680}$ | $-\frac{\sqrt{35}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{\sqrt{14}i}{336}$ | $\frac{\sqrt{21}}{56}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{11\sqrt{210}i}{1680}$ | 0 | 0 | $\frac{\sqrt{35}}{120}$ | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{336}$ | 0 | 0 | $-\frac{\sqrt{21}}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{70}}{80}$ | 0 | 0 | $-\frac{\sqrt{105}i}{210}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{80}$ | $\frac{\sqrt{105}i}{210}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 |
| 723 | symmetry | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{5,2}^{(1,-1;a)}(E, 1)$ | $\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | $-\frac{\sqrt{14}}{336}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ |
| | | 0 | $-\frac{\sqrt{210}}{560}$ | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | $\frac{\sqrt{14}}{336}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{210}}{560}$ | 0 | 0 | $-\frac{5\sqrt{35}i}{168}$ | 0 | $\frac{\sqrt{35}}{60}$ | 0 | 0 | $\frac{13\sqrt{14}}{336}$ | 0 | 0 | $-\frac{5\sqrt{21}i}{168}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{560}$ | $\frac{5\sqrt{35}i}{168}$ | 0 | $\frac{\sqrt{35}}{60}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{14}}{336}$ | $\frac{5\sqrt{21}i}{168}$ | 0 |
| | | 0 | $\frac{11\sqrt{210}}{1680}$ | 0 | $\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{35}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{336}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{21}}{56}$ | 0 |
| | | $\frac{11\sqrt{210}}{1680}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{120}$ | 0 | 0 | $-\frac{\sqrt{14}}{336}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{56}$ |
| | | 0 | $\frac{5\sqrt{210}i}{336}$ | 0 | $-\frac{17\sqrt{210}}{1680}$ | 0 | 0 | $-\frac{\sqrt{35}}{60}$ | 0 | 0 | $\frac{5\sqrt{14}i}{336}$ | 0 | $\frac{\sqrt{14}}{336}$ | 0 | 0 |
| | | $-\frac{5\sqrt{210}i}{336}$ | 0 | $-\frac{17\sqrt{210}}{1680}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{60}$ | $-\frac{5\sqrt{14}i}{336}$ | 0 | $\frac{\sqrt{14}}{336}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{70}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{210}$ | 0 | $\frac{\sqrt{105}i}{84}$ | $\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{80}$ | 0 | 0 | $\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 |
| 724 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|---------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_{5,1}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{6}}{80}$ | 0 | 0 | $-\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | $\frac{\sqrt{10}}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{20}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{80}$ | $\frac{i}{20}$ | 0 | $-\frac{1}{20}$ | 0 | 0 | 0 | $-\frac{\sqrt{10}}{16}$ | $\frac{\sqrt{15}i}{20}$ | 0 | |
| | | $\frac{\sqrt{6}}{80}$ | 0 | 0 | 0 | 0 | $\frac{3}{40}$ | 0 | $\frac{i}{20}$ | $\frac{\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{40}$ |
| | | 0 | $-\frac{\sqrt{6}}{80}$ | 0 | 0 | $\frac{3}{40}$ | 0 | $-\frac{i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}}{80}$ | 0 | 0 | $\frac{\sqrt{15}}{40}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | $\frac{1}{20}$ | 0 | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{80}$ | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | 0 | $-\frac{1}{20}$ | $\frac{\sqrt{10}i}{80}$ | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | $-\frac{\sqrt{6}i}{16}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{80}$ | $\frac{\sqrt{15}}{40}$ | 0 |
| | | $-\frac{\sqrt{6}}{40}$ | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{80}$ | 0 | 0 | $-\frac{\sqrt{15}}{40}$ |
| | | 0 | 0 | $-\frac{9\sqrt{2}}{80}$ | 0 | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{9\sqrt{2}}{80}$ | $-\frac{\sqrt{3}i}{10}$ | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{80}$ | 0 | 0 |
| 725 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{5,2}^{(1,-1;a)}(E, 2)$ | $\frac{\sqrt{6}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{1}{20}$ | 0 | $\frac{i}{20}$ | $\frac{\sqrt{10}}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ |
| | | 0 | $-\frac{\sqrt{6}}{80}$ | 0 | 0 | $-\frac{1}{20}$ | 0 | $-\frac{i}{20}$ | 0 | 0 | $-\frac{\sqrt{10}}{16}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | $-\frac{3i}{40}$ | 0 | $\frac{1}{20}$ | 0 | 0 | $-\frac{\sqrt{10}}{80}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}}{80}$ | $\frac{3i}{40}$ | 0 | $\frac{1}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{80}$ | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{16}$ | 0 | $\frac{\sqrt{6}i}{40}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{80}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | $-\frac{\sqrt{15}}{40}$ | 0 |
| | | $\frac{\sqrt{6}}{16}$ | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $\frac{\sqrt{10}}{80}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | $\frac{\sqrt{15}}{40}$ |
| | | 0 | $-\frac{\sqrt{6}i}{80}$ | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | $-\frac{1}{20}$ | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | $-\frac{\sqrt{10}}{80}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{80}$ | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | 0 | $\frac{1}{20}$ | $-\frac{3\sqrt{10}i}{80}$ | 0 | $-\frac{\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{2}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | $\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{9\sqrt{2}}{80}$ | 0 | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | 0 | 0 | 0 |
| 726 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------------------------|-------------------------------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|
| | $\mathbb{T}_{5,1}^{(1,-1;a)}(E, 3)$ | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{15}$ | 0 | $-\frac{\sqrt{3}i}{10}$ | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2}}{40}$ | 0 | 0 | $-\frac{\sqrt{3}}{15}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | $-\frac{\sqrt{3}i}{60}$ | 0 | $\frac{\sqrt{3}}{15}$ | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{2}}{40}$ | $\frac{\sqrt{3}i}{60}$ | 0 | $\frac{\sqrt{3}}{15}$ | 0 | 0 | 0 | $\frac{\sqrt{30}}{40}$ | $-\frac{\sqrt{5}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{2}}{10}$ | 0 | $\frac{\sqrt{2}i}{8}$ | $\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | $\frac{\sqrt{5}}{20}$ | 0 |
| | | $\frac{\sqrt{2}}{10}$ | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | $\frac{\sqrt{2}i}{20}$ | 0 | $-\frac{\sqrt{2}}{10}$ | 0 | 0 | $\frac{\sqrt{3}}{15}$ | 0 | 0 | $-\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{2}i}{20}$ | 0 | $-\frac{\sqrt{2}}{10}$ | 0 | 0 | 0 | $-\frac{\sqrt{3}}{15}$ | $\frac{\sqrt{30}i}{60}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{10}$ | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | 0 | $\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| 727 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{5,2}^{(1,-1;a)}(E, 3)$ | 0 | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | $\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2}}{40}$ | $-\frac{\sqrt{3}i}{15}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | 0 |
| | | $\frac{\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{60}$ | 0 | $-\frac{\sqrt{3}i}{15}$ | $-\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | $-\frac{\sqrt{2}}{40}$ | 0 | 0 | $-\frac{\sqrt{3}}{60}$ | 0 | $\frac{\sqrt{3}i}{15}$ | 0 | 0 | $\frac{\sqrt{30}}{40}$ | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | $-\frac{\sqrt{2}i}{10}$ | 0 | $\frac{\sqrt{2}}{20}$ | 0 | 0 | $\frac{\sqrt{3}}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 |
| | | $\frac{\sqrt{2}i}{10}$ | 0 | $\frac{\sqrt{2}}{20}$ | 0 | 0 | 0 | $-\frac{\sqrt{3}}{15}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2}}{8}$ | 0 | $\frac{\sqrt{2}i}{10}$ | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | 0 | $\frac{\sqrt{5}}{20}$ |
| | | $\frac{\sqrt{2}}{8}$ | 0 | $-\frac{\sqrt{2}i}{10}$ | 0 | 0 | $\frac{\sqrt{3}}{20}$ | 0 | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 | $-\frac{\sqrt{5}}{20}$ |
| | | 0 | 0 | $\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 |
| 728 | symmetry | z | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|
| | $\mathbb{T}_1^{(1,0;a)}(B)$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 |
| 729 | symmetry | x | | | | | | | | | | | | | |
| | $\mathbb{T}_{1,1}^{(1,0;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | $\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | $\frac{3\sqrt{70}i}{140}$ | 0 |
| 730 | symmetry | y | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|
| | $\mathbb{T}_{1,2}^{(1,0;a)}(E)$ | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 |
| 731 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | |
| | $\mathbb{T}_3^{(1,0;a)}(A, 1)$ | 0 | $\frac{\sqrt{10}}{48}$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | $-\frac{1}{6}$ | 0 |
| | | $\frac{\sqrt{10}}{48}$ | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{48}$ | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{1}{6}$ |
| | | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | $\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{10}i}{48}$ | 0 | $\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | $-\frac{1}{24}$ |
| | | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{1}{24}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{i}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | $\frac{i}{24}$ | 0 |
| | | 0 | $\frac{\sqrt{30}}{48}$ | 0 | $-\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{30}}{48}$ | 0 | $\frac{\sqrt{30}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{16}$ | 0 | $\frac{\sqrt{2}i}{16}$ | 0 | 0 | 0 |
| 732 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------|--------------------------|--------------------------|-------------------------|----------------|----------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| | $\mathbb{T}_3^{(1,0;a)}(A, 2)$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | $-\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{48}$ | 0 | $-\frac{\sqrt{10}}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{48}$ | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $-\frac{\sqrt{6}i}{48}$ | $\frac{1}{6}$ | 0 |
| | | $\frac{\sqrt{10}}{48}$ | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{1}{6}$ |
| | | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{i}{24}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | $\frac{i}{24}$ | 0 |
| | | $\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | $\frac{1}{24}$ |
| | | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{1}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{30}i}{48}$ | 0 | $-\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{30}i}{48}$ | 0 | $-\frac{\sqrt{30}}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{16}$ | 0 | $\frac{\sqrt{2}}{16}$ | 0 | 0 | 0 |
| 733 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_3^{(1,0;a)}(B)$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{60}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{60}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{60}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{60}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 |
| 734 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------------------------|-----------------------------------|--------------------------|-------------------------|--------------------------|-----------------|----------------|----------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_{3,1}^{(1,0;\alpha)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{96}$ | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{160}$ | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | $\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | $\frac{7\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $-\frac{7\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 |
| | | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{6}i}{96}$ | $-\frac{3}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}i}{160}$ | $\frac{\sqrt{15}}{240}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | $\frac{3}{16}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{240}$ |
| | | 0 | 0 | $\frac{5\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{160}$ | 0 | 0 | $\frac{\sqrt{5}i}{20}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{160}$ | $-\frac{\sqrt{5}i}{20}$ | 0 |
| 735 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{3,2}^{(1,0;\alpha)}(E, 1)$ | $\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ |
| | | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $-\frac{7\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}}{160}$ | 0 | 0 |
| | | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | $-\frac{3}{16}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{10}}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{240}$ | 0 |
| | | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | $\frac{3}{16}$ | 0 | 0 | $\frac{7\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{240}$ |
| | | 0 | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $-\frac{3\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 |
| | | $\frac{5\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{20}$ |
| | | 0 | $-\frac{5\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{160}$ | 0 | 0 | $\frac{\sqrt{5}}{20}$ | 0 |
| 736 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------------------------|-----------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|--|
| | $\mathbb{T}_{3,1}^{(1,0;\alpha)}(E, 2)$ | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | $\frac{1}{24}$ | |
| | | 0 | $\frac{\sqrt{10}}{96}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 | $\frac{1}{24}$ | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $-\frac{i}{6}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{96}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $\frac{\sqrt{6}}{96}$ | $\frac{i}{6}$ | 0 | |
| | | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | $\frac{\sqrt{10}i}{24}$ | $-\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | $\frac{\sqrt{6}i}{24}$ | $\frac{1}{48}$ | 0 | |
| | | $-\frac{\sqrt{10}}{96}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | $\frac{\sqrt{15}}{48}$ | 0 | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{1}{48}$ | |
| | | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | |
| | | $\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | |
| | | $\frac{\sqrt{30}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{12}$ | |
| | | 0 | $-\frac{\sqrt{30}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{32}$ | 0 | 0 | $-\frac{\sqrt{3}}{12}$ | 0 | |
| 737 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{3,2}^{(1,0;\alpha)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6}}{96}$ | 0 | $\frac{i}{24}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{96}$ | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | $-\frac{i}{24}$ | |
| | | $\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | $\frac{1}{6}$ | |
| | | 0 | $-\frac{\sqrt{10}}{96}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}}{96}$ | 0 | 0 | $\frac{1}{6}$ | |
| | | 0 | $-\frac{\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | |
| | | $\frac{\sqrt{10}i}{96}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{6}i}{96}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10}i}{96}$ | $\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{32}$ | $\frac{1}{48}$ | 0 | |
| | | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{96}$ | 0 | 0 | $-\frac{\sqrt{15}}{48}$ | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | $-\frac{1}{48}$ | |
| | | 0 | 0 | $-\frac{\sqrt{30}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{32}$ | 0 | 0 | $\frac{\sqrt{3}i}{12}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{30}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{32}$ | $-\frac{\sqrt{3}i}{12}$ | 0 | |
| 738 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|--------------------------|---------------------------|-------------------------|-------------------------|
| | $\mathbb{T}_5^{(1,0;a)}(A, 1)$ | 0 | $\frac{\sqrt{2}}{120}$ | 0 | $\frac{\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}}{30}$ | 0 |
| | | $\frac{\sqrt{2}}{120}$ | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}}{30}$ |
| | | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | $\frac{\sqrt{2}}{120}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{2}i}{120}$ | 0 | $\frac{\sqrt{2}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $-\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{2}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{30}$ | 0 | $-\frac{\sqrt{3}i}{10}$ | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{15}$ |
| | | 0 | $-\frac{\sqrt{2}}{60}$ | 0 | 0 | $\frac{\sqrt{3}}{30}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | $\frac{\sqrt{5}}{15}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{2}}{60}$ | 0 | 0 | $-\frac{\sqrt{3}i}{30}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | $\frac{\sqrt{5}i}{15}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2}}{60}$ | $\frac{\sqrt{3}i}{30}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{60}$ | $-\frac{\sqrt{5}i}{15}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{30}$ | 0 | $-\frac{\sqrt{6}i}{30}$ | $-\frac{1}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{30}$ | 0 | $\frac{\sqrt{6}i}{30}$ | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 |
| 739 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_5^{(1,0;a)}(A, 2)$ | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | $\frac{\sqrt{2}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{2}i}{120}$ | 0 | $\frac{\sqrt{2}}{120}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{40}$ | 0 | $\frac{\sqrt{30}}{40}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}}{120}$ | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}}{30}$ | 0 |
| | | $-\frac{\sqrt{2}}{120}$ | 0 | $\frac{\sqrt{2}i}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}}{30}$ |
| | | 0 | 0 | $\frac{\sqrt{2}}{60}$ | 0 | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | $-\frac{\sqrt{5}i}{15}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2}}{60}$ | $-\frac{\sqrt{3}i}{10}$ | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{60}$ | $\frac{\sqrt{5}i}{15}$ | 0 |
| | | $-\frac{\sqrt{2}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{10}$ | 0 | $-\frac{\sqrt{3}i}{30}$ | $-\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{15}$ |
| | | 0 | $\frac{\sqrt{2}}{60}$ | 0 | 0 | $\frac{\sqrt{3}}{10}$ | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | $\frac{\sqrt{5}}{15}$ | 0 |
| | | 0 | $\frac{\sqrt{6}i}{30}$ | 0 | $\frac{\sqrt{6}}{30}$ | 0 | 0 | $-\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{30}$ | 0 | $\frac{\sqrt{6}}{30}$ | 0 | 0 | 0 | $\frac{1}{10}$ | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 |
| 740 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $\mathbb{T}_5^{(1,0;\alpha)}(B, 1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{6}i}{24} & \frac{1}{5} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{40} & 0 & -\frac{\sqrt{10}i}{40} & 0 & 0 \\ -\frac{\sqrt{6}}{24} & 0 & -\frac{\sqrt{6}i}{24} & 0 & 0 & -\frac{1}{5} & 0 & 0 & -\frac{\sqrt{10}}{40} & 0 & \frac{\sqrt{10}i}{40} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}i}{24} & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & -\frac{1}{5} & 0 & 0 & -\frac{\sqrt{10}i}{40} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 \\ -\frac{\sqrt{6}i}{24} & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & 0 & 0 & \frac{1}{5} & \frac{\sqrt{10}i}{40} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{15} & 0 & 0 & 0 & 0 & -\frac{1}{10} & 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{15} & 0 & 0 & -\frac{1}{10} & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{15} & 0 & 0 & -\frac{i}{10} & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{15} & \frac{i}{10} & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{20} & 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{20} & 0 & \frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 741 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ $\begin{bmatrix} 0 & \frac{\sqrt{210}i}{840} & 0 & \frac{\sqrt{210}}{840} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{56} & 0 & \frac{\sqrt{14}}{56} & 0 & 0 \\ -\frac{\sqrt{210}i}{840} & 0 & \frac{\sqrt{210}}{840} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{56} & 0 & \frac{\sqrt{14}}{56} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{210}}{840} & 0 & \frac{\sqrt{210}i}{840} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{56} & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 \\ -\frac{\sqrt{210}}{840} & 0 & -\frac{\sqrt{210}i}{840} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{56} & 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{70} & 0 & -\frac{\sqrt{35}}{70} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{21} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{70} & 0 & -\frac{\sqrt{35}}{70} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{70} & 0 & -\frac{\sqrt{35}i}{70} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{21} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{70} & 0 & \frac{\sqrt{35}i}{70} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{28} & 0 & \frac{\sqrt{42}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 & \frac{\sqrt{42}}{28} & 0 & 0 & 0 \end{bmatrix}$ |
| 742 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------------------------|------------------------------------------------------------|----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
| | $\mathbb{T}_5^{(1,0;\alpha)}(B, 3)$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{1}{5}$ | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | $\frac{1}{5}$ | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | $-\frac{1}{5}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $\frac{1}{5}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}}{15}$ | 0 | 0 | $-\frac{i}{10}$ | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{15}$ | $\frac{i}{10}$ | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{15}$ | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{15}$ | 0 | 0 | $\frac{1}{10}$ | 0 | $-\frac{i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{20}$ | 0 | $\frac{\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{2}i}{20}$ | 0 | $\frac{\sqrt{2}}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 743 | symmetry | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{5,1}^{(1,0;\alpha)}(E, 1)$ | 0 | 0 | $-\frac{53\sqrt{210}}{3360}$ | 0 | 0 | $-\frac{13\sqrt{35}i}{560}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{224}$ | 0 | 0 | $\frac{\sqrt{21}i}{48}$ |
| | | 0 | 0 | 0 | $\frac{53\sqrt{210}}{3360}$ | $\frac{13\sqrt{35}i}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{224}$ | $-\frac{\sqrt{21}i}{48}$ | 0 |
| | | $-\frac{13\sqrt{210}}{840}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{70}$ | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{13\sqrt{210}}{840}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{3\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{210}i}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | $-\frac{3\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}i}{240}$ | $\frac{3\sqrt{35}}{280}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{112}$ | $-\frac{\sqrt{21}}{168}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210}i}{240}$ | 0 | 0 | $-\frac{3\sqrt{35}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | 0 | $\frac{\sqrt{21}}{168}$ |
| | | 0 | 0 | $\frac{\sqrt{70}}{160}$ | 0 | 0 | $\frac{\sqrt{105}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{160}$ | $-\frac{\sqrt{105}i}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{224}$ | $\frac{5\sqrt{7}i}{112}$ | 0 |
| 744 | symmetry | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------------------------|---------------------------------------------------|------------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|--------------------------|---------------------------|-------------------------|---------------------------|--------------------------|---------------------------|
| | $\mathbb{T}_{5,2}^{(1,0;\alpha)}(E, 1)$ | $\frac{53\sqrt{210}}{3360}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{35}}{560}$ | 0 | 0 | $\frac{3\sqrt{14}}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{48}$ |
| | | 0 | $-\frac{53\sqrt{210}}{3360}$ | 0 | 0 | $-\frac{13\sqrt{35}}{560}$ | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{224}$ | 0 | 0 | $-\frac{\sqrt{21}}{48}$ | 0 |
| | | 0 | 0 | $-\frac{13\sqrt{210}}{840}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{13\sqrt{210}}{840}$ | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{240}$ | 0 | 0 | $\frac{3\sqrt{35}}{280}$ | 0 | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 | $\frac{\sqrt{21}}{168}$ | 0 |
| | | $-\frac{\sqrt{210}}{240}$ | 0 | 0 | 0 | $-\frac{3\sqrt{35}}{280}$ | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{120}$ | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{210}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{160}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{80}$ | 0 | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{112}$ |
| | | 0 | $-\frac{\sqrt{70}}{160}$ | 0 | 0 | $-\frac{\sqrt{105}}{80}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}}{112}$ | 0 |
| 745 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{5,1}^{(1,0;\alpha)}(E, 2)$ | 0 | 0 | $-\frac{13\sqrt{6}}{480}$ | 0 | 0 | $\frac{3i}{80}$ | 0 | $\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | $-\frac{\sqrt{15}i}{240}$ |
| | | 0 | 0 | 0 | $\frac{13\sqrt{6}}{480}$ | $-\frac{3i}{80}$ | 0 | $\frac{1}{10}$ | 0 | 0 | 0 | $\frac{\sqrt{10}}{32}$ | $\frac{\sqrt{15}i}{240}$ | 0 |
| | | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | 0 | $\frac{1}{10}$ | 0 | $-\frac{i}{10}$ | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 | $\frac{\sqrt{15}}{30}$ |
| | | 0 | $\frac{\sqrt{6}}{40}$ | 0 | 0 | $\frac{1}{10}$ | 0 | $\frac{i}{10}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | $\frac{\sqrt{15}}{30}$ | 0 |
| | | 0 | $\frac{\sqrt{6}i}{40}$ | 0 | $\frac{\sqrt{6}}{60}$ | 0 | 0 | $-\frac{1}{10}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{40}$ | 0 | $\frac{\sqrt{6}}{60}$ | 0 | 0 | 0 | $\frac{1}{10}$ | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{20}$ | 0 | $-\frac{\sqrt{6}i}{48}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $\frac{3\sqrt{10}i}{80}$ | $-\frac{\sqrt{15}}{120}$ | 0 |
| | | $\frac{\sqrt{6}}{20}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{15}}{120}$ |
| | | 0 | 0 | $-\frac{9\sqrt{2}}{160}$ | 0 | 0 | $-\frac{\sqrt{3}i}{80}$ | 0 | $\frac{\sqrt{3}}{10}$ | 0 | 0 | $-\frac{\sqrt{30}}{160}$ | 0 | $-\frac{\sqrt{5}i}{16}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{2}}{160}$ | $\frac{\sqrt{3}i}{80}$ | 0 | $\frac{\sqrt{3}}{10}$ | 0 | 0 | 0 | $\frac{\sqrt{30}}{160}$ | $\frac{\sqrt{5}i}{16}$ | 0 |
| 746 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------------------------|-------------------------------------------------|---------------------------|---------------------------|--------------------------|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_{5,2}^{(1,0;\alpha)}(E, 2)$ | $\frac{13\sqrt{6}}{480}$ | 0 | 0 | 0 | 0 | $\frac{3}{80}$ | 0 | $-\frac{i}{10}$ | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | $\frac{\sqrt{15}}{240}$ |
| | | 0 | $-\frac{13\sqrt{6}}{480}$ | 0 | 0 | $\frac{3}{80}$ | 0 | $\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $\frac{\sqrt{15}}{240}$ |
| | | 0 | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | $-\frac{i}{10}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{15}i}{30}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{40}$ | $\frac{i}{10}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | $-\frac{\sqrt{15}i}{30}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $-\frac{\sqrt{6}i}{20}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | $\frac{\sqrt{10}i}{20}$ | $\frac{\sqrt{15}}{120}$ |
| | | $\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{20}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $\frac{3\sqrt{10}}{80}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{15}}{120}$ |
| | | 0 | $-\frac{\sqrt{6}i}{60}$ | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | $\frac{1}{10}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 |
| | | $\frac{\sqrt{6}i}{60}$ | 0 | $-\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | $-\frac{1}{10}$ | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{2}}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{80}$ | 0 | $\frac{\sqrt{3}i}{10}$ | $\frac{\sqrt{30}}{160}$ | 0 | 0 | 0 | $-\frac{\sqrt{5}}{16}$ |
| | | 0 | $\frac{9\sqrt{2}}{160}$ | 0 | 0 | $\frac{\sqrt{3}}{80}$ | 0 | $-\frac{\sqrt{3}i}{10}$ | 0 | 0 | $-\frac{\sqrt{30}}{160}$ | 0 | 0 | $-\frac{\sqrt{5}}{16}$ |
| 747 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{5,1}^{(1,0;\alpha)}(E, 3)$ | $\frac{37\sqrt{2}}{240}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{120}$ | 0 | $-\frac{\sqrt{3}i}{20}$ | $-\frac{\sqrt{30}}{240}$ | 0 | 0 | 0 | $\frac{\sqrt{5}}{24}$ |
| | | 0 | $-\frac{37\sqrt{2}}{240}$ | 0 | 0 | $\frac{\sqrt{3}}{120}$ | 0 | $\frac{\sqrt{3}i}{20}$ | 0 | 0 | $\frac{\sqrt{30}}{240}$ | 0 | 0 | $\frac{\sqrt{5}}{24}$ |
| | | 0 | 0 | $-\frac{19\sqrt{2}}{120}$ | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | $-\frac{\sqrt{5}i}{60}$ |
| | | 0 | 0 | 0 | $\frac{19\sqrt{2}}{120}$ | $\frac{\sqrt{3}i}{20}$ | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | $\frac{\sqrt{5}i}{60}$ | 0 |
| | | 0 | $-\frac{\sqrt{2}}{30}$ | 0 | $-\frac{\sqrt{2}i}{24}$ | $-\frac{\sqrt{3}}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}}{60}$ | 0 |
| | | $-\frac{\sqrt{2}}{30}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | $\frac{\sqrt{3}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{5}}{60}$ |
| | | 0 | $-\frac{7\sqrt{2}i}{120}$ | 0 | $-\frac{\sqrt{2}}{120}$ | 0 | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}}{24}$ | 0 |
| | | $\frac{7\sqrt{2}i}{120}$ | 0 | $-\frac{\sqrt{2}}{120}$ | 0 | 0 | 0 | $-\frac{\sqrt{3}}{30}$ | $\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{80}$ | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | 0 | $-\frac{i}{20}$ | $-\frac{\sqrt{10}}{80}$ | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ |
| | | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | $\frac{1}{8}$ | 0 | $\frac{i}{20}$ | 0 | 0 | $\frac{\sqrt{10}}{80}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ |
| 748 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|--------------------------|------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|
| | $\mathbb{T}_{5,2}^{(1,0;a)}(E, 3)$ | 0 | 0 | $\frac{37\sqrt{2}}{240}$ | 0 | 0 | $-\frac{\sqrt{3}i}{120}$ | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | $\frac{\sqrt{30}}{240}$ | 0 | 0 | $\frac{\sqrt{5}i}{24}$ |
| | | 0 | 0 | 0 | $-\frac{37\sqrt{2}}{240}$ | $\frac{\sqrt{3}i}{120}$ | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{240}$ | $-\frac{\sqrt{5}i}{24}$ | 0 |
| | | $\frac{19\sqrt{2}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | $-\frac{\sqrt{3}i}{30}$ | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{60}$ |
| | | 0 | $-\frac{19\sqrt{2}}{120}$ | 0 | 0 | $-\frac{\sqrt{3}}{20}$ | 0 | $\frac{\sqrt{3}i}{30}$ | 0 | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | $\frac{\sqrt{5}}{60}$ | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{120}$ | 0 | $-\frac{7\sqrt{2}}{120}$ | 0 | 0 | $\frac{\sqrt{3}}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 |
| | | $\frac{\sqrt{2}i}{120}$ | 0 | $-\frac{7\sqrt{2}}{120}$ | 0 | 0 | 0 | $-\frac{\sqrt{3}}{30}$ | $-\frac{\sqrt{30}i}{24}$ | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | $-\frac{\sqrt{2}i}{30}$ | $\frac{\sqrt{3}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 | $-\frac{\sqrt{5}}{60}$ | 0 |
| | | $-\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{30}$ | 0 | 0 | $-\frac{\sqrt{3}}{60}$ | 0 | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{60}$ |
| | | 0 | 0 | $\frac{\sqrt{6}}{80}$ | 0 | 0 | $\frac{i}{8}$ | 0 | $\frac{1}{20}$ | 0 | 0 | $-\frac{\sqrt{10}}{80}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}}{80}$ | $-\frac{i}{8}$ | 0 | $\frac{1}{20}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{80}$ | $\frac{\sqrt{15}i}{24}$ | 0 |
| 749 | symmetry | z | | | | | | | | | | | | | |
| | $\mathbb{T}_1^{(1,1;a)}(B)$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | $-\frac{3\sqrt{70}i}{280}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | $-\frac{\sqrt{105}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | 0 | 0 | 0 |
| 750 | symmetry | x | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | $\mathbb{T}_{1,1}^{(1,1;a)}(E)$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | $\frac{\sqrt{105}i}{140}$ | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{3\sqrt{70}i}{280}$ | $\frac{\sqrt{105}}{70}$ | 0 |
| | | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | 0 |
| 751 | symmetry | y | | | | | | | | | | | | | |
| | $\mathbb{T}_{1,2}^{(1,1;a)}(E)$ | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{140}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | $\frac{\sqrt{105}i}{140}$ | 0 |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{105}}{70}$ | 0 |
| | | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ |
| | | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{280}$ | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | $\frac{\sqrt{210}}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 | 0 | 0 | 0 |
| 752 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-------------------------|------------------------|
| | $T_3^{(1,1;a)}(A, 1)$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $\frac{3\sqrt{42}i}{112}$ | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | $-\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{336}$ | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}i}{560}$ | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{120}$ | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | $\frac{\sqrt{105}}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $\frac{\sqrt{7}}{56}$ | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $\frac{\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | $\frac{\sqrt{105}i}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | $-\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{210}}{80}$ | 0 | $-\frac{\sqrt{210}i}{80}$ | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{80}$ | 0 | $\frac{\sqrt{210}i}{80}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | 0 | 0 |
| 753 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $T_3^{(1,1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | $\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{336}$ | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{560}$ | 0 | $\frac{\sqrt{70}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | $\frac{5\sqrt{42}}{336}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{3\sqrt{42}i}{112}$ | $\frac{\sqrt{7}}{14}$ | 0 |
| | | $-\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{42}}{112}$ | 0 | $\frac{3\sqrt{42}i}{112}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $\frac{\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | $-\frac{\sqrt{7}i}{56}$ | 0 |
| | | $-\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{120}$ | $\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{56}$ |
| | | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{120}$ | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{80}$ | 0 | $-\frac{\sqrt{210}}{80}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{80}$ | 0 | $-\frac{\sqrt{210}}{80}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | $\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | 0 |
| 754 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|--------------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|-------------------------|-------------------------|-------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
| | $\mathbb{T}_3^{(1,1;a)}(B)$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{21}$ | 0 | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{21}$ | $\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | $\frac{\sqrt{7}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{21}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{24}$ | 0 | $\frac{\sqrt{7}}{24}$ | 0 | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | $\frac{\sqrt{105}i}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{24}$ | 0 | $\frac{\sqrt{7}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{42}$ | $-\frac{\sqrt{105}i}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | $\frac{\sqrt{7}i}{24}$ | $-\frac{\sqrt{70}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7}i}{24}$ | 0 | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 |
| 755 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{T}_{3,1}^{(1,1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $\frac{\sqrt{7}i}{24}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $\frac{\sqrt{70}}{672}$ | 0 | 0 | $-\frac{\sqrt{105}i}{168}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | $-\frac{\sqrt{7}i}{24}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{672}$ | $\frac{\sqrt{105}i}{168}$ | 0 |
| | | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $-\frac{\sqrt{7}i}{24}$ | $\frac{13\sqrt{70}}{672}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ |
| | | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $\frac{\sqrt{7}i}{24}$ | 0 | 0 | $-\frac{13\sqrt{70}}{672}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 |
| | | 0 | $-\frac{17\sqrt{42}i}{672}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | 0 | $-\frac{\sqrt{70}i}{672}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 |
| | | $\frac{17\sqrt{42}i}{672}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{24}$ | $\frac{\sqrt{70}i}{672}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $\frac{11\sqrt{42}i}{672}$ | $\frac{\sqrt{7}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{70}i}{672}$ | $-\frac{\sqrt{105}}{112}$ | 0 |
| | | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{11\sqrt{42}i}{672}$ | 0 | 0 | $-\frac{\sqrt{7}}{48}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70}i}{672}$ | 0 | 0 | $\frac{\sqrt{105}}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{14}}{32}$ | 0 | 0 | $\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{32}$ | $-\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{224}$ | 0 | 0 |
| 756 | symmetry | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------------------------|-----------------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{T}_{3,2}^{(1,1;\alpha)}(E, 1)$ | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{24}$ | 0 | $-\frac{\sqrt{7}i}{42}$ | $\frac{\sqrt{70}}{672}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ |
| | | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $\frac{\sqrt{7}}{24}$ | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | 0 | $-\frac{\sqrt{70}}{672}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ |
| | | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | 0 | $-\frac{13\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{105}i}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}}{224}$ | $\frac{5\sqrt{7}i}{84}$ | 0 | $-\frac{\sqrt{7}}{24}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{70}}{672}$ | $\frac{\sqrt{105}i}{84}$ |
| | | 0 | $-\frac{11\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42}i}{84}$ | $\frac{\sqrt{7}}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{672}$ | 0 | $-\frac{\sqrt{70}i}{84}$ | $\frac{\sqrt{105}}{112}$ |
| | | $-\frac{11\sqrt{42}}{672}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | $-\frac{\sqrt{7}}{48}$ | 0 | 0 | $\frac{\sqrt{70}}{672}$ | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | $-\frac{\sqrt{105}}{112}$ |
| | | 0 | $\frac{5\sqrt{42}i}{168}$ | 0 | $\frac{17\sqrt{42}}{672}$ | 0 | 0 | $\frac{\sqrt{7}}{24}$ | 0 | 0 | $\frac{\sqrt{70}i}{168}$ | 0 | $-\frac{\sqrt{70}}{672}$ | 0 |
| | | $-\frac{5\sqrt{42}i}{168}$ | 0 | $\frac{17\sqrt{42}}{672}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}}{24}$ | $-\frac{\sqrt{70}i}{168}$ | 0 | $-\frac{\sqrt{70}}{672}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{14}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{21}i}{42}$ | $-\frac{\sqrt{210}}{224}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{14}}{32}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{224}$ | 0 | 0 | 0 |
| 757 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | |
| | $\mathbb{T}_{3,1}^{(1,1;\alpha)}(E, 2)$ | $\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{120}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | $\frac{17\sqrt{42}}{672}$ | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{120}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}i}{420}$ | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $\frac{\sqrt{42}}{224}$ | 0 | $\frac{\sqrt{7}i}{28}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{224}$ | $\frac{\sqrt{105}i}{420}$ | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | $-\frac{\sqrt{7}i}{28}$ |
| | | 0 | $-\frac{23\sqrt{70}}{1120}$ | 0 | $\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{105}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | $\frac{\sqrt{42}i}{56}$ | $-\frac{5\sqrt{7}}{112}$ |
| | | $-\frac{23\sqrt{70}}{1120}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{80}$ | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{5\sqrt{7}}{112}$ |
| | | 0 | $\frac{\sqrt{70}i}{140}$ | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{224}$ | 0 |
| | | $-\frac{\sqrt{70}i}{140}$ | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{120}$ | $\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{160}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | $\frac{5\sqrt{14}}{224}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}}{160}$ | 0 | 0 | $\frac{3\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{5\sqrt{14}}{224}$ | 0 | 0 | 0 |
| 758 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|--------------------------------|--------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|
| | $\mathbb{T}_{3,2}^{(1,1;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105i}}{120}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{17\sqrt{42}}{672}$ | 0 | 0 | $-\frac{3\sqrt{7i}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{224}$ | $\frac{\sqrt{105i}}{120}$ | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | $\frac{17\sqrt{42}}{672}$ | $\frac{3\sqrt{7i}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105i}}{120}$ | $\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ |
| | | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{420}$ | 0 | $-\frac{\sqrt{105i}}{120}$ | 0 | 0 | $-\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 |
| | | 0 | $\frac{\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{105}}{120}$ | 0 | 0 | $-\frac{\sqrt{42i}}{224}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{120}$ | $\frac{\sqrt{42i}}{224}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{23\sqrt{70i}}{1120}$ | $\frac{\sqrt{105}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{224}$ | $-\frac{5\sqrt{7}}{112}$ | 0 |
| | | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{23\sqrt{70i}}{1120}$ | 0 | 0 | $-\frac{\sqrt{105}}{80}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{224}$ | 0 | 0 | $\frac{5\sqrt{7}}{112}$ |
| | | 0 | 0 | $\frac{\sqrt{210}}{160}$ | 0 | 0 | $\frac{3\sqrt{35i}}{140}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | $\frac{5\sqrt{14}}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{160}$ | $-\frac{3\sqrt{35i}}{140}$ | 0 | $\frac{\sqrt{35}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{224}$ | 0 | 0 |
| 759 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $\mathbb{M}_2^{(a)}(A, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{28}$ |
| | | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 |
| | | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 760 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_2^{(a)}(A, 2)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{35}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{35}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{35}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 761 | symmetry | $ -\frac{x^2}{2} - \frac{y^2}{2} + z^2 $ |
| | $M_2^{(a)}(B)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 762 | symmetry | $ \sqrt{3}xz $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------|----------------------------------------------|-------------------------|--------------------------|--------------------------|---|---|---|---|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| | $M_{2,1}^{(a)}(E)$ | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 |
| 763 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | $M_{2,2}^{(a)}(E)$ | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{35i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 |
| 764 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_4^{(a)}(B, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & 0 \\ \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 767 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ |
| | $M_4^{(a)}(B, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{210} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{210} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}i}{168} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}i}{168} & 0 & 0 \\ -\frac{\sqrt{70}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}i}{168} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}i}{168} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 768 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix |
|-----|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_4^{(a)}(B, 3)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 769 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\begin{bmatrix} \frac{\sqrt{30}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}i}{16} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{30}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}i}{40} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{10}i}{80} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{16} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 770 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | |
|-----|-----------------------|---------------------------------------|---------------------------|----------------------------|----------------------------|--------------------------|--------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|
| | $M_{4,2}^{(a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{30i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{16}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{30i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{16}$ | 0 |
| | | $-\frac{\sqrt{30i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2i}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{30i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2i}}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5i}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5i}}{10}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{5i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{5i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{8}$ |
| | | 0 | 0 | $-\frac{3\sqrt{10i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6i}}{16}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{10i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6i}}{16}$ | 0 |
| 771 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | |
| | $M_{4,1}^{(a)}(E, 2)$ | 0 | 0 | $-\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{14i}}{112}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{14i}}{112}$ | 0 |
| | | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{112}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{56}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{56}$ |
| | | 0 | 0 | $-\frac{3\sqrt{70i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{112}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{70i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{112}$ | 0 |
| 772 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--|
| | $M_{4,2}^{(a)}(E, 2)$ | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{14i}}{112}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{14i}}{112}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14i}}{112}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{210i}}{560}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14i}}{112}$ | 0 | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{40}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{56}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{3\sqrt{70i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{112}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{3\sqrt{70i}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{112}$ | 0 | 0 | 0 | |
| 773 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | |
| | $M_2^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35i}}{140}$ | 0 | |
| | | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35i}}{140}$ | 0 | |
| | | 0 | $-\frac{\sqrt{21i}}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{140}$ | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | |
| | | $\frac{\sqrt{21i}}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{140}$ | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{140}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{140}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{140}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105i}}{70}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105i}}{70}$ | 0 | |
| 774 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | $M_2^{(1,-1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $\frac{\sqrt{35}i}{140}$ | 0 | 0 |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | $-\frac{\sqrt{35}i}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 |
| 775 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |
| | $M_2^{(1,-1;a)}(B)$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{420}$ | 0 | $\frac{\sqrt{105}i}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{420}$ | 0 | $-\frac{\sqrt{105}i}{420}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | $-\frac{\sqrt{105}i}{420}$ | 0 | $\frac{\sqrt{105}}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | $\frac{\sqrt{105}i}{420}$ | 0 | $\frac{\sqrt{105}}{420}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{84}$ | $\frac{2\sqrt{105}}{105}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | $-\frac{2\sqrt{105}}{105}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | $\frac{2\sqrt{105}}{105}$ | 0 | 0 | $-\frac{\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | $-\frac{2\sqrt{105}}{105}$ | $\frac{\sqrt{70}i}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $\frac{\sqrt{35}i}{70}$ | $\frac{\sqrt{210}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 | $-\frac{\sqrt{35}i}{70}$ | 0 | 0 | $-\frac{\sqrt{210}}{70}$ |
| 776 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|----------------------------------|----------------------------------------------|-------------------------|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|
| | $\mathbb{M}_{2,1}^{(1,-1;a)}(E)$ | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{3\sqrt{70}}{140}$ | 0 |
| 777 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | $\mathbb{M}_{2,2}^{(1,-1;a)}(E)$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{140}$ | 0 |
| | | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | $-\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $\frac{\sqrt{35}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{35}i}{35}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{35}$ | $-\frac{\sqrt{210}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{35}$ | 0 | $\frac{\sqrt{210}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $\frac{3\sqrt{70}i}{140}$ | 0 |
| 778 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|------------------------------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|------------------------|-------------------------|
| | $M_4^{(1,-1;a)}(A, 1)$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{48}$ | 0 | $\frac{\sqrt{42}i}{48}$ | $\frac{\sqrt{7}}{14}$ | 0 |
| | | $\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{48}$ | 0 | $-\frac{\sqrt{42}i}{48}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{336}$ | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{56}$ |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}}{56}$ |
| | | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | $-\frac{\sqrt{105}i}{168}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{112}$ | 0 | $-\frac{3\sqrt{14}i}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{336}$ | 0 | $-\frac{\sqrt{210}i}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{112}$ | 0 | $\frac{3\sqrt{14}i}{112}$ | 0 | 0 | 0 |
| 779 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $M_4^{(1,-1;a)}(A, 2)$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{336}$ | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}i}{112}$ | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{336}$ | 0 | $-\frac{5\sqrt{42}}{336}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{48}$ | 0 | $-\frac{\sqrt{42}i}{48}$ | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | $\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{48}$ | 0 | $\frac{\sqrt{42}i}{48}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{56}$ | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{168}$ | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{168}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{56}$ |
| | | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{112}$ | 0 | $\frac{3\sqrt{14}}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}i}{112}$ | 0 | $\frac{3\sqrt{14}}{112}$ | 0 | 0 | 0 |
| 780 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------------------------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|--------------------------|
| | $M_4^{(1,-1;a)}(B, 1)$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $-\frac{\sqrt{6}i}{48}$ | $-\frac{1}{6}$ | 0 | 0 | 0 | 0 | $-\frac{11\sqrt{10}}{240}$ | 0 | $-\frac{11\sqrt{10}i}{240}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{1}{6}$ | 0 | 0 | $-\frac{11\sqrt{10}}{240}$ | 0 | $\frac{11\sqrt{10}i}{240}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 | $-\frac{1}{6}$ | 0 | 0 | $\frac{\sqrt{10}i}{240}$ | 0 | $-\frac{\sqrt{10}}{240}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{48}$ | 0 | $\frac{\sqrt{6}}{48}$ | 0 | 0 | 0 | 0 | $\frac{1}{6}$ | $-\frac{\sqrt{10}i}{240}$ | 0 | $-\frac{\sqrt{10}}{240}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{1}{24}$ | 0 | $\frac{i}{6}$ | $\frac{\sqrt{10}}{60}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{120}$ |
| | | 0 | 0 | 0 | 0 | $\frac{1}{24}$ | 0 | $-\frac{i}{6}$ | 0 | $-\frac{\sqrt{10}}{60}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{120}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{24}$ | 0 | $-\frac{1}{6}$ | 0 | 0 | $\frac{\sqrt{10}}{60}$ | 0 | 0 | $\frac{\sqrt{15}i}{120}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{i}{24}$ | 0 | $-\frac{1}{6}$ | 0 | 0 | 0 | $-\frac{\sqrt{10}}{60}$ | $-\frac{\sqrt{15}i}{120}$ | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{2}}{48}$ | 0 | $-\frac{5\sqrt{2}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | $\frac{\sqrt{30}i}{80}$ | $\frac{\sqrt{5}}{15}$ | 0 |
| | | $-\frac{5\sqrt{2}}{48}$ | 0 | $\frac{5\sqrt{2}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{80}$ | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 | $-\frac{\sqrt{5}}{15}$ |
| 781 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | | |
| | $M_4^{(1,-1;a)}(B, 2)$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | $-\frac{\sqrt{210}i}{336}$ | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{336}$ | 0 | $\frac{\sqrt{14}i}{336}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{336}$ | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{336}$ | 0 | $-\frac{\sqrt{14}i}{336}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{13\sqrt{14}i}{336}$ | 0 | $-\frac{13\sqrt{14}}{336}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{336}$ | 0 | $\frac{\sqrt{210}}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | $-\frac{13\sqrt{14}i}{336}$ | 0 | $-\frac{13\sqrt{14}}{336}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{168}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}i}{168}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | $\frac{\sqrt{21}i}{168}$ |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35}i}{168}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | $-\frac{\sqrt{21}i}{168}$ | 0 |
| | | 0 | $\frac{\sqrt{70}}{48}$ | 0 | $\frac{\sqrt{70}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | $\frac{\sqrt{42}i}{112}$ | $\frac{\sqrt{7}}{21}$ | 0 |
| | | $\frac{\sqrt{70}}{48}$ | 0 | $-\frac{\sqrt{70}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | $-\frac{\sqrt{42}i}{112}$ | 0 | 0 | $-\frac{\sqrt{7}}{21}$ |
| 782 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|------------------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|
| | $M_4^{(1,-1;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{30}i}{24}$ | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 783 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $M_{4,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{6}}{96}$ | 0 | 0 | $-\frac{i}{8}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{6}}{96}$ | $\frac{i}{8}$ | 0 |
| | | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $-\frac{5\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{32}$ | $\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | $-\frac{1}{16}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{32}$ | 0 | 0 | $-\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | $\frac{1}{16}$ |
| | | 0 | 0 | $\frac{\sqrt{30}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2}}{32}$ | 0 | 0 | $\frac{\sqrt{3}i}{12}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}}{32}$ | $-\frac{\sqrt{3}i}{12}$ | 0 |
| 784 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|----------------------------|---------------------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------|-------------------------|
| | $M_{4,2}^{(1,-1;a)}(E, 1)$ | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{7\sqrt{6}}{96}$ | 0 | 0 | 0 | $\frac{1}{8}$ |
| | | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $-\frac{7\sqrt{6}}{96}$ | 0 | 0 | $\frac{1}{8}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $-\frac{5\sqrt{6}}{96}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | $\frac{\sqrt{15}}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | $\frac{1}{16}$ | 0 |
| | | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{48}$ | 0 | 0 | $-\frac{\sqrt{6}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{1}{16}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{5\sqrt{6}}{96}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2}}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{12}$ |
| | | 0 | $-\frac{\sqrt{30}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{2}}{32}$ | 0 | 0 | $\frac{\sqrt{3}}{12}$ | 0 |
| 785 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | |
| | $M_{4,1}^{(1,-1;a)}(E, 2)$ | $\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{\sqrt{42}}{672}$ | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ |
| | | 0 | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{672}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{13\sqrt{42}}{672}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | $\frac{13\sqrt{42}}{672}$ | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | $-\frac{11\sqrt{42}}{672}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{112}$ | 0 |
| | | $-\frac{3\sqrt{70}}{224}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | $-\frac{11\sqrt{42}}{672}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{7}}{112}$ |
| | | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{96}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{96}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{210}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ |
| | | 0 | $-\frac{\sqrt{210}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{224}$ | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 |
| 786 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|-----------------------------------------------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|------------------------|---------------------------|-----------------------------|----------------------------|--------------------------|-------------------------|
| | $M_{4,2}^{(1,-1;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{672}$ | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{224}$ | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{672}$ | $-\frac{3\sqrt{7i}}{56}$ | 0 |
| | | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | $-\frac{13\sqrt{42}}{672}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | $\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{13\sqrt{42}}{672}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | $-\frac{3\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{42i}}{96}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 |
| | | $\frac{3\sqrt{70i}}{224}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{42i}}{96}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{3\sqrt{70i}}{224}$ | $\frac{5\sqrt{105}}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{11\sqrt{42i}}{672}$ | $-\frac{\sqrt{7}}{112}$ | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{3\sqrt{70i}}{224}$ | 0 | 0 | $-\frac{5\sqrt{105}}{336}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{11\sqrt{42i}}{672}$ | 0 | 0 | $\frac{\sqrt{7}}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{210}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{224}$ | 0 | 0 | $\frac{\sqrt{21i}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{224}$ | $-\frac{\sqrt{21i}}{84}$ | 0 |
| 787 | symmetry | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ | | | | | | | | | | | | | |
| | $M_6^{(1,-1;a)}(A, 1)$ | 0 | $\frac{7\sqrt{5}}{120}$ | 0 | $\frac{7\sqrt{5i}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$ | 0 | $-\frac{\sqrt{3i}}{24}$ | $-\frac{\sqrt{2}}{12}$ | 0 |
| | | $\frac{7\sqrt{5}}{120}$ | 0 | $-\frac{7\sqrt{5i}}{120}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{24}$ | 0 | 0 | $\frac{\sqrt{2}}{12}$ |
| | | 0 | $\frac{\sqrt{5i}}{15}$ | 0 | $-\frac{\sqrt{5}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{5i}}{15}$ | 0 | $-\frac{\sqrt{5}}{15}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{5}}{60}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | $-\frac{\sqrt{3}}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{12}$ |
| | | 0 | $-\frac{\sqrt{5}}{60}$ | 0 | 0 | $\frac{\sqrt{30}}{60}$ | 0 | 0 | 0 | $\frac{\sqrt{3}}{12}$ | 0 | 0 | $-\frac{\sqrt{2}}{12}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{5}}{60}$ | 0 | 0 | $-\frac{\sqrt{30i}}{60}$ | 0 | 0 | 0 | $\frac{\sqrt{3}}{12}$ | 0 | 0 | $-\frac{\sqrt{2i}}{12}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{5}}{60}$ | $\frac{\sqrt{30i}}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{12}$ | $\frac{\sqrt{2i}}{12}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}}{120}$ | 0 | $-\frac{\sqrt{15i}}{120}$ | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | $-\frac{i}{8}$ | 0 | 0 |
| | | $\frac{\sqrt{15}}{120}$ | 0 | $\frac{\sqrt{15i}}{120}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | $\frac{i}{8}$ | 0 | 0 | 0 |
| 788 | symmetry | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_6^{(1,-1;a)}(A, 2)$ | $ \begin{array}{ccccccccccccccc} 0 & \frac{17\sqrt{11}}{264} & 0 & \frac{17\sqrt{11}i}{264} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}}{264} & 0 & \frac{\sqrt{165}i}{264} & \frac{\sqrt{110}}{132} & 0 \\ \frac{17\sqrt{11}}{264} & 0 & -\frac{17\sqrt{11}i}{264} & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}}{264} & 0 & -\frac{\sqrt{165}i}{264} & 0 & 0 & -\frac{\sqrt{110}}{132} \\ 0 & \frac{2\sqrt{11}i}{33} & 0 & -\frac{2\sqrt{11}}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{11}i}{33} & 0 & -\frac{2\sqrt{11}}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{11}}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{66}}{132} & 0 & 0 & \frac{\sqrt{165}}{132} & 0 & 0 & 0 & 0 & \frac{\sqrt{110}}{132} \\ 0 & \frac{\sqrt{11}}{132} & 0 & 0 & -\frac{\sqrt{66}}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}}{132} & 0 & 0 & \frac{\sqrt{110}}{132} & 0 \\ 0 & 0 & -\frac{\sqrt{11}}{132} & 0 & 0 & \frac{\sqrt{66}i}{132} & 0 & 0 & 0 & 0 & -\frac{\sqrt{165}}{132} & 0 & 0 & \frac{\sqrt{110}i}{132} \\ 0 & 0 & 0 & \frac{\sqrt{11}}{132} & -\frac{\sqrt{66}i}{132} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{165}}{132} & -\frac{\sqrt{110}i}{132} & 0 \\ 0 & -\frac{\sqrt{33}}{264} & 0 & \frac{\sqrt{33}i}{264} & \frac{\sqrt{22}}{44} & 0 & 0 & 0 & 0 & \frac{\sqrt{55}}{88} & 0 & \frac{\sqrt{55}i}{88} & 0 & 0 \\ -\frac{\sqrt{33}}{264} & 0 & -\frac{\sqrt{33}i}{264} & 0 & 0 & -\frac{\sqrt{22}}{44} & 0 & 0 & \frac{\sqrt{55}}{88} & 0 & -\frac{\sqrt{55}i}{88} & 0 & 0 & 0 \end{array} $ |
| 789 | symmetry | $ \frac{\sqrt{462xy(x^2-3y^2)(3x^2-y^2)}}{16} $ $ \begin{bmatrix} 0 & -\frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{i}{4} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{4} & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $ |
| 790 | symmetry | $ \frac{\sqrt{210xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}}{16} $ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| | $M_6^{(1,-1;a)}(A, 4)$ | 0 | $-\frac{\sqrt{55}i}{660}$ | 0 | $\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{55}i}{660}$ | 0 | $\frac{\sqrt{55}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{55}}{660}$ | 0 | $-\frac{\sqrt{55}i}{660}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $\frac{\sqrt{33}i}{66}$ | $\frac{\sqrt{22}}{33}$ | 0 |
| | | $-\frac{\sqrt{55}}{660}$ | 0 | $\frac{\sqrt{55}i}{660}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | $-\frac{\sqrt{22}}{33}$ |
| | | 0 | 0 | $-\frac{\sqrt{55}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | $-\frac{\sqrt{22}i}{33}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{55}}{165}$ | 0 | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{33}$ | $\frac{\sqrt{22}i}{33}$ | 0 |
| | | $\frac{\sqrt{55}}{165}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{165}$ | $\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{33}$ |
| | | 0 | $-\frac{\sqrt{55}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | $-\frac{\sqrt{33}}{33}$ | 0 | 0 | $\frac{\sqrt{22}}{33}$ | 0 |
| | | 0 | $-\frac{\sqrt{165}i}{330}$ | 0 | $-\frac{\sqrt{165}}{330}$ | 0 | 0 | $\frac{\sqrt{110}}{55}$ | 0 | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 |
| | | $\frac{\sqrt{165}i}{330}$ | 0 | $-\frac{\sqrt{165}}{330}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{55}$ | $\frac{\sqrt{11}i}{22}$ | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 |
| 791 | symmetry | $\frac{\sqrt{2}(2x^6 - 15x^4y^2 - 15x^4z^2 - 15x^2y^4 + 180x^2y^2z^2 - 15x^2z^4 + 2y^6 - 15y^4z^2 - 15y^2z^4 + 2z^6)}{8}$ | | | | | | | | | | | | | |
| | $M_6^{(1,-1;a)}(B, 1)$ | 0 | $\frac{\sqrt{231}}{616}$ | 0 | $-\frac{\sqrt{231}i}{616}$ | $-\frac{3\sqrt{154}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{385}}{616}$ | 0 | $-\frac{3\sqrt{385}i}{616}$ | 0 | 0 |
| | | $\frac{\sqrt{231}}{616}$ | 0 | $\frac{\sqrt{231}i}{616}$ | 0 | 0 | $\frac{3\sqrt{154}}{308}$ | 0 | 0 | $-\frac{3\sqrt{385}}{616}$ | 0 | $\frac{3\sqrt{385}i}{616}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{231}i}{462}$ | 0 | $-\frac{\sqrt{231}}{462}$ | 0 | 0 | $\frac{\sqrt{154}}{77}$ | 0 | 0 | $-\frac{\sqrt{385}i}{154}$ | 0 | $\frac{\sqrt{385}}{154}$ | 0 | 0 |
| | | $\frac{\sqrt{231}i}{462}$ | 0 | $-\frac{\sqrt{231}}{462}$ | 0 | 0 | 0 | $-\frac{\sqrt{154}}{77}$ | $\frac{\sqrt{385}i}{154}$ | 0 | $\frac{\sqrt{385}}{154}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{231}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{308}$ | 0 | $-\frac{\sqrt{154}i}{77}$ | $-\frac{\sqrt{385}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{924}$ |
| | | 0 | $\frac{\sqrt{231}}{132}$ | 0 | 0 | $-\frac{3\sqrt{154}}{308}$ | 0 | $\frac{\sqrt{154}i}{77}$ | 0 | 0 | $\frac{\sqrt{385}}{308}$ | 0 | 0 | $-\frac{\sqrt{2310}}{924}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{231}}{132}$ | 0 | 0 | $-\frac{3\sqrt{154}i}{308}$ | 0 | $\frac{\sqrt{154}}{77}$ | 0 | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | 0 | $\frac{\sqrt{2310}i}{924}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231}}{132}$ | $\frac{3\sqrt{154}i}{308}$ | 0 | $\frac{\sqrt{154}}{77}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{308}$ | $-\frac{\sqrt{2310}i}{924}$ | 0 |
| | | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | $-\frac{\sqrt{77}i}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{616}$ | 0 | $\frac{\sqrt{1155}i}{616}$ | $\frac{\sqrt{770}}{308}$ | 0 |
| | | $-\frac{\sqrt{77}}{88}$ | 0 | $\frac{\sqrt{77}i}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{616}$ | 0 | $-\frac{\sqrt{1155}i}{616}$ | 0 | 0 | $-\frac{\sqrt{770}}{308}$ |
| 792 | symmetry | $-\frac{\sqrt{14}(x^6 - 15x^4z^2 + 15x^2z^4 + y^6 - 15y^4z^2 + 15y^2z^4 - 2z^6)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|---------------------------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|
| | $M_6^{(1,-1;a)}(B, 2)$ | 0 | $-\frac{\sqrt{33}}{264}$ | 0 | $\frac{\sqrt{33i}}{264}$ | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55i}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{33}}{264}$ | 0 | $-\frac{\sqrt{33i}}{264}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{55}}{88}$ | 0 | $-\frac{\sqrt{55i}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{33}}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ |
| | | 0 | $-\frac{\sqrt{33}}{132}$ | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{33}}{132}$ | 0 | 0 | $\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | $\frac{\sqrt{330i}}{132}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}}{132}$ | $-\frac{\sqrt{22i}}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{44}$ | $-\frac{\sqrt{330i}}{132}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{11}}{88}$ | 0 | $\frac{\sqrt{11i}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | $\frac{\sqrt{165i}}{88}$ | $\frac{\sqrt{110}}{44}$ | 0 | 0 |
| | | $\frac{\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11i}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | $-\frac{\sqrt{165i}}{88}$ | 0 | 0 | 0 | $-\frac{\sqrt{110}}{44}$ |
| 793 | symmetry | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ | | | | | | | | | | | | | |
| | $M_6^{(1,-1;a)}(B, 3)$ | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | $-\frac{\sqrt{110i}}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $\frac{\sqrt{66i}}{264}$ | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | $\frac{\sqrt{110i}}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | $\frac{\sqrt{66i}}{264}$ | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110i}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110i}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{66}}{66}$ | 0 | 0 | $-\frac{\sqrt{11i}}{22}$ | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{66}}{66}$ | $\frac{\sqrt{11i}}{22}$ | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{66}}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | $-\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{22i}}{44}$ | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{22i}}{44}$ | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 794 | symmetry | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|--------------------------------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | $M_{6,1}^{(1,-1;a)}(E, 1)$ | 0 | 0 | $-\frac{5\sqrt{66}}{528}$ | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | $-\frac{\sqrt{110}}{176}$ | 0 | 0 | $\frac{\sqrt{165}i}{264}$ |
| | | 0 | 0 | 0 | $\frac{5\sqrt{66}}{528}$ | $-\frac{3\sqrt{11}i}{88}$ | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{176}$ | $-\frac{\sqrt{165}i}{264}$ | 0 | |
| | | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | $-\frac{\sqrt{11}i}{22}$ | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{132}$ |
| | | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | $\frac{\sqrt{11}i}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | $-\frac{\sqrt{165}}{132}$ | 0 |
| | | 0 | $\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | $-\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | $-\frac{\sqrt{66}i}{66}$ | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | $\frac{\sqrt{165}}{132}$ | 0 |
| | | $-\frac{\sqrt{66}}{88}$ | 0 | $\frac{\sqrt{66}i}{66}$ | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{132}$ |
| | | 0 | 0 | $-\frac{3\sqrt{22}}{176}$ | 0 | 0 | $\frac{\sqrt{33}i}{88}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | $\frac{\sqrt{330}}{176}$ | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{22}}{176}$ | $-\frac{\sqrt{33}i}{88}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | $-\frac{\sqrt{330}}{176}$ | $\frac{\sqrt{55}i}{88}$ | 0 | 0 |
| 795 | symmetry | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ | | | | | | | | | | | | | |
| | $M_{6,2}^{(1,-1;a)}(E, 1)$ | $\frac{5\sqrt{66}}{528}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}}{88}$ | 0 | $\frac{\sqrt{11}i}{44}$ | $-\frac{\sqrt{110}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ |
| | | 0 | $-\frac{5\sqrt{66}}{528}$ | 0 | 0 | $\frac{3\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $\frac{\sqrt{110}}{176}$ | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | $-\frac{\sqrt{165}i}{132}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | $-\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | $\frac{\sqrt{165}i}{132}$ | 0 |
| | | 0 | $\frac{\sqrt{66}}{66}$ | 0 | $\frac{\sqrt{66}i}{88}$ | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | $-\frac{\sqrt{165}}{132}$ | 0 | 0 |
| | | $\frac{\sqrt{66}}{66}$ | 0 | $-\frac{\sqrt{66}i}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | $\frac{\sqrt{165}}{132}$ |
| | | 0 | $\frac{\sqrt{66}i}{264}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}i}{264}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | $\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{22}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | $-\frac{\sqrt{330}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ |
| | | 0 | $\frac{3\sqrt{22}}{176}$ | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | $\frac{\sqrt{33}i}{44}$ | 0 | 0 | $\frac{\sqrt{330}}{176}$ | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 |
| 796 | symmetry | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{6,1}^{(1,-1;a)}(E, 2)$ | $\begin{bmatrix} \frac{1}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{32} & 0 & 0 & -\frac{\sqrt{15}}{32} & 0 & 0 & 0 & -\frac{\sqrt{10}}{32} \\ 0 & -\frac{1}{32} & 0 & 0 & \frac{\sqrt{6}}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{32} & 0 & 0 & -\frac{\sqrt{10}}{32} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{16} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{16} & 0 & 0 & \frac{\sqrt{10}}{16} \\ \frac{1}{16} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{16} & 0 & 0 & -\frac{\sqrt{15}}{16} & 0 & 0 & 0 & -\frac{\sqrt{10}}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{32} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{32} & 0 & 0 & \frac{3\sqrt{5}}{32} & 0 & 0 & 0 & \frac{\sqrt{30}}{32} \\ 0 & \frac{\sqrt{3}}{32} & 0 & 0 & -\frac{3\sqrt{2}}{32} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{32} & 0 & 0 & \frac{\sqrt{30}}{32} \end{bmatrix}$ |
| 797 | symmetry | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ $\begin{bmatrix} 0 & 0 & \frac{1}{32} & 0 & 0 & -\frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{32} & 0 & 0 & -\frac{\sqrt{10}i}{32} \\ 0 & 0 & 0 & -\frac{1}{32} & \frac{\sqrt{6}i}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{32} & \frac{\sqrt{10}i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{16} & \frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{16} & \frac{\sqrt{10}}{16} & 0 \\ 0 & 0 & -\frac{i}{16} & 0 & 0 & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{16} & 0 & 0 & -\frac{\sqrt{10}}{16} \\ 0 & 0 & \frac{\sqrt{3}}{32} & 0 & 0 & -\frac{3\sqrt{2}i}{32} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{32} & 0 & 0 & -\frac{\sqrt{30}i}{32} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{32} & \frac{3\sqrt{2}i}{32} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{32} & \frac{\sqrt{30}i}{32} & 0 \end{bmatrix}$ |
| 798 | symmetry | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|----------------------------|--------------------------------------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-------------------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-----------------------------|
| | $M_{6,1}^{(1,-1;a)}(E, 3)$ | $\frac{17\sqrt{55}}{1056}$ | 0 | 0 | 0 | 0 | $\frac{37\sqrt{330}}{5280}$ | 0 | $\frac{\sqrt{330}i}{110}$ | $\frac{\sqrt{33}}{96}$ | 0 | 0 | 0 | $\frac{\sqrt{22}}{96}$ |
| | | 0 | $-\frac{17\sqrt{55}}{1056}$ | 0 | 0 | $\frac{37\sqrt{330}}{5280}$ | 0 | $-\frac{\sqrt{330}i}{110}$ | 0 | 0 | $-\frac{\sqrt{33}}{96}$ | 0 | 0 | $\frac{\sqrt{22}}{96}$ |
| | | 0 | 0 | $-\frac{\sqrt{55}}{66}$ | 0 | 0 | $\frac{\sqrt{330}i}{110}$ | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $\frac{\sqrt{22}i}{66}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{55}}{66}$ | $-\frac{\sqrt{330}i}{110}$ | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | 0 | $\frac{\sqrt{33}}{66}$ | $-\frac{\sqrt{22}i}{66}$ | 0 |
| | | 0 | $\frac{29\sqrt{55}}{2640}$ | 0 | $\frac{\sqrt{55}i}{66}$ | $\frac{\sqrt{330}}{240}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{176}$ | 0 | $\frac{\sqrt{33}i}{66}$ | $\frac{5\sqrt{22}}{528}$ |
| | | $\frac{29\sqrt{55}}{2640}$ | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | 0 | $-\frac{\sqrt{330}}{240}$ | 0 | 0 | $\frac{\sqrt{33}}{176}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{5\sqrt{22}}{528}$ |
| | | 0 | $\frac{7\sqrt{55}i}{330}$ | 0 | $-\frac{\sqrt{55}}{66}$ | 0 | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 |
| | | $-\frac{7\sqrt{55}i}{330}$ | 0 | $-\frac{\sqrt{55}}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{165}$ | $-\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 |
| | | $\frac{9\sqrt{165}}{1760}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{160}$ | 0 | $\frac{\sqrt{110}i}{110}$ | $\frac{5\sqrt{11}}{352}$ | 0 | 0 | 0 | $\frac{5\sqrt{66}}{1056}$ |
| | | 0 | $-\frac{9\sqrt{165}}{1760}$ | 0 | 0 | $\frac{\sqrt{110}}{160}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | $-\frac{5\sqrt{11}}{352}$ | 0 | 0 | $\frac{5\sqrt{66}}{1056}$ |
| 799 | symmetry | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ | | | | | | | | | | | | |
| | $M_{6,2}^{(1,-1;a)}(E, 3)$ | 0 | 0 | $\frac{17\sqrt{55}}{1056}$ | 0 | 0 | $-\frac{37\sqrt{330}i}{5280}$ | 0 | $\frac{\sqrt{330}}{110}$ | 0 | 0 | $-\frac{\sqrt{33}}{96}$ | 0 | $\frac{\sqrt{22}i}{96}$ |
| | | 0 | 0 | 0 | $-\frac{17\sqrt{55}}{1056}$ | $\frac{37\sqrt{330}i}{5280}$ | 0 | $\frac{\sqrt{330}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{96}$ | $-\frac{\sqrt{22}i}{96}$ |
| | | $\frac{\sqrt{55}}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{110}$ | 0 | $\frac{\sqrt{330}i}{165}$ | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | $-\frac{\sqrt{22}}{66}$ |
| | | 0 | $-\frac{\sqrt{55}}{66}$ | 0 | 0 | $\frac{\sqrt{330}}{110}$ | 0 | $-\frac{\sqrt{330}i}{165}$ | 0 | 0 | $\frac{\sqrt{33}}{66}$ | 0 | 0 | $-\frac{\sqrt{22}}{66}$ |
| | | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | $\frac{7\sqrt{55}}{330}$ | 0 | 0 | $-\frac{\sqrt{330}}{165}$ | 0 | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 |
| | | $\frac{\sqrt{55}i}{66}$ | 0 | $\frac{7\sqrt{55}}{330}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{165}$ | $-\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{55}}{66}$ | 0 | $\frac{29\sqrt{55}i}{2640}$ | $-\frac{\sqrt{330}}{240}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{176}$ | $\frac{5\sqrt{22}}{528}$ |
| | | $\frac{\sqrt{55}}{66}$ | 0 | $-\frac{29\sqrt{55}i}{2640}$ | 0 | 0 | $\frac{\sqrt{330}}{240}$ | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $\frac{\sqrt{33}i}{176}$ | 0 | $-\frac{5\sqrt{22}}{528}$ |
| | | 0 | 0 | $-\frac{9\sqrt{165}}{1760}$ | 0 | 0 | $\frac{\sqrt{110}i}{160}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 | 0 | $\frac{5\sqrt{11}}{352}$ | 0 | $-\frac{5\sqrt{66}i}{1056}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{165}}{1760}$ | $-\frac{\sqrt{110}i}{160}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{352}$ | $\frac{5\sqrt{66}i}{1056}$ |
| 800 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|----------------------------------------|---------------------------|----------------------------|----------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $M_2^{(1,0;a)}(A, 1)$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | 0 |
| 801 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |
| | $M_2^{(1,0;a)}(A, 2)$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | $-\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{42}$ | 0 | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ | $\frac{\sqrt{42}i}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 802 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $M_2^{(1,0;a)}(B)$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 |
| 803 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |
| | $M_{2,1}^{(1,0;a)}(E)$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{84}$ |
| | | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{84}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | $\frac{\sqrt{21}i}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | $\frac{\sqrt{21}}{42}$ | 0 |
| | | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | 0 |
| 804 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|-------------------------|-------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|
| | $M_{2,2}^{(1,0;a)}(E)$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $\frac{\sqrt{21}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | $-\frac{\sqrt{21}i}{84}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{84}$ |
| | | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $\frac{\sqrt{21}}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}i}{56}$ | $\frac{\sqrt{21}}{42}$ | 0 |
| | | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| 805 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |
| | $M_4^{(1,0;a)}(A, 1)$ | 0 | $-\frac{3\sqrt{42}}{560}$ | 0 | $-\frac{3\sqrt{42}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | $-\frac{\sqrt{105}}{70}$ | 0 |
| | | $-\frac{3\sqrt{42}}{560}$ | 0 | $\frac{3\sqrt{42}i}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ |
| | | 0 | $\frac{3\sqrt{42}i}{560}$ | 0 | $-\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{70}i}{560}$ | 0 | $-\frac{13\sqrt{70}}{560}$ | 0 | 0 |
| | | $-\frac{3\sqrt{42}i}{560}$ | 0 | $-\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | 0 | $\frac{13\sqrt{70}i}{560}$ | 0 | $-\frac{13\sqrt{70}}{560}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{42}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{40}$ | 0 | $\frac{\sqrt{7}i}{20}$ | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{105}}{280}$ |
| | | 0 | $\frac{3\sqrt{42}}{280}$ | 0 | 0 | $\frac{\sqrt{7}}{40}$ | 0 | $-\frac{\sqrt{7}i}{20}$ | 0 | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 | $\frac{3\sqrt{105}}{280}$ | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{42}}{280}$ | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | $\frac{\sqrt{7}}{20}$ | 0 | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 | $\frac{3\sqrt{105}i}{280}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{42}}{280}$ | $\frac{\sqrt{7}i}{40}$ | 0 | $\frac{\sqrt{7}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | $-\frac{3\sqrt{105}i}{280}$ | 0 |
| | | 0 | $-\frac{3\sqrt{14}}{80}$ | 0 | $\frac{3\sqrt{14}i}{80}$ | $\frac{\sqrt{21}}{35}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{210}}{560}$ | 0 | $-\frac{3\sqrt{210}i}{560}$ | 0 | 0 |
| | | $-\frac{3\sqrt{14}}{80}$ | 0 | $-\frac{3\sqrt{14}i}{80}$ | 0 | 0 | $-\frac{\sqrt{21}}{35}$ | 0 | 0 | $-\frac{3\sqrt{210}}{560}$ | 0 | $\frac{3\sqrt{210}i}{560}$ | 0 | 0 | 0 |
| 806 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------|--------------------------------------------------------------------------|----------------------------|---------------------------|----------------------------|-------------------------|--------------------------|--------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|
| | $M_4^{(1,0;a)}(A, 2)$ | 0 | $-\frac{3\sqrt{42}i}{560}$ | 0 | $\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{70}i}{560}$ | 0 | $-\frac{13\sqrt{70}}{560}$ | 0 | 0 |
| | | $\frac{3\sqrt{42}i}{560}$ | 0 | $\frac{3\sqrt{42}}{560}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{70}i}{560}$ | 0 | $-\frac{13\sqrt{70}}{560}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{42}i}{560}$ | 0 | $-\frac{3\sqrt{42}i}{560}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | $\frac{\sqrt{70}i}{560}$ | $\frac{\sqrt{105}}{70}$ | 0 |
| | | $-\frac{3\sqrt{42}}{560}$ | 0 | $\frac{3\sqrt{42}i}{560}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{560}$ | 0 | $-\frac{\sqrt{70}i}{560}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| | | 0 | 0 | $\frac{3\sqrt{42}}{280}$ | 0 | 0 | $\frac{\sqrt{7}i}{20}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | $\frac{\sqrt{70}}{280}$ | 0 | 0 | $\frac{3\sqrt{105}i}{280}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{280}$ | $-\frac{\sqrt{7}i}{20}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | $-\frac{3\sqrt{105}i}{280}$ | 0 |
| | | $-\frac{3\sqrt{42}}{280}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{20}$ | 0 | $\frac{\sqrt{7}i}{40}$ | $\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 | $-\frac{3\sqrt{105}}{280}$ |
| | | 0 | $\frac{3\sqrt{42}}{280}$ | 0 | 0 | $\frac{\sqrt{7}}{20}$ | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | $-\frac{3\sqrt{105}}{280}$ | 0 |
| | | 0 | $\frac{3\sqrt{14}i}{80}$ | 0 | $\frac{3\sqrt{14}}{80}$ | 0 | 0 | $-\frac{\sqrt{21}}{35}$ | 0 | $-\frac{3\sqrt{210}i}{560}$ | 0 | $\frac{3\sqrt{210}}{560}$ | 0 | 0 |
| | | $-\frac{3\sqrt{14}i}{80}$ | 0 | $\frac{3\sqrt{14}}{80}$ | 0 | 0 | 0 | $\frac{\sqrt{21}}{35}$ | $\frac{3\sqrt{210}i}{560}$ | 0 | $\frac{3\sqrt{210}}{560}$ | 0 | 0 | 0 |
| 807 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ | | | | | | | | | | | | |
| | $M_4^{(1,0;a)}(B, 1)$ | 0 | $\frac{\sqrt{10}}{80}$ | 0 | $-\frac{\sqrt{10}i}{80}$ | $\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 |
| | | $\frac{\sqrt{10}}{80}$ | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | $\frac{\sqrt{6}}{48}$ | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}}{80}$ | 0 | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | $\frac{\sqrt{6}}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{80}$ | 0 | $\frac{\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{30}$ | $\frac{\sqrt{6}i}{16}$ | 0 | $\frac{\sqrt{6}}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | $\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ |
| | | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 | $-\frac{\sqrt{15}i}{30}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ |
| | | 0 | 0 | $\frac{\sqrt{10}}{20}$ | 0 | 0 | $-\frac{\sqrt{15}i}{40}$ | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | $\frac{\sqrt{15}i}{40}$ | 0 | $-\frac{\sqrt{15}}{30}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 |
| | | 0 | $\frac{\sqrt{30}}{80}$ | 0 | $\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | $-\frac{\sqrt{2}i}{16}$ | 0 | 0 |
| | | $\frac{\sqrt{30}}{80}$ | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{16}$ | 0 | $\frac{\sqrt{2}i}{16}$ | 0 | 0 |
| 808 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|--------------------------|-------------------------|
| | $M_4^{(1,0;a)}(B, 2)$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | $-\frac{\sqrt{14}i}{112}$ | $-\frac{\sqrt{21}}{30}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{210}}{1680}$ | 0 | $\frac{17\sqrt{210}i}{1680}$ | 0 | 0 |
| | | $\frac{\sqrt{14}}{112}$ | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | 0 | $\frac{\sqrt{21}}{30}$ | 0 | 0 | $\frac{17\sqrt{210}}{1680}$ | 0 | $-\frac{17\sqrt{210}i}{1680}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | 0 | $\frac{\sqrt{21}}{30}$ | 0 | 0 | $-\frac{\sqrt{210}i}{560}$ | 0 | $\frac{\sqrt{210}}{560}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}i}{112}$ | 0 | $\frac{\sqrt{14}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{30}$ | $\frac{\sqrt{210}i}{560}$ | 0 | $\frac{\sqrt{210}}{560}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{14}}{20}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{40}$ | 0 | $\frac{\sqrt{21}i}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{56}$ |
| | | 0 | $-\frac{\sqrt{14}}{20}$ | 0 | 0 | $-\frac{\sqrt{21}}{40}$ | 0 | $-\frac{\sqrt{21}i}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{14}}{20}$ | 0 | 0 | $-\frac{\sqrt{21}i}{40}$ | 0 | $-\frac{\sqrt{21}}{60}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{20}$ | $\frac{\sqrt{21}i}{40}$ | 0 | $-\frac{\sqrt{21}}{60}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}}{80}$ | 0 | $-\frac{\sqrt{42}i}{80}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{80}$ | 0 | $\frac{\sqrt{42}i}{80}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | 0 | 0 | 0 |
| 809 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $M_4^{(1,0;a)}(B, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{5}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{5}$ | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{1}{5}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{5}$ | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}}{10}$ | 0 | 0 | $-\frac{i}{40}$ | 0 | $\frac{1}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{10}$ | $\frac{i}{40}$ | 0 | $\frac{1}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{10}$ | 0 | 0 | 0 | 0 | $\frac{1}{40}$ | 0 | $\frac{i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{10}$ | 0 | 0 | $\frac{1}{40}$ | 0 | $-\frac{i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{2}i}{40}$ | 0 | $\frac{3\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{2}i}{40}$ | 0 | $\frac{3\sqrt{2}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 810 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|---------------------------------------|--------------------------|-------------------------|--------------------------|------------------------|-------------------------|------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|
| | $M_{4,1}^{(1,0;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{6}}{160}$ | 0 | 0 | $\frac{i}{40}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | $\frac{\sqrt{15}i}{40}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}}{160}$ | $-\frac{i}{40}$ | 0 | $-\frac{1}{10}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{32}$ | $-\frac{\sqrt{15}i}{40}$ | 0 |
| | | $-\frac{\sqrt{6}}{160}$ | 0 | 0 | 0 | 0 | $\frac{3}{20}$ | 0 | $-\frac{i}{40}$ | $-\frac{\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{20}$ |
| | | 0 | $\frac{\sqrt{6}}{160}$ | 0 | 0 | $\frac{3}{20}$ | 0 | $\frac{i}{40}$ | 0 | 0 | $\frac{\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}i}{160}$ | 0 | $\frac{\sqrt{6}}{40}$ | 0 | 0 | $-\frac{1}{40}$ | 0 | 0 | $\frac{\sqrt{10}i}{160}$ | 0 | $\frac{3\sqrt{10}}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{160}$ | 0 | $\frac{\sqrt{6}}{40}$ | 0 | 0 | 0 | 0 | $\frac{1}{40}$ | $-\frac{\sqrt{10}i}{160}$ | 0 | $\frac{3\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}}{20}$ | 0 | $\frac{\sqrt{6}i}{32}$ | $\frac{1}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{160}$ | $-\frac{\sqrt{15}}{80}$ | 0 |
| | | $-\frac{\sqrt{6}}{20}$ | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{1}{16}$ | 0 | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $\frac{\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{80}$ |
| | | 0 | 0 | $\frac{9\sqrt{2}}{160}$ | 0 | 0 | $-\frac{\sqrt{3}i}{20}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{160}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{2}}{160}$ | $\frac{\sqrt{3}i}{20}$ | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{160}$ | 0 | 0 |
| 811 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |
| | $M_{4,2}^{(1,0;a)}(E, 1)$ | $-\frac{\sqrt{6}}{160}$ | 0 | 0 | 0 | 0 | $\frac{1}{40}$ | 0 | $\frac{i}{10}$ | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{40}$ |
| | | 0 | $\frac{\sqrt{6}}{160}$ | 0 | 0 | $\frac{1}{40}$ | 0 | $-\frac{i}{10}$ | 0 | 0 | $\frac{\sqrt{10}}{32}$ | 0 | 0 | $-\frac{\sqrt{15}}{40}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}}{160}$ | 0 | 0 | $-\frac{3i}{20}$ | 0 | $-\frac{1}{40}$ | 0 | 0 | $\frac{\sqrt{10}}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{20}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}}{160}$ | $\frac{3i}{20}$ | 0 | $-\frac{1}{40}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{160}$ | $-\frac{\sqrt{15}i}{20}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}}{32}$ | 0 | $\frac{\sqrt{6}i}{20}$ | $\frac{1}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{160}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | $\frac{\sqrt{15}}{80}$ | 0 |
| | | $-\frac{\sqrt{6}}{32}$ | 0 | $-\frac{\sqrt{6}i}{20}$ | 0 | 0 | $-\frac{1}{16}$ | 0 | 0 | $-\frac{\sqrt{10}}{160}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | $-\frac{\sqrt{15}}{80}$ |
| | | 0 | $-\frac{\sqrt{6}i}{40}$ | 0 | $-\frac{\sqrt{6}}{160}$ | 0 | 0 | $\frac{1}{40}$ | 0 | 0 | $\frac{3\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{160}$ | 0 | 0 |
| | | $\frac{\sqrt{6}i}{40}$ | 0 | $-\frac{\sqrt{6}}{160}$ | 0 | 0 | 0 | $-\frac{1}{40}$ | $-\frac{3\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{160}$ | 0 | 0 | 0 | 0 |
| | | $\frac{9\sqrt{2}}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{20}$ | 0 | $-\frac{\sqrt{3}i}{10}$ | $-\frac{\sqrt{30}}{160}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{9\sqrt{2}}{160}$ | 0 | 0 | $\frac{\sqrt{3}}{20}$ | 0 | $\frac{\sqrt{3}i}{10}$ | 0 | 0 | $\frac{\sqrt{30}}{160}$ | 0 | 0 | 0 | 0 |
| 812 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------|------------------------------------------|-----------------------------|----------------------------|----------------------------|-------------------------|--------------------------|-------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------|
| | $M_{4,1}^{(1,0;a)}(E, 2)$ | $\frac{\sqrt{42}}{1120}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{40}$ | 0 | $-\frac{3\sqrt{7}i}{70}$ | $-\frac{19\sqrt{70}}{1120}$ | 0 | 0 | 0 | $\frac{\sqrt{105}}{56}$ |
| | | 0 | $-\frac{\sqrt{42}}{1120}$ | 0 | 0 | $\frac{\sqrt{7}}{40}$ | 0 | $\frac{3\sqrt{7}i}{70}$ | 0 | 0 | $\frac{19\sqrt{70}}{1120}$ | 0 | 0 | $\frac{\sqrt{105}}{56}$ |
| | | 0 | 0 | $\frac{\sqrt{42}}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}i}{140}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | $\frac{23\sqrt{70}}{1120}$ | 0 | $\frac{\sqrt{105}i}{140}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{1120}$ | $\frac{\sqrt{7}i}{140}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | 0 | $-\frac{23\sqrt{70}}{1120}$ | $-\frac{\sqrt{105}i}{140}$ | 0 |
| | | 0 | $\frac{\sqrt{42}}{1120}$ | 0 | $\frac{\sqrt{42}i}{56}$ | $\frac{\sqrt{7}}{80}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | $-\frac{\sqrt{105}}{560}$ |
| | | $\frac{\sqrt{42}}{1120}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{80}$ | 0 | 0 | $\frac{\sqrt{70}}{224}$ | 0 | $-\frac{3\sqrt{70}i}{280}$ | 0 | $\frac{\sqrt{105}}{560}$ |
| | | 0 | $\frac{\sqrt{42}i}{140}$ | 0 | $\frac{29\sqrt{42}}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | $-\frac{\sqrt{70}i}{140}$ | 0 | $-\frac{\sqrt{70}}{224}$ | 0 |
| | | $-\frac{\sqrt{42}i}{140}$ | 0 | $\frac{29\sqrt{42}}{1120}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{40}$ | $\frac{\sqrt{70}i}{140}$ | 0 | $-\frac{\sqrt{70}}{224}$ | 0 | 0 | 0 |
| | | $\frac{9\sqrt{14}}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{70}$ | $\frac{\sqrt{210}}{1120}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{9\sqrt{14}}{160}$ | 0 | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{70}$ | 0 | 0 | $-\frac{\sqrt{210}}{1120}$ | 0 | 0 | 0 |
| 813 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | |
| | $M_{4,2}^{(1,0;a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{42}}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | $-\frac{3\sqrt{7}}{70}$ | 0 | 0 | $\frac{19\sqrt{70}}{1120}$ | 0 | $\frac{\sqrt{105}i}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{1120}$ | $\frac{\sqrt{7}i}{40}$ | 0 | $-\frac{3\sqrt{7}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{70}}{1120}$ | $-\frac{\sqrt{105}i}{56}$ |
| | | $-\frac{\sqrt{42}}{1120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{140}$ | 0 | $\frac{\sqrt{7}i}{40}$ | $\frac{23\sqrt{70}}{1120}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | 0 | $\frac{\sqrt{42}}{1120}$ | 0 | 0 | $-\frac{\sqrt{7}}{140}$ | 0 | $-\frac{\sqrt{7}i}{40}$ | 0 | 0 | $-\frac{23\sqrt{70}}{1120}$ | 0 | 0 | $-\frac{\sqrt{105}}{140}$ |
| | | 0 | $\frac{29\sqrt{42}i}{1120}$ | 0 | $\frac{\sqrt{42}}{140}$ | 0 | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | $\frac{\sqrt{70}}{140}$ | 0 |
| | | $-\frac{29\sqrt{42}i}{1120}$ | 0 | $\frac{\sqrt{42}}{140}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{40}$ | $-\frac{\sqrt{70}i}{224}$ | 0 | $\frac{\sqrt{70}}{140}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{1120}$ | $-\frac{\sqrt{7}}{80}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70}i}{224}$ | $-\frac{\sqrt{105}}{560}$ |
| | | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{1120}$ | 0 | 0 | $\frac{\sqrt{7}}{80}$ | 0 | 0 | $-\frac{3\sqrt{70}}{280}$ | 0 | $\frac{\sqrt{70}i}{224}$ | 0 | $\frac{\sqrt{105}}{560}$ |
| | | 0 | 0 | $-\frac{9\sqrt{14}}{160}$ | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{70}$ | 0 | 0 | $\frac{\sqrt{210}}{1120}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{9\sqrt{14}}{160}$ | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{1120}$ | 0 |
| 814 | symmetry | 1 | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|--------------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|----------------------------|---------------------------|----------------------------|----------------------------|--------------------------|---------------------------|
| | $M_0^{(1,1;a)}(B)$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | $-\frac{\sqrt{210}i}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{14}}{28}$ | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | $\frac{\sqrt{210}i}{420}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{420}$ | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}i}{28}$ | 0 | $\frac{\sqrt{14}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | $-\frac{\sqrt{210}i}{420}$ | 0 | $-\frac{\sqrt{210}}{420}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}}{105}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{70}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{105}$ | 0 | 0 | $\frac{\sqrt{35}i}{70}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | $-\frac{\sqrt{35}i}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $-\frac{\sqrt{70}i}{70}$ | $\frac{\sqrt{105}}{70}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ |
| 815 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |
| | $M_2^{(1,1;a)}(A, 1)$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | $\frac{\sqrt{210}i}{120}$ | $-\frac{\sqrt{35}}{42}$ | 0 |
| | | $\frac{\sqrt{14}}{168}$ | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ |
| | | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | $\frac{\sqrt{210}}{280}$ | 0 | 0 |
| | | $\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{280}$ | 0 | $\frac{\sqrt{210}}{280}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{21}i}{28}$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{420}$ |
| | | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{420}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{420}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | $\frac{\sqrt{21}i}{42}$ | 0 | $-\frac{\sqrt{21}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35}i}{420}$ | 0 |
| | | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | $\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | $\frac{\sqrt{70}i}{280}$ | 0 | 0 | 0 |
| 816 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|----------------------------------------|----------------------------|---------------------------|---------------------------|--------------------------|-------------------------|-------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | $M_2^{(1,1;a)}(A, 2)$ | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{280}$ | 0 | $-\frac{\sqrt{210}}{280}$ | 0 | 0 |
| | | $\frac{\sqrt{14}i}{168}$ | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | $-\frac{\sqrt{210}}{280}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | $-\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | $\frac{\sqrt{210}i}{120}$ | $-\frac{\sqrt{35}}{42}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}}{168}$ | 0 | $\frac{\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | $-\frac{\sqrt{210}i}{120}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{35}i}{420}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | $-\frac{\sqrt{21}i}{28}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $-\frac{\sqrt{35}i}{420}$ | 0 |
| | | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $-\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{420}$ |
| | | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{28}$ | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{420}$ | 0 |
| | | 0 | $-\frac{5\sqrt{42}i}{168}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 |
| | | $\frac{5\sqrt{42}i}{168}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{280}$ | 0 | 0 | 0 |
| 817 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |
| | $M_2^{(1,1;a)}(B)$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{84}$ | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{70}i}{70}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{84}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{70}i}{70}$ | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{210}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{105}}{210}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{105}i}{210}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}}{140}$ | $\frac{\sqrt{105}i}{210}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | $-\frac{\sqrt{210}i}{140}$ | $\frac{\sqrt{35}}{35}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{140}$ | 0 | $\frac{\sqrt{210}i}{140}$ | 0 | 0 | $-\frac{\sqrt{35}}{35}$ |
| 818 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------|----------------------------------------------|---------------------------|----------------------------|----------------------------|-------------------------|--------------------------|--------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|
| | $M_{2,1}^{(1,1;a)}(E)$ | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{105}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ |
| | | 0 | $\frac{\sqrt{14}}{42}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{105}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{42}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{210}}{280}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | $\frac{\sqrt{35}}{105}$ | 0 |
| | | $\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{280}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{35}}{105}$ |
| | | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | 0 |
| | | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{120}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | $-\frac{\sqrt{105}}{105}$ | 0 |
| 819 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |
| | $M_{2,2}^{(1,1;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{42}$ | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{105}$ | $\frac{\sqrt{35}i}{42}$ |
| | | $\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{210}}{105}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ |
| | | 0 | $-\frac{\sqrt{14}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{105}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ |
| | | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 |
| | | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | $-\frac{\sqrt{210}i}{120}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{280}$ | $\frac{\sqrt{35}}{105}$ |
| | | $-\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{280}$ | 0 | $-\frac{\sqrt{35}}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{70}$ | 0 | 0 | $\frac{\sqrt{105}i}{105}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | $-\frac{\sqrt{105}i}{105}$ | 0 |
| 820 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|------------------------------------------------------------|----------------------------|----------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|----------------------------|---------------------------|
| | $M_4^{(1,1;a)}(A, 1)$ | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{1155}}{4620}$ | 0 | $\frac{17\sqrt{1155}i}{4620}$ | $-\frac{\sqrt{770}}{220}$ | 0 |
| | | $\frac{\sqrt{77}}{1540}$ | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{1155}}{4620}$ | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | 0 | 0 | $\frac{\sqrt{770}}{220}$ |
| | | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{77}i}{1540}$ | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{420}$ | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{77}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{462}}{2310}$ | 0 | $\frac{\sqrt{462}i}{210}$ | $-\frac{\sqrt{1155}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{385}$ |
| | | 0 | $-\frac{\sqrt{77}}{220}$ | 0 | 0 | $-\frac{17\sqrt{462}}{2310}$ | 0 | $-\frac{\sqrt{462}i}{210}$ | 0 | 0 | $\frac{\sqrt{1155}}{220}$ | 0 | 0 | $\frac{\sqrt{770}}{385}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{77}}{220}$ | 0 | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | $\frac{\sqrt{462}}{210}$ | 0 | 0 | $\frac{\sqrt{1155}}{220}$ | 0 | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{77}}{220}$ | $-\frac{17\sqrt{462}i}{2310}$ | 0 | $\frac{\sqrt{462}}{210}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{220}$ | $-\frac{\sqrt{770}i}{385}$ | 0 |
| | | 0 | $-\frac{\sqrt{231}}{165}$ | 0 | $\frac{\sqrt{231}i}{165}$ | $-\frac{3\sqrt{154}}{220}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{385}}{770}$ | 0 | $\frac{3\sqrt{385}i}{770}$ | 0 | 0 |
| | | $-\frac{\sqrt{231}}{165}$ | 0 | $-\frac{\sqrt{231}i}{165}$ | 0 | 0 | $\frac{3\sqrt{154}}{220}$ | 0 | 0 | $\frac{3\sqrt{385}}{770}$ | 0 | $-\frac{3\sqrt{385}i}{770}$ | 0 | 0 | 0 |
| 821 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |
| | $M_4^{(1,1;a)}(A, 2)$ | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{420}$ | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 |
| | | $-\frac{\sqrt{77}i}{1540}$ | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{420}$ | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | $\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{1155}}{4620}$ | 0 | $-\frac{17\sqrt{1155}i}{4620}$ | $\frac{\sqrt{770}}{220}$ | 0 |
| | | $\frac{\sqrt{77}}{1540}$ | 0 | $-\frac{\sqrt{77}i}{1540}$ | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{1155}}{4620}$ | 0 | $\frac{17\sqrt{1155}i}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}}{220}$ |
| | | 0 | 0 | $-\frac{\sqrt{77}}{220}$ | 0 | 0 | $\frac{\sqrt{462}i}{210}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $\frac{\sqrt{1155}}{220}$ | 0 | 0 | $\frac{\sqrt{770}i}{385}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}}{220}$ | $-\frac{\sqrt{462}i}{210}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{220}$ | $-\frac{\sqrt{770}i}{385}$ | 0 |
| | | $\frac{\sqrt{77}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{210}$ | 0 | $-\frac{17\sqrt{462}i}{2310}$ | $\frac{\sqrt{1155}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{385}$ |
| | | 0 | $-\frac{\sqrt{77}}{220}$ | 0 | 0 | $\frac{\sqrt{462}}{210}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $-\frac{\sqrt{1155}}{220}$ | 0 | 0 | $-\frac{\sqrt{770}}{385}$ | 0 |
| | | 0 | $\frac{\sqrt{231}i}{165}$ | 0 | $\frac{\sqrt{231}}{165}$ | 0 | 0 | $\frac{3\sqrt{154}}{220}$ | 0 | 0 | $\frac{3\sqrt{385}i}{770}$ | 0 | $-\frac{3\sqrt{385}}{770}$ | 0 | 0 |
| | | $-\frac{\sqrt{231}i}{165}$ | 0 | $\frac{\sqrt{231}}{165}$ | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{220}$ | $-\frac{3\sqrt{385}i}{770}$ | 0 | $-\frac{3\sqrt{385}}{770}$ | 0 | 0 | 0 | 0 |
| 822 | symmetry | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------|----------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | $M_4^{(1,1;a)}(B, 1)$ | 0 | $\frac{2\sqrt{165}}{165}$ | 0 | $-\frac{2\sqrt{165}i}{660}$ | $\frac{7\sqrt{110}}{660}$ | 0 | 0 | 0 | $-\frac{\sqrt{11}}{66}$ | 0 | $-\frac{\sqrt{11}i}{66}$ | 0 | 0 |
| | | $\frac{2\sqrt{165}}{165}$ | 0 | $\frac{2\sqrt{165}i}{165}$ | 0 | 0 | $-\frac{7\sqrt{110}}{660}$ | 0 | 0 | $-\frac{\sqrt{11}}{66}$ | 0 | $\frac{\sqrt{11}i}{66}$ | 0 | 0 |
| | | 0 | $-\frac{7\sqrt{165}i}{660}$ | 0 | $-\frac{7\sqrt{165}}{660}$ | 0 | 0 | $-\frac{\sqrt{110}}{330}$ | 0 | 0 | $\frac{\sqrt{11}i}{132}$ | 0 | $-\frac{\sqrt{11}}{132}$ | 0 |
| | | $\frac{7\sqrt{165}i}{660}$ | 0 | $-\frac{7\sqrt{165}}{660}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{330}$ | $-\frac{\sqrt{11}i}{132}$ | 0 | $-\frac{\sqrt{11}}{132}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{165}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{165}$ | 0 | $\frac{\sqrt{110}i}{330}$ | $-\frac{5\sqrt{11}}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{66}}{66}$ |
| | | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | 0 | $-\frac{\sqrt{110}}{165}$ | 0 | $-\frac{\sqrt{110}i}{330}$ | 0 | 0 | $\frac{5\sqrt{11}}{132}$ | 0 | 0 | $\frac{\sqrt{66}}{66}$ |
| | | 0 | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | 0 | $-\frac{\sqrt{110}i}{165}$ | 0 | $-\frac{\sqrt{110}}{330}$ | 0 | 0 | $-\frac{5\sqrt{11}}{132}$ | 0 | $-\frac{\sqrt{66}i}{66}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{165}}{220}$ | $\frac{\sqrt{110}i}{165}$ | 0 | $-\frac{\sqrt{110}}{330}$ | 0 | 0 | 0 | $\frac{5\sqrt{11}}{132}$ | $\frac{\sqrt{66}i}{66}$ | 0 |
| | | 0 | $-\frac{\sqrt{55}}{660}$ | 0 | $-\frac{\sqrt{55}i}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{44}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | $\frac{5\sqrt{22}}{132}$ |
| | | $-\frac{\sqrt{55}}{660}$ | 0 | $\frac{\sqrt{55}i}{660}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{44}$ | 0 | $\frac{\sqrt{33}i}{44}$ | 0 | 0 | $-\frac{5\sqrt{22}}{132}$ |
| 823 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | |
| | $M_4^{(1,1;a)}(B, 2)$ | 0 | $-\frac{5\sqrt{231}}{462}$ | 0 | $\frac{5\sqrt{231}i}{462}$ | $-\frac{19\sqrt{154}}{4620}$ | 0 | 0 | 0 | $-\frac{\sqrt{385}}{1155}$ | 0 | $-\frac{\sqrt{385}i}{1155}$ | 0 | 0 |
| | | $-\frac{5\sqrt{231}}{462}$ | 0 | $-\frac{5\sqrt{231}i}{462}$ | 0 | 0 | $\frac{19\sqrt{154}}{4620}$ | 0 | 0 | $-\frac{\sqrt{385}}{1155}$ | 0 | $\frac{\sqrt{385}i}{1155}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{231}i}{84}$ | 0 | $\frac{\sqrt{231}}{84}$ | 0 | 0 | $\frac{\sqrt{154}}{105}$ | 0 | 0 | $\frac{\sqrt{385}i}{420}$ | 0 | $-\frac{\sqrt{385}}{420}$ | 0 |
| | | $-\frac{\sqrt{231}i}{84}$ | 0 | $\frac{\sqrt{231}}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{154}}{105}$ | $-\frac{\sqrt{385}i}{420}$ | 0 | $-\frac{\sqrt{385}}{420}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{231}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154}}{1155}$ | 0 | $\frac{\sqrt{154}i}{210}$ | $-\frac{5\sqrt{385}}{924}$ | 0 | 0 | 0 | $\frac{\sqrt{2310}}{462}$ |
| | | 0 | $\frac{\sqrt{231}}{220}$ | 0 | 0 | $-\frac{2\sqrt{154}}{1155}$ | 0 | $-\frac{\sqrt{154}i}{210}$ | 0 | 0 | $\frac{5\sqrt{385}}{924}$ | 0 | 0 | $\frac{\sqrt{2310}}{462}$ |
| | | 0 | 0 | $\frac{\sqrt{231}}{220}$ | 0 | 0 | $-\frac{2\sqrt{154}i}{1155}$ | 0 | $-\frac{\sqrt{154}}{210}$ | 0 | 0 | $-\frac{5\sqrt{385}}{924}$ | 0 | $-\frac{\sqrt{2310}i}{462}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231}}{220}$ | $\frac{2\sqrt{154}i}{1155}$ | 0 | $-\frac{\sqrt{154}}{210}$ | 0 | 0 | 0 | $\frac{5\sqrt{385}}{924}$ | $\frac{\sqrt{2310}i}{462}$ | 0 |
| | | 0 | $\frac{\sqrt{77}}{660}$ | 0 | $\frac{\sqrt{77}i}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $-\frac{\sqrt{1155}i}{308}$ | $\frac{5\sqrt{770}}{924}$ |
| | | $\frac{\sqrt{77}}{660}$ | 0 | $-\frac{\sqrt{77}i}{660}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $-\frac{5\sqrt{770}}{924}$ |
| 824 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| | $M_4^{(1,1;a)}(B, 3)$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | $\frac{3\sqrt{11}}{44}$ | 0 | 0 | $\frac{3\sqrt{66}}{220}$ | 0 | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 |
| | | $-\frac{3\sqrt{11}i}{44}$ | 0 | $\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{66}}{220}$ | $-\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{11}}{44}$ | 0 | $-\frac{3\sqrt{11}i}{44}$ | $\frac{3\sqrt{66}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 |
| | | $\frac{3\sqrt{11}}{44}$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{3\sqrt{66}}{220}$ | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{3\sqrt{11}}{110}$ | 0 | 0 | $\frac{\sqrt{66}i}{330}$ | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{110}$ | $-\frac{\sqrt{66}i}{330}$ | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{11}}{110}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{11}}{110}$ | 0 | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | $\frac{\sqrt{66}i}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{33}i}{330}$ | 0 | $-\frac{\sqrt{33}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{33}i}{330}$ | 0 | $-\frac{\sqrt{33}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 825 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |
| | $M_{4,1}^{(1,1;a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{11}}{220}$ | 0 | 0 | $-\frac{7\sqrt{66}i}{660}$ | 0 | $-\frac{3\sqrt{66}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | 0 | $-\frac{\sqrt{110}i}{110}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{11}}{220}$ | $\frac{7\sqrt{66}i}{660}$ | 0 | $-\frac{3\sqrt{66}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{132}$ | $\frac{\sqrt{110}i}{110}$ | 0 |
| | | $\frac{\sqrt{11}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{66}}{440}$ | 0 | $\frac{\sqrt{66}i}{330}$ | $\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}}{440}$ |
| | | 0 | $-\frac{\sqrt{11}}{220}$ | 0 | 0 | $-\frac{3\sqrt{66}}{440}$ | 0 | $-\frac{\sqrt{66}i}{330}$ | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | $-\frac{3\sqrt{110}}{440}$ | 0 |
| | | 0 | $-\frac{\sqrt{11}i}{220}$ | 0 | $-\frac{3\sqrt{11}}{440}$ | 0 | 0 | $\frac{\sqrt{66}}{330}$ | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{3\sqrt{165}}{440}$ | 0 | 0 |
| | | $\frac{\sqrt{11}i}{220}$ | 0 | $-\frac{3\sqrt{11}}{440}$ | 0 | 0 | 0 | $-\frac{\sqrt{66}}{330}$ | $\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{3\sqrt{165}}{440}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{9\sqrt{11}}{440}$ | 0 | $\frac{\sqrt{11}i}{44}$ | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{165}}{440}$ | 0 | $\frac{\sqrt{165}i}{60}$ | $-\frac{\sqrt{110}}{55}$ | 0 |
| | | $-\frac{9\sqrt{11}}{440}$ | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $\frac{\sqrt{66}}{66}$ | 0 | 0 | $-\frac{3\sqrt{165}}{440}$ | 0 | $-\frac{\sqrt{165}i}{60}$ | 0 | 0 | $\frac{\sqrt{110}}{55}$ |
| | | 0 | 0 | $-\frac{\sqrt{33}}{165}$ | 0 | 0 | $-\frac{3\sqrt{22}i}{110}$ | 0 | $-\frac{9\sqrt{22}}{440}$ | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}i}{132}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}}{165}$ | $\frac{3\sqrt{22}i}{110}$ | 0 | $-\frac{9\sqrt{22}}{440}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | $\frac{\sqrt{330}i}{132}$ | 0 |
| 826 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------|---------------------------------------|---------------------------|----------------------------|---------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|-------------------------------|----------------------------|-----------------------------|
| | $M_{4,2}^{(1,1;a)}(E, 1)$ | $\frac{\sqrt{11}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{66}}{660}$ | 0 | $\frac{3\sqrt{66}i}{440}$ | $-\frac{\sqrt{165}}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{110}$ |
| | | 0 | $-\frac{\sqrt{11}}{220}$ | 0 | 0 | $-\frac{7\sqrt{66}}{660}$ | 0 | $-\frac{3\sqrt{66}i}{440}$ | 0 | $\frac{\sqrt{165}}{132}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{11}}{220}$ | 0 | 0 | $\frac{3\sqrt{66}i}{440}$ | 0 | $\frac{\sqrt{66}}{330}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{440}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}}{220}$ | $-\frac{3\sqrt{66}i}{440}$ | 0 | $\frac{\sqrt{66}}{330}$ | 0 | 0 | 0 | $\frac{\sqrt{165}}{660}$ | $\frac{3\sqrt{110}i}{440}$ | 0 |
| | | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | $\frac{9\sqrt{11}i}{440}$ | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | 0 | $\frac{\sqrt{165}}{60}$ | 0 | $-\frac{3\sqrt{165}i}{440}$ | $\frac{\sqrt{110}}{55}$ | 0 |
| | | $-\frac{\sqrt{11}}{44}$ | 0 | $-\frac{9\sqrt{11}i}{440}$ | 0 | 0 | $\frac{\sqrt{66}}{66}$ | 0 | 0 | $\frac{\sqrt{165}}{60}$ | 0 | $\frac{3\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{110}}{55}$ |
| | | 0 | $\frac{3\sqrt{11}i}{440}$ | 0 | $\frac{\sqrt{11}}{220}$ | 0 | 0 | $-\frac{\sqrt{66}}{330}$ | 0 | $-\frac{3\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 |
| | | $-\frac{3\sqrt{11}i}{440}$ | 0 | $\frac{\sqrt{11}}{220}$ | 0 | 0 | 0 | $\frac{\sqrt{66}}{330}$ | $\frac{3\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{33}}{165}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{110}$ | 0 | $-\frac{9\sqrt{22}i}{440}$ | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ |
| | | 0 | $\frac{\sqrt{33}}{165}$ | 0 | 0 | $\frac{3\sqrt{22}}{110}$ | 0 | $\frac{9\sqrt{22}i}{440}$ | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 |
| 827 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | |
| | $M_{4,1}^{(1,1;a)}(E, 2)$ | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | $-\frac{29\sqrt{462}}{4620}$ | 0 | $\frac{3\sqrt{462}i}{440}$ | $-\frac{\sqrt{1155}}{420}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | $-\frac{29\sqrt{462}}{4620}$ | 0 | $-\frac{3\sqrt{462}i}{440}$ | 0 | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | $\frac{3\sqrt{462}i}{440}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $\frac{17\sqrt{1155}}{4620}$ | 0 | $\frac{\sqrt{770}i}{440}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}}{1540}$ | $-\frac{3\sqrt{462}i}{440}$ | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | 0 | $-\frac{17\sqrt{1155}}{4620}$ | $-\frac{\sqrt{770}i}{440}$ | 0 |
| | | 0 | $-\frac{3\sqrt{77}}{220}$ | 0 | $\frac{\sqrt{77}i}{88}$ | $-\frac{\sqrt{462}}{210}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{1155}i}{440}$ | $-\frac{\sqrt{770}}{385}$ |
| | | $-\frac{3\sqrt{77}}{220}$ | 0 | $-\frac{\sqrt{77}i}{88}$ | 0 | 0 | $\frac{\sqrt{462}}{210}$ | 0 | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{440}$ | 0 | $\frac{\sqrt{770}}{385}$ |
| | | 0 | $\frac{7\sqrt{77}i}{440}$ | 0 | $\frac{3\sqrt{77}}{220}$ | 0 | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $\frac{\sqrt{1155}i}{440}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 |
| | | $-\frac{7\sqrt{77}i}{440}$ | 0 | $\frac{3\sqrt{77}}{220}$ | 0 | 0 | 0 | $-\frac{17\sqrt{462}}{2310}$ | $-\frac{\sqrt{1155}i}{440}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{231}}{165}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}i}{440}$ | $-\frac{3\sqrt{385}}{770}$ | 0 | 0 | 0 | $\frac{\sqrt{2310}}{924}$ |
| | | 0 | $\frac{\sqrt{231}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}i}{440}$ | 0 | $\frac{3\sqrt{385}}{770}$ | 0 | 0 | $\frac{\sqrt{2310}}{924}$ | 0 |
| 828 | symmetry | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 9

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|-----------|----------------------------|---------------------------|---------------------------|----------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|
| $M_{4,2}^{(1,1;a)}(E, 2)$ | | 0 | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | $\frac{29\sqrt{462}i}{4620}$ | 0 | $\frac{3\sqrt{462}}{440}$ | 0 | 0 | $\frac{\sqrt{1155}}{420}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{77}}{1540}$ | $-\frac{29\sqrt{462}i}{4620}$ | 0 | $\frac{3\sqrt{462}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{420}$ | 0 | 0 |
| | | $\frac{\sqrt{77}}{1540}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}}{440}$ | 0 | $-\frac{17\sqrt{462}i}{2310}$ | $\frac{17\sqrt{1155}}{4620}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{440}$ |
| | | 0 | $-\frac{\sqrt{77}}{1540}$ | 0 | 0 | $\frac{3\sqrt{462}}{440}$ | 0 | $\frac{17\sqrt{462}i}{2310}$ | 0 | 0 | $-\frac{17\sqrt{1155}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}}{440}$ | 0 |
| | | 0 | $\frac{3\sqrt{77}i}{220}$ | 0 | $\frac{7\sqrt{77}}{440}$ | 0 | 0 | $\frac{17\sqrt{462}}{2310}$ | 0 | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{\sqrt{1155}}{440}$ | 0 | 0 |
| | | $-\frac{3\sqrt{77}i}{220}$ | 0 | $\frac{7\sqrt{77}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{462}}{2310}$ | $-\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{\sqrt{1155}}{440}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{88}$ | 0 | $-\frac{3\sqrt{77}i}{220}$ | $\frac{\sqrt{462}}{210}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{440}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | $-\frac{\sqrt{770}}{385}$ | 0 |
| | | $\frac{\sqrt{77}}{88}$ | 0 | $\frac{3\sqrt{77}i}{220}$ | 0 | 0 | $-\frac{\sqrt{462}}{210}$ | 0 | 0 | $-\frac{\sqrt{1155}}{440}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | 0 | $\frac{\sqrt{770}}{385}$ |
| | | 0 | 0 | $\frac{\sqrt{231}}{165}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{440}$ | 0 | 0 | $-\frac{3\sqrt{385}}{770}$ | 0 | 0 | $-\frac{\sqrt{2310}i}{924}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231}}{165}$ | 0 | 0 | $-\frac{3\sqrt{154}}{440}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{385}}{770}$ | $\frac{\sqrt{2310}i}{924}$ | 0 |

bra: = $\langle f_2, \uparrow |, \langle f_2, \downarrow |, \langle f_1, \uparrow |, \langle f_1, \downarrow |, \langle f_{bz}, \uparrow |, \langle f_{bz}, \downarrow |, \langle f_3, \uparrow |, \langle f_3, \downarrow |, \langle f_{3x}, \uparrow |, \langle f_{3x}, \downarrow |, \langle f_{3y}, \uparrow |, \langle f_{3y}, \downarrow |, \langle f_{az}, \uparrow |, \langle f_{az}, \downarrow |$
ket: = $|f_2, \uparrow \rangle, |f_2, \downarrow \rangle, |f_1, \uparrow \rangle, |f_1, \downarrow \rangle, |f_{bz}, \uparrow \rangle, |f_{bz}, \downarrow \rangle, |f_3, \uparrow \rangle, |f_3, \downarrow \rangle, |f_{3x}, \uparrow \rangle, |f_{3x}, \downarrow \rangle, |f_{3y}, \uparrow \rangle, |f_{3y}, \downarrow \rangle, |f_{az}, \uparrow \rangle, |f_{az}, \downarrow \rangle$

Table 10: (f,f) block.

| No. | multipole | matrix |
|-----|-----------|--------|
| 829 | symmetry | 1 |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ |
| | $\mathbb{Q}_2^{(a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 832 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------|-------------------------|-------------------------|--------------------------|--------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 |
| | | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 833 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|---|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_{2,1}^{(a)}(E)$ | $-\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| 834 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------------|----------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | $\mathbb{Q}_{2,2}^{(a)}(E)$ | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 |
| 835 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|----------------------------------------------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|
| | $Q_4^{(a)}(A, 1)$ | $\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{11}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{11}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{132}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{132}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{132}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{132}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{22}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{22}$ |
| 836 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------|-----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | | $\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $Q_4^{(a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{154}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{154}$ |
| 837 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|----------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---|---|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | $Q_4^{(a)}(A, 3)$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 838 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|---------------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|---|---|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|
| | $Q_4^{(a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{231}}{154}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{231}}{154}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 839 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------|------------------------------------|----------------------------|---------------------------|---------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{154}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{154}$ |
| | | 0 | 0 | $\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 |
| | | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{77}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 840 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--|
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | |
| | $Q_{4,1}^{(a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{22}}{88}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{22}}{88}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | |
| 841 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|------------------------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 |
| | $Q_{4,2}^{(a)}(E, 1)$ | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ |
| | | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{22}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{88}$ | 0 | 0 | 0 |
| 842 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|---------------------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{88}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 |
| | $Q_{4,1}^{(a)}(E, 2)$ | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{154}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{154}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 |
| 843 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{88}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_{4,2}^{(a)}(E, 2)$ | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{154}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{154}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 |
| 844 | symmetry | $\frac{\sqrt{2}(2x^6 - 15x^4y^2 - 15x^4z^2 - 15x^2y^4 + 180x^2y^2z^2 - 15x^2z^4 + 2y^6 - 15y^4z^2 - 15y^2z^4 + 2z^6)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|--------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | | $-\frac{\sqrt{231}}{1848}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{231}}{1848}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{231}}{1848}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{231}}{1848}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{231}}{77}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{231}}{77}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{616}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{616}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{616}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{385}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{616}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{462}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{462}$ |
| 845 | symmetry | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|---------------------------------------------------|--------------------------|--------------------------|--------------------------|------------------------|------------------------|---|---|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| | $Q_6^{(a)}(A, 2)$ | $-\frac{\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{66}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{66}$ |
| 846 | symmetry | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------|--------------------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---|---|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{22}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 847 | symmetry | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|-----------------------------------------------|---------------------------|---------------------------|---------------------------|-------------------------|-------------------------|---|---|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|-------------------------|
| | $Q_6^{(a)}(B, 2)$ | $\frac{\sqrt{11}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{11}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{11}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 849 | symmetry | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------|--------------------------------------------------|------------------------|-------------------------|-------------------------|---|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|
| | $Q_6^{(a)}(B, 4)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{66}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{33}}{33}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{33}}{33}$ |
| | | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 |
| | | $\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{22}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{2\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 851 | symmetry | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 |
| | $\mathbb{Q}_{6,1}^{(a)}(E, 1)$ | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{44}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 |
| 852 | symmetry | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|-----------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ |
| | | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 |
| | $\mathbb{Q}_{6,2}^{(a)}(E, 1)$ | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{44}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ |
| | | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{165}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | 0 |
| 853 | symmetry | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix |
|-----|-----------------------|------------------------------------------------------------------------|
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 $\frac{\sqrt{6}}{32}$ 0 0 0 0 0 0 0 $\frac{\sqrt{10}}{32}$ 0 |
| | | 0 0 0 0 0 $\frac{\sqrt{6}}{32}$ 0 0 0 0 0 0 0 $\frac{\sqrt{10}}{32}$ |
| | | 0 0 $\frac{\sqrt{6}}{32}$ 0 0 0 0 0 0 0 $\frac{3\sqrt{10}}{32}$ 0 0 0 |
| | | 0 0 0 $\frac{\sqrt{6}}{32}$ 0 0 0 0 0 0 0 $\frac{3\sqrt{10}}{32}$ 0 0 |
| | $Q_{6,1}^{(a)}(E, 2)$ | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| | | 0 0 0 0 $\frac{3\sqrt{10}}{32}$ 0 0 0 0 0 0 0 $\frac{5\sqrt{6}}{32}$ 0 |
| | | 0 0 0 0 0 $\frac{3\sqrt{10}}{32}$ 0 0 0 0 0 0 0 $\frac{5\sqrt{6}}{32}$ |
| | | 0 0 $\frac{\sqrt{10}}{32}$ 0 0 0 0 0 0 0 $\frac{5\sqrt{6}}{32}$ 0 0 0 |
| | | 0 0 0 $\frac{\sqrt{10}}{32}$ 0 0 0 0 0 0 0 $\frac{5\sqrt{6}}{32}$ 0 0 |
| 854 | symmetry | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|------------------------------------------------------------------------------|-------------------------|---|---|--------------------------|--------------------------|---|---|--------------------------|--------------------------|---|---|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{32}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{32}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 |
| | $Q_{6,2}^{(a)}(E, 2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}}{32}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}}{32}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}}{32}$ | 0 | 0 | 0 | 0 |
| 855 | symmetry | $\frac{\sqrt{210}yz(16x^4 - 16x^2y^2 - 16x^2z^2 + y^4 + 2y^2z^2 + z^4)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------------------------------------------|-------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------|-------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{22}}{352}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{22}}{352}$ |
| | | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{32}$ | 0 | 0 |
| | $\mathbb{Q}_{6,1}^{(a)}(E, 3)$ | $\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ |
| | | 0 | 0 | $-\frac{9\sqrt{22}}{352}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{22}}{352}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 | 0 |
| 856 | symmetry | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------|-----------------------------|--------------------------|--------------------------|-----------------------------|-----------------------------|--------------------------|--------------------------|----------------------------|----------------------------|-------------------------|-------------------------|----------------------------|----------------------------|
| 857 | $\mathbb{Q}_{6,2}^{(a)}(E, 3)$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{22}}{352}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{22}}{352}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{17\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{330}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{9\sqrt{22}}{352}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{9\sqrt{22}}{352}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{1056}$ | 0 | 0 | 0 | 0 |
| | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-------------------------|-------------------------|
| | | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | $\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 |
| | | $-\frac{\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{14}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{21}$ | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_2^{(1,-1;a)}(A)$ | 0 | $\frac{\sqrt{14}i}{56}$ | 0 | $\frac{\sqrt{14}}{56}$ | $\frac{\sqrt{21}i}{21}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{14}i}{56}$ | 0 | $-\frac{\sqrt{14}}{56}$ | 0 | 0 | $-\frac{\sqrt{21}i}{21}$ | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | $\frac{\sqrt{14}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{28}$ | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 |
| 858 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| $\mathbb{Q}_2^{(1,-1;a)}(B,1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42i}}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 |
| 859 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_2^{(1,-1;a)}(B, 2)$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 |
| 860 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|----------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{3\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_{2,1}^{(1,-1;a)}(E)$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{42}i}{28}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 |
| 861 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|--------------------------------|-----------|-------------------------|----------------------------------------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| $\mathbb{Q}_4^{(1,-1;a)}(A,1)$ | | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{i}{6}$ | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6i}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 |
| | | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{24}$ |
| | | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6i}}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6i}}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{i}{6}$ | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6i}}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | $\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 |
| | | $-\frac{\sqrt{6i}}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10i}}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | $-\frac{\sqrt{6}}{24}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{i}{6}$ | $\frac{\sqrt{6}}{24}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | $\frac{i}{6}$ | 0 | 0 | 0 | $\frac{\sqrt{6i}}{24}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $\frac{\sqrt{6i}}{24}$ |
| | | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6i}}{24}$ | 0 |
| | | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10i}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6i}}{24}$ | 0 | 0 |
| | 863 | symmetry | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|---------------------------------|-----------|----------------------------|-----------------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_4^{(1,-1;a)}(A, 2)$ | | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{24}$ | 0 |
| | | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{24}$ |
| | | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}}{24}$ | 0 | $\frac{\sqrt{14}i}{24}$ | 0 |
| | | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | $-\frac{\sqrt{14}}{24}$ | 0 | $\frac{\sqrt{14}i}{24}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{24}$ | 0 | $-\frac{\sqrt{14}}{24}$ | 0 |
| | | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{24}$ | 0 | $\frac{\sqrt{14}}{24}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{24}$ | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{210}}{168}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{24}$ | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{210}}{168}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 | $\frac{\sqrt{14}}{24}$ | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{24}$ | 0 | $-\frac{\sqrt{14}}{24}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{168}$ |
| | | 0 | $\frac{\sqrt{14}}{24}$ | 0 | $\frac{\sqrt{14}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 |
| | | $-\frac{\sqrt{14}}{24}$ | 0 | $\frac{\sqrt{14}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 |
| | 864 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------|------------------------|-----------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|---|-------------------------|-------------------------|
| | $\mathbb{Q}_4^{(1,-1;a)}(A, 3)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 865 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|---------------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
| $\mathbb{Q}_4^{(1,-1;a)}(B,1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{42}}{168}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{42}}{168}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}}{168}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 |
| | | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ |
| | | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 |
| | | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 |
| 866 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|------------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | $\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | $\mathbb{Q}_4^{(1,-1;a)}(B, 2)$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ |
| | | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{168}$ | 0 | $-\frac{\sqrt{42}i}{168}$ | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{168}$ | 0 | $\frac{\sqrt{42}i}{168}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 |
| 867 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|--------------------------|-----------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| $\mathbb{Q}_{4,1}^{(1,-1;a)}(E,1)$ | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | |
| | | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | |
| | | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 |
| | | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{i}{8}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 |
| | | 0 | $\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 |
| | | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ |
| | | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 |
| | 868 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------|------------------------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | $\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | $\frac{\sqrt{6i}}{48}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ |
| | | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{16}$ | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10i}}{16}$ | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{10i}}{16}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | $\frac{\sqrt{6i}}{48}$ | 0 | 0 | $\frac{1}{8}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10i}}{16}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ | $-\frac{1}{8}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{1}{8}$ | $\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{10i}}{16}$ | 0 |
| | | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{10i}}{16}$ |
| | | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{48}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 |
| | | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6i}}{48}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | $\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6i}}{48}$ | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{10i}}{16}$ | 0 | 0 | 0 |
| 869 | symmetry | $\frac{\sqrt{3}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|---------------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | $\frac{3\sqrt{7}}{56}$ | $-\frac{\sqrt{42i}}{48}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ |
| | | 0 | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | $\frac{3\sqrt{7}}{56}$ | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | $\frac{\sqrt{7i}}{14}$ |
| | | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | $\frac{\sqrt{7i}}{14}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | $-\frac{3\sqrt{7}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | $\frac{3\sqrt{7}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | $\frac{3\sqrt{7}}{56}$ | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{168}$ | $-\frac{\sqrt{70i}}{112}$ | 0 |
| | | $-\frac{\sqrt{7i}}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | $\frac{\sqrt{70i}}{112}$ |
| | | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | $-\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | $\frac{\sqrt{105}}{168}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | $\frac{3\sqrt{7}}{56}$ | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 | $-\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 |
| 870 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
| $\mathbb{Q}_{4,2}^{(1,-1;a)}(E, 2)$ | | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | $\frac{\sqrt{7}}{14}$ | $-\frac{\sqrt{42i}}{48}$ | 0 |
| | | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ |
| | | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ |
| | | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | $\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{7i}}{56}$ | 0 | $-\frac{\sqrt{7}}{14}$ | $-\frac{\sqrt{42i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 |
| | | $\frac{3\sqrt{7i}}{56}$ | 0 | $\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | $-\frac{\sqrt{105i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ |
| | | 0 | 0 | $\frac{\sqrt{42i}}{48}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | $-\frac{\sqrt{70i}}{112}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{48}$ | $\frac{\sqrt{7}}{14}$ | 0 | $-\frac{3\sqrt{7i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{112}$ | 0 | 0 |
| 871 | symmetry | $\frac{\sqrt{2}(2x^6 - 15x^4y^2 - 15x^4z^2 - 15x^2y^4 + 180x^2y^2z^2 - 15x^2z^4 + 2y^6 - 15y^4z^2 - 15y^2z^4 + 2z^6)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|--------------------------------------------------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|
| $\mathbb{Q}_6^{(1,-1;a)}(A,1)$ | | 0 | 0 | $-\frac{\sqrt{154i}}{616}$ | 0 | 0 | $\frac{\sqrt{231}}{1848}$ | 0 | $-\frac{\sqrt{231i}}{308}$ | 0 | 0 | $\frac{\sqrt{2310i}}{264}$ | 0 | 0 | $\frac{\sqrt{385}}{88}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{154i}}{616}$ | $-\frac{\sqrt{231}}{1848}$ | 0 | $-\frac{\sqrt{231i}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310i}}{264}$ | $-\frac{\sqrt{385}}{88}$ | 0 |
| | | $\frac{\sqrt{154i}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231i}}{1848}$ | 0 | $-\frac{\sqrt{231}}{308}$ | $\frac{\sqrt{2310i}}{264}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385i}}{88}$ |
| | | 0 | $-\frac{\sqrt{154i}}{616}$ | 0 | 0 | $-\frac{\sqrt{231i}}{1848}$ | 0 | $\frac{\sqrt{231}}{308}$ | 0 | 0 | $-\frac{\sqrt{2310i}}{264}$ | 0 | 0 | $\frac{\sqrt{385i}}{88}$ | 0 |
| | | 0 | $-\frac{\sqrt{231}}{1848}$ | 0 | $\frac{\sqrt{231i}}{1848}$ | 0 | 0 | $\frac{\sqrt{154i}}{154}$ | 0 | 0 | $\frac{5\sqrt{385}}{616}$ | 0 | $\frac{5\sqrt{385i}}{616}$ | 0 | 0 |
| | | $\frac{\sqrt{231}}{1848}$ | 0 | $\frac{\sqrt{231i}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154i}}{154}$ | $-\frac{5\sqrt{385}}{616}$ | 0 | $\frac{5\sqrt{385i}}{616}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{231i}}{308}$ | 0 | $\frac{\sqrt{231}}{308}$ | $-\frac{\sqrt{154i}}{154}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385i}}{308}$ | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | 0 |
| | | $\frac{\sqrt{231i}}{308}$ | 0 | $-\frac{\sqrt{231}}{308}$ | 0 | 0 | $\frac{\sqrt{154i}}{154}$ | 0 | 0 | $\frac{\sqrt{385i}}{308}$ | 0 | $\frac{\sqrt{385}}{308}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{2310i}}{264}$ | 0 | 0 | $-\frac{5\sqrt{385}}{616}$ | 0 | $-\frac{\sqrt{385i}}{308}$ | 0 | 0 | $-\frac{5\sqrt{154i}}{616}$ | 0 | 0 | $-\frac{5\sqrt{231}}{1848}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{2310i}}{264}$ | $\frac{5\sqrt{385}}{616}$ | 0 | $-\frac{\sqrt{385i}}{308}$ | 0 | 0 | 0 | $\frac{5\sqrt{154i}}{616}$ | $\frac{5\sqrt{231}}{1848}$ | 0 | 0 |
| | | $-\frac{\sqrt{2310i}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{385i}}{616}$ | 0 | $\frac{\sqrt{385}}{308}$ | $\frac{5\sqrt{154i}}{616}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231i}}{1848}$ |
| | | 0 | $\frac{\sqrt{2310i}}{264}$ | 0 | 0 | $-\frac{5\sqrt{385i}}{616}$ | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | 0 | $-\frac{5\sqrt{154i}}{616}$ | 0 | 0 | $\frac{5\sqrt{231i}}{1848}$ | 0 |
| | | 0 | $-\frac{\sqrt{385}}{88}$ | 0 | $-\frac{\sqrt{385i}}{88}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{1848}$ | 0 | $-\frac{5\sqrt{231i}}{1848}$ | 0 | 0 |
| | | $\frac{\sqrt{385}}{88}$ | 0 | $-\frac{\sqrt{385i}}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{1848}$ | 0 | $-\frac{5\sqrt{231i}}{1848}$ | 0 | 0 | 0 |
| 872 | symmetry | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|---------------------------------------------------|----------------------------|---------------------------|----------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $\mathbb{Q}_6^{(1,-1;a)}(A, 2)$ | 0 | 0 | $-\frac{\sqrt{22}i}{88}$ | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{132}$ | 0 | 0 | $-\frac{\sqrt{330}i}{264}$ | 0 | 0 | $-\frac{\sqrt{55}}{88}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{22}i}{88}$ | $\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{264}$ | $\frac{\sqrt{55}}{88}$ | 0 |
| | | $\frac{\sqrt{22}i}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{88}$ | 0 | $-\frac{\sqrt{33}}{132}$ | $-\frac{\sqrt{330}i}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ |
| | | 0 | $-\frac{\sqrt{22}i}{88}$ | 0 | 0 | $\frac{\sqrt{33}i}{88}$ | 0 | $\frac{\sqrt{33}}{132}$ | 0 | 0 | $\frac{\sqrt{330}i}{264}$ | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ | 0 |
| | | 0 | $\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{88}$ | 0 | 0 | $\frac{\sqrt{22}i}{22}$ | 0 | 0 | $\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{33}}{88}$ | 0 | $-\frac{\sqrt{33}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{22}$ | $-\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{33}i}{132}$ | 0 | $\frac{\sqrt{33}}{132}$ | $-\frac{\sqrt{22}i}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{44}$ | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 |
| | | $\frac{\sqrt{33}i}{132}$ | 0 | $-\frac{\sqrt{33}}{132}$ | 0 | 0 | $\frac{\sqrt{22}i}{22}$ | 0 | 0 | $-\frac{\sqrt{55}i}{44}$ | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{330}i}{264}$ | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{44}$ | 0 | 0 | $-\frac{5\sqrt{22}i}{88}$ | 0 | 0 | $-\frac{5\sqrt{33}}{264}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{264}$ | $\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{44}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{22}i}{88}$ | $\frac{5\sqrt{33}}{264}$ | 0 |
| | | $\frac{\sqrt{330}i}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{44}$ | $\frac{5\sqrt{22}i}{88}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ |
| | | 0 | $-\frac{\sqrt{330}i}{264}$ | 0 | 0 | $-\frac{\sqrt{55}i}{88}$ | 0 | $\frac{\sqrt{55}}{44}$ | 0 | 0 | $-\frac{5\sqrt{22}i}{88}$ | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ | 0 |
| | | 0 | $\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{264}$ | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 | 0 |
| | | $-\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{264}$ | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 | 0 | 0 |
| 873 | symmetry | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|--------------------------------|-----------|---------------------------|--------------------------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---|
| $\mathbb{Q}_6^{(1,-1;a)}(A,3)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | $-\frac{\sqrt{66}}{264}$ | $\frac{\sqrt{165}i}{66}$ | 0 | 0 | 0 | $\frac{\sqrt{110}i}{44}$ | | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | $\frac{\sqrt{66}}{264}$ | 0 | 0 | $-\frac{\sqrt{165}i}{66}$ | 0 | 0 | $\frac{\sqrt{110}i}{44}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | $\frac{\sqrt{66}i}{264}$ | 0 | 0 | $-\frac{\sqrt{165}i}{66}$ | 0 | 0 | $-\frac{\sqrt{110}}{44}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{264}$ | 0 | $\frac{\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{66}$ | $\frac{\sqrt{110}}{44}$ | 0 | |
| | | 0 | $\frac{\sqrt{66}i}{264}$ | 0 | $\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $\frac{\sqrt{66}i}{264}$ | 0 | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}}{264}$ | 0 | $-\frac{\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{165}i}{66}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{165}i}{66}$ | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{165}i}{66}$ | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{66}$ | $-\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{110}i}{44}$ | 0 | $\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{110}i}{44}$ | 0 | $-\frac{\sqrt{110}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 874 | symmetry | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|-----------------------------------------------------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{24}$ | 0 | $-\frac{\sqrt{5i}}{12}$ | 0 | 0 | $\frac{\sqrt{2i}}{12}$ | 0 | 0 | $\frac{\sqrt{3}}{24}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{24}$ | 0 | $-\frac{\sqrt{5i}}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{12}$ | $-\frac{\sqrt{3}}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5i}}{24}$ | 0 | $\frac{\sqrt{5}}{12}$ | $-\frac{\sqrt{2i}}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{24}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5i}}{24}$ | 0 | $-\frac{\sqrt{5}}{12}$ | 0 | 0 | $\frac{\sqrt{2i}}{12}$ | 0 | 0 | $-\frac{\sqrt{3i}}{24}$ | 0 |
| | | 0 | $\frac{\sqrt{5}}{24}$ | 0 | $\frac{\sqrt{5i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{24}$ | 0 |
| | | $-\frac{\sqrt{5}}{24}$ | 0 | $\frac{\sqrt{5i}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{24}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_6^{(1,-1;a)}(B,1)$ | 0 | $\frac{\sqrt{5i}}{12}$ | 0 | $-\frac{\sqrt{5}}{12}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{12}$ | 0 | $-\frac{\sqrt{3}}{12}$ | $\frac{\sqrt{2i}}{6}$ | 0 |
| | | $\frac{\sqrt{5i}}{12}$ | 0 | $\frac{\sqrt{5}}{12}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{12}$ | 0 | $\frac{\sqrt{3}}{12}$ | 0 | 0 | $-\frac{\sqrt{2i}}{6}$ |
| | | 0 | 0 | $\frac{\sqrt{2i}}{12}$ | 0 | 0 | $\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{12}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{12}$ | $-\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{12}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{24}$ | 0 |
| | | $-\frac{\sqrt{2i}}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3i}}{24}$ | 0 | $\frac{\sqrt{3}}{12}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5i}}{24}$ |
| | | 0 | $\frac{\sqrt{2i}}{12}$ | 0 | 0 | $-\frac{\sqrt{3i}}{24}$ | 0 | $-\frac{\sqrt{3}}{12}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5i}}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{24}$ | 0 | 0 | $-\frac{\sqrt{2i}}{6}$ | 0 | 0 | $-\frac{\sqrt{5}}{24}$ | 0 | $-\frac{\sqrt{5i}}{24}$ | 0 | 0 |
| | | $\frac{\sqrt{3}}{24}$ | 0 | $\frac{\sqrt{3i}}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{6}$ | $\frac{\sqrt{5}}{24}$ | 0 | $-\frac{\sqrt{5i}}{24}$ | 0 | 0 | 0 |
| 875 | symmetry | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|---------------------------------|-----------------------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{11}}{264}$ | 0 | $-\frac{7\sqrt{11}i}{132}$ | 0 | 0 | $-\frac{\sqrt{110}i}{132}$ | 0 | $-\frac{\sqrt{165}}{264}$ |
| | | 0 | 0 | 0 | 0 | $\frac{19\sqrt{11}}{264}$ | 0 | $-\frac{7\sqrt{11}i}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{110}i}{132}$ | $\frac{\sqrt{165}}{264}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{11}i}{264}$ | 0 | $\frac{7\sqrt{11}}{132}$ | $\frac{\sqrt{110}i}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{165}i}{264}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{11}i}{264}$ | 0 | $-\frac{7\sqrt{11}}{132}$ | 0 | 0 | $-\frac{\sqrt{110}i}{132}$ | 0 | $\frac{\sqrt{165}i}{264}$ | 0 |
| | | 0 | $\frac{19\sqrt{11}}{264}$ | 0 | $\frac{19\sqrt{11}i}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{264}$ | 0 |
| | | $-\frac{19\sqrt{11}}{264}$ | 0 | $\frac{19\sqrt{11}i}{264}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{264}$ | 0 | 0 |
| | $\mathbb{Q}_6^{(1,-1;a)}(B, 2)$ | 0 | $\frac{7\sqrt{11}i}{132}$ | 0 | $-\frac{7\sqrt{11}}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | 0 | $\frac{\sqrt{165}}{132}$ | $-\frac{\sqrt{110}i}{66}$ |
| | | $\frac{7\sqrt{11}i}{132}$ | 0 | $\frac{7\sqrt{11}}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | $\frac{\sqrt{110}i}{66}$ |
| | | 0 | 0 | $-\frac{\sqrt{110}i}{132}$ | 0 | 0 | $-\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{264}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{110}i}{132}$ | $\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{264}$ |
| | | $\frac{\sqrt{110}i}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{264}$ | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}i}{264}$ |
| | | 0 | $-\frac{\sqrt{110}i}{132}$ | 0 | 0 | $\frac{\sqrt{165}i}{264}$ | 0 | $\frac{\sqrt{165}}{132}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}i}{264}$ |
| | | 0 | $\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{264}$ | 0 | 0 | $\frac{\sqrt{110}i}{66}$ | 0 | 0 | $\frac{5\sqrt{11}}{264}$ | 0 | $\frac{5\sqrt{11}i}{264}$ | 0 |
| | | $-\frac{\sqrt{165}}{264}$ | 0 | $-\frac{\sqrt{165}i}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{66}$ | $-\frac{5\sqrt{11}}{264}$ | 0 | $\frac{5\sqrt{11}i}{264}$ | 0 | 0 |
| 876 | symmetry | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------------|---------------------------|---------------------------|--------------------------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---|
| $\mathbb{Q}_6^{(1,-1;a)}(B, 4)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}i}{132}$ | 0 | $\frac{\sqrt{55}}{132}$ | $-\frac{\sqrt{22}i}{33}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{66}$ | |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}i}{132}$ | 0 | $-\frac{\sqrt{55}}{132}$ | 0 | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{132}$ | 0 | $\frac{\sqrt{55}i}{132}$ | 0 | 0 | $-\frac{\sqrt{22}i}{33}$ | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{132}$ | 0 | $\frac{\sqrt{55}i}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}i}{33}$ | $\frac{\sqrt{33}}{66}$ | 0 | |
| | 0 | $-\frac{\sqrt{55}i}{132}$ | 0 | $\frac{\sqrt{55}}{132}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{33}$ | 0 | $-\frac{\sqrt{33}}{33}$ | $\frac{2\sqrt{22}i}{33}$ | 0 | |
| | $-\frac{\sqrt{55}i}{132}$ | 0 | $-\frac{\sqrt{55}}{132}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{33}$ | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | $-\frac{2\sqrt{22}i}{33}$ | |
| | 0 | $-\frac{\sqrt{55}}{132}$ | 0 | $-\frac{\sqrt{55}i}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | |
| | $\frac{\sqrt{55}}{132}$ | 0 | $-\frac{\sqrt{55}i}{132}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | $-\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 | |
| | $\frac{\sqrt{22}i}{33}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{33}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}i}{66}$ | |
| | 0 | $-\frac{\sqrt{22}i}{33}$ | 0 | 0 | $\frac{\sqrt{33}i}{33}$ | 0 | $\frac{\sqrt{33}}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}i}{66}$ | 0 |
| | 0 | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | 0 | $\frac{\sqrt{33}}{33}$ | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{66}$ | |
| | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{33}$ | $-\frac{\sqrt{33}}{33}$ | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{66}$ | 0 |
| | 0 | $\frac{\sqrt{33}i}{66}$ | 0 | $\frac{\sqrt{33}}{66}$ | $-\frac{2\sqrt{22}i}{33}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | $\frac{\sqrt{55}}{66}$ | 0 | 0 | |
| | $\frac{\sqrt{33}i}{66}$ | 0 | $-\frac{\sqrt{33}}{66}$ | 0 | 0 | $\frac{2\sqrt{22}i}{33}$ | 0 | 0 | $-\frac{\sqrt{55}i}{66}$ | 0 | $-\frac{\sqrt{55}}{66}$ | 0 | 0 | 0 | |
| | 878 | symmetry | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|----------------------------|----------------------------|--------------------------------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|---|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(E,1)$ | 0 | 0 | 0 | $\frac{\sqrt{11}i}{176}$ | 0 | 0 | $-\frac{\sqrt{66}i}{66}$ | 0 | 0 | $-\frac{\sqrt{165}}{66}$ | 0 | $-\frac{5\sqrt{165}i}{528}$ | 0 | 0 | |
| | 0 | 0 | $\frac{\sqrt{11}i}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}i}{66}$ | $\frac{\sqrt{165}}{66}$ | 0 | $-\frac{5\sqrt{165}i}{528}$ | 0 | 0 | 0 | |
| | 0 | $-\frac{\sqrt{11}i}{176}$ | 0 | 0 | $-\frac{\sqrt{66}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{165}i}{176}$ | 0 | 0 | $\frac{3\sqrt{110}i}{176}$ | 0 | |
| | $-\frac{\sqrt{11}i}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}i}{176}$ | 0 | 0 | $-\frac{3\sqrt{165}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{176}$ | |
| | 0 | 0 | $\frac{\sqrt{66}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $\frac{3\sqrt{110}i}{176}$ | 0 | 0 | $\frac{\sqrt{165}}{66}$ | |
| | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{176}$ | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{176}$ | $-\frac{\sqrt{165}}{66}$ | 0 | |
| | $\frac{\sqrt{66}i}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | |
| | 0 | $-\frac{\sqrt{66}i}{66}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{132}$ | 0 |
| | 0 | $\frac{\sqrt{165}}{66}$ | 0 | $\frac{3\sqrt{165}i}{176}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}i}{176}$ | 0 | 0 |
| | $-\frac{\sqrt{165}}{66}$ | 0 | $\frac{3\sqrt{165}i}{176}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}i}{176}$ | 0 | 0 | 0 |
| | 0 | $\frac{5\sqrt{165}i}{528}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}i}{176}$ | 0 | 0 | 0 | $\frac{5\sqrt{66}i}{528}$ | 0 |
| | $\frac{5\sqrt{165}i}{528}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{110}i}{176}$ | 0 | 0 | $-\frac{5\sqrt{11}i}{176}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{66}i}{528}$ | |
| | 0 | 0 | $-\frac{3\sqrt{110}i}{176}$ | 0 | 0 | $-\frac{\sqrt{165}}{66}$ | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | $-\frac{5\sqrt{66}i}{528}$ | 0 | 0 | 0 | |
| | 0 | 0 | 0 | $\frac{3\sqrt{110}i}{176}$ | $\frac{\sqrt{165}}{66}$ | 0 | $-\frac{\sqrt{165}i}{132}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{66}i}{528}$ | 0 | 0 | |
| | 879 | symmetry | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|-----------------------------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|--|
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}}{176}$ | $-\frac{\sqrt{66i}}{176}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{165}}{176}$ | $-\frac{3\sqrt{110i}}{176}$ | 0 | |
| | | 0 | 0 | $\frac{\sqrt{11}}{176}$ | 0 | 0 | $\frac{\sqrt{66i}}{176}$ | 0 | 0 | 0 | $-\frac{3\sqrt{165}}{176}$ | 0 | 0 | $\frac{3\sqrt{110i}}{176}$ | |
| | | 0 | $\frac{\sqrt{11}}{176}$ | 0 | 0 | 0 | $\frac{\sqrt{66i}}{66}$ | 0 | 0 | $\frac{5\sqrt{165}}{528}$ | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | 0 | |
| | | $-\frac{\sqrt{11}}{176}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66i}}{66}$ | $-\frac{5\sqrt{165}}{528}$ | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | 0 | 0 | |
| | | $\frac{\sqrt{66i}}{176}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{44}$ | $-\frac{3\sqrt{110i}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{66}$ | |
| | | 0 | $-\frac{\sqrt{66i}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | $\frac{3\sqrt{110i}}{176}$ | 0 | 0 | $-\frac{\sqrt{165i}}{66}$ | |
| | | 0 | 0 | $-\frac{\sqrt{66i}}{66}$ | 0 | 0 | $-\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{132}$ | |
| | $\mathbb{Q}_{6,2}^{(1,-1;a)}(E,1)$ | 0 | 0 | 0 | $\frac{\sqrt{66i}}{66}$ | $\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{165}}{528}$ | $\frac{3\sqrt{110i}}{176}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{176}$ | $\frac{5\sqrt{66i}}{528}$ | 0 | |
| | | 0 | 0 | $\frac{5\sqrt{165}}{528}$ | 0 | 0 | $-\frac{3\sqrt{110i}}{176}$ | 0 | 0 | 0 | $\frac{5\sqrt{11}}{176}$ | 0 | 0 | $-\frac{5\sqrt{66i}}{528}$ | |
| | | 0 | $-\frac{3\sqrt{165}}{176}$ | 0 | $-\frac{\sqrt{165i}}{66}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{176}$ | 0 | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{165}}{176}$ | 0 | $-\frac{\sqrt{165i}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{176}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{110i}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | $-\frac{\sqrt{165}}{132}$ | $-\frac{5\sqrt{66i}}{528}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{3\sqrt{110i}}{176}$ | 0 | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | $\frac{\sqrt{165}}{132}$ | 0 | $\frac{5\sqrt{66i}}{528}$ | 0 | 0 | 0 | 0 | |
| 880 | symmetry | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------------------------|-----------------------------------------------|-------------------------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | $\mathbb{Q}_{6,1}^{(1,-1;a)}(E, 2)$ | 0 | 0 | 0 | $-\frac{\sqrt{6}}{64}$ | $\frac{3i}{32}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{64}$ | $\frac{\sqrt{15}i}{32}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}}{64}$ | 0 | 0 | $-\frac{3i}{32}$ | 0 | 0 | 0 | $\frac{3\sqrt{10}}{64}$ | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ |
| | | 0 | $\frac{\sqrt{6}}{64}$ | 0 | 0 | 0 | 0 | $\frac{i}{16}$ | 0 | 0 | $\frac{\sqrt{10}}{64}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}}{64}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{16}$ | $-\frac{\sqrt{10}}{64}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{3i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{16}$ | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 | $\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{i}{16}$ | 0 | 0 | $-\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{16}$ | 0 | 0 | $-\frac{\sqrt{10}}{16}$ |
| | | 0 | 0 | 0 | $\frac{i}{16}$ | $\frac{\sqrt{6}}{16}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{16}$ | $\frac{\sqrt{10}}{16}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}}{64}$ | $\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6}}{64}$ | $\frac{5i}{32}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10}}{64}$ | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | $\frac{5\sqrt{6}}{64}$ | 0 | 0 | $-\frac{5i}{32}$ |
| | | 0 | $\frac{3\sqrt{10}}{64}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{16}$ | 0 | 0 | $\frac{5\sqrt{6}}{64}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{10}}{64}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{16}$ | $-\frac{5\sqrt{6}}{64}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{16}$ | $-\frac{5i}{32}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{16}$ | 0 | 0 | $\frac{5i}{32}$ | 0 | 0 | 0 |
| 881 | symmetry | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{64}$ | 0 | 0 | $\frac{i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{64}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{64}$ | 0 | 0 | 0 | 0 | $-\frac{i}{16}$ | 0 | 0 | $\frac{\sqrt{10}i}{64}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{64}$ | 0 | 0 | $-\frac{3i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{64}$ | 0 | 0 | $\frac{\sqrt{15}i}{32}$ | 0 |
| | | $\frac{\sqrt{6}i}{64}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3i}{32}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{64}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ |
| | | 0 | 0 | $\frac{3i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3i}{32}$ | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{32}$ | 0 | 0 |
| | $\mathbb{Q}_{6,2}^{(1,-1;a)}(E, 2)$ | $-\frac{i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | $\frac{\sqrt{15}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ |
| | | 0 | $\frac{i}{16}$ | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{16}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{64}$ | 0 | 0 | $-\frac{\sqrt{15}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6}i}{64}$ | 0 | 0 |
| | | 0 | 0 | $\frac{3\sqrt{10}i}{64}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{16}$ | 0 | 0 | $-\frac{5\sqrt{6}i}{64}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{64}$ | 0 | 0 | $\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6}i}{64}$ | 0 | 0 | $-\frac{5i}{32}$ | 0 |
| | | $-\frac{\sqrt{10}i}{64}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | $\frac{5\sqrt{6}i}{64}$ | 0 | 0 | 0 | 0 | $\frac{5i}{32}$ |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $\frac{5i}{32}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{32}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{5i}{32}$ | 0 | 0 |
| 882 | symmetry | $\frac{\sqrt{210}yz(16x^4 - 16x^2y^2 - 16x^2z^2 + y^4 + 2y^2z^2 + z^4)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|------------------------------|--------------------------------------------------------------------|-----------------------------|----------------------------|-----------------------------|------------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(E,3)$ | | 0 | 0 | 0 | $-\frac{\sqrt{330}}{2112}$ | $\frac{19\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{22}i}{33}$ | 0 | $-\frac{47\sqrt{22}}{2112}$ | $-\frac{9\sqrt{33}i}{352}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{330}}{2112}$ | 0 | 0 | $-\frac{19\sqrt{55}i}{1056}$ | 0 | 0 | $\frac{2\sqrt{22}i}{33}$ | 0 | $\frac{47\sqrt{22}}{2112}$ | 0 | 0 | $\frac{9\sqrt{33}i}{352}$ |
| | | 0 | $\frac{\sqrt{330}}{2112}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{55}i}{528}$ | 0 | 0 | $-\frac{91\sqrt{22}}{2112}$ | 0 | $-\frac{\sqrt{22}i}{33}$ | 0 | 0 |
| | | $-\frac{\sqrt{330}}{2112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{7\sqrt{55}i}{528}$ | $\frac{91\sqrt{22}}{2112}$ | 0 | $-\frac{\sqrt{22}i}{33}$ | 0 | 0 | 0 |
| | | $-\frac{19\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{528}$ | $-\frac{7\sqrt{33}i}{352}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{33}$ |
| | | 0 | $\frac{19\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{528}$ | 0 | 0 | $\frac{7\sqrt{33}i}{352}$ | 0 | 0 | $-\frac{\sqrt{22}i}{33}$ | 0 |
| | | 0 | 0 | $\frac{7\sqrt{55}i}{528}$ | 0 | 0 | $-\frac{\sqrt{330}}{528}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{176}$ | 0 | 0 | $\frac{\sqrt{22}}{48}$ |
| | | 0 | 0 | 0 | $-\frac{7\sqrt{55}i}{528}$ | $\frac{\sqrt{330}}{528}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{176}$ | $-\frac{\sqrt{22}}{48}$ | 0 |
| | | 0 | $-\frac{2\sqrt{22}i}{33}$ | 0 | $\frac{91\sqrt{22}}{2112}$ | $\frac{7\sqrt{33}i}{352}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{330}}{2112}$ | $\frac{5\sqrt{55}i}{1056}$ | 0 |
| | | $-\frac{2\sqrt{22}i}{33}$ | 0 | $-\frac{91\sqrt{22}}{2112}$ | 0 | 0 | $-\frac{7\sqrt{33}i}{352}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330}}{2112}$ | 0 | 0 | $-\frac{5\sqrt{55}i}{1056}$ |
| | | 0 | $\frac{47\sqrt{22}}{2112}$ | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | 0 | $-\frac{\sqrt{33}i}{176}$ | 0 | 0 | $\frac{5\sqrt{330}}{2112}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{47\sqrt{22}}{2112}$ | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{176}$ | $-\frac{5\sqrt{330}}{2112}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{9\sqrt{33}i}{352}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | $-\frac{\sqrt{22}}{48}$ | $-\frac{5\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{9\sqrt{33}i}{352}$ | 0 | 0 | $\frac{\sqrt{22}i}{33}$ | 0 | $\frac{\sqrt{22}}{48}$ | 0 | 0 | $\frac{5\sqrt{55}i}{1056}$ | 0 | 0 | 0 | 0 |
| | 883 | symmetry | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|
| $\mathbb{Q}_{6,2}^{(1,-1;a)}(E,3)$ | | 0 | 0 | 0 | $-\frac{\sqrt{330i}}{2112}$ | 0 | 0 | $-\frac{7\sqrt{55i}}{528}$ | 0 | 0 | $-\frac{\sqrt{22}}{33}$ | 0 | $-\frac{91\sqrt{22i}}{2112}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{330i}}{2112}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{55i}}{528}$ | $\frac{\sqrt{22}}{33}$ | 0 | $-\frac{91\sqrt{22i}}{2112}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{330i}}{2112}$ | 0 | 0 | $-\frac{19\sqrt{55i}}{1056}$ | 0 | 0 | 0 | 0 | $-\frac{47\sqrt{22i}}{2112}$ | 0 | $\frac{2\sqrt{22}}{33}$ | $-\frac{9\sqrt{33i}}{352}$ | 0 |
| | | $\frac{\sqrt{330i}}{2112}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{55i}}{1056}$ | 0 | 0 | $-\frac{47\sqrt{22i}}{2112}$ | 0 | $-\frac{2\sqrt{22}}{33}$ | 0 | 0 | $\frac{9\sqrt{33i}}{352}$ |
| | | 0 | 0 | $\frac{19\sqrt{55i}}{1056}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330i}}{528}$ | 0 | 0 | $-\frac{7\sqrt{33i}}{352}$ | 0 | 0 | $-\frac{\sqrt{22}}{33}$ |
| | | 0 | 0 | 0 | $-\frac{19\sqrt{55i}}{1056}$ | 0 | 0 | $\frac{\sqrt{330i}}{528}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{33i}}{352}$ | $\frac{\sqrt{22}}{33}$ | 0 |
| | | $\frac{7\sqrt{55i}}{528}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330i}}{528}$ | 0 | 0 | $-\frac{\sqrt{33i}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22i}}{48}$ |
| | | 0 | $-\frac{7\sqrt{55i}}{528}$ | 0 | 0 | $-\frac{\sqrt{330i}}{528}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33i}}{176}$ | 0 | 0 | $-\frac{\sqrt{22i}}{48}$ | 0 |
| | | 0 | $\frac{\sqrt{22}}{33}$ | 0 | $\frac{47\sqrt{22i}}{2112}$ | 0 | 0 | $\frac{\sqrt{33i}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{330i}}{2112}$ | 0 | 0 |
| | | $-\frac{\sqrt{22}}{33}$ | 0 | $\frac{47\sqrt{22i}}{2112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33i}}{176}$ | 0 | 0 | $-\frac{5\sqrt{330i}}{2112}$ | 0 | 0 | 0 |
| | | 0 | $\frac{91\sqrt{22i}}{2112}$ | 0 | $-\frac{2\sqrt{22}}{33}$ | $\frac{7\sqrt{33i}}{352}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{330i}}{2112}$ | 0 | 0 | $-\frac{5\sqrt{55i}}{1056}$ | 0 |
| | | $\frac{91\sqrt{22i}}{2112}$ | 0 | $\frac{2\sqrt{22}}{33}$ | 0 | 0 | $-\frac{7\sqrt{33i}}{352}$ | 0 | 0 | $\frac{5\sqrt{330i}}{2112}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{55i}}{1056}$ |
| | | 0 | 0 | $\frac{9\sqrt{33i}}{352}$ | 0 | 0 | $\frac{\sqrt{22}}{33}$ | 0 | $\frac{\sqrt{22i}}{48}$ | 0 | 0 | $\frac{5\sqrt{55i}}{1056}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{33i}}{352}$ | $-\frac{\sqrt{22}}{33}$ | 0 | $\frac{\sqrt{22i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{55i}}{1056}$ | 0 | 0 |
| | 884 | symmetry | 1 | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|----------------------------------|-------------------------|--------------------------|----------------------------------------|-------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| $\mathbb{Q}_0^{(1,1;\alpha)}(A)$ | 0 | 0 | $-\frac{\sqrt{42i}}{28}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | $\frac{\sqrt{42i}}{28}$ | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $\frac{\sqrt{42i}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{42i}}{28}$ | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 |
| | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{42}$ | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42i}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 |
| | $-\frac{\sqrt{7i}}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 | $\frac{\sqrt{7}}{14}$ |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{84}$ | $-\frac{\sqrt{7}}{14}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 | $-\frac{\sqrt{7i}}{14}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7i}}{14}$ | 0 | 0 | 0 |
| | 885 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|--------------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| | | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{42}}{42}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{42}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}}{42}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | $\frac{\sqrt{42}}{42}$ | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | $-\frac{\sqrt{42}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | 0 | 0 |
| 886 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{84}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{210}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | $-\frac{\sqrt{14}}{84}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 |
| | | $-\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 |
| | $\mathbb{Q}_2^{(1,1;a)}(B,1)$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | $-\frac{\sqrt{14}i}{84}$ | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ |
| | | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{84}$ |
| | | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{14}}{84}$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 |
| 887 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{210}}{84}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{210}}{84}$ | 0 |
| | | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | $\frac{\sqrt{35}i}{42}$ |
| | | $-\frac{\sqrt{14}i}{84}$ | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | $Q_2^{(1,1;a)}(B, 2)$ | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 |
| | | $\frac{\sqrt{14}}{84}$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ |
| | | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ |
| | | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | $\frac{\sqrt{210}}{84}$ | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 |
| | | 0 | $\frac{\sqrt{210}i}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | $-\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{210}i}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 |
| 888 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--|
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | $-\frac{\sqrt{14i}}{21}$ | 0 | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | |
| | | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | $\frac{\sqrt{14i}}{21}$ | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | |
| | | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{21}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | |
| | | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{21}$ | $-\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | |
| | | $\frac{\sqrt{14i}}{21}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | |
| | | 0 | $-\frac{\sqrt{14i}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{42}$ | |
| | $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$ | 0 | 0 | $\frac{\sqrt{14i}}{21}$ | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{21}$ | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | |
| | | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | $\frac{\sqrt{14i}}{21}$ | 0 | |
| | | $-\frac{\sqrt{35i}}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | $-\frac{\sqrt{14i}}{21}$ | |
| | | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{35}}{42}$ | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | $-\frac{\sqrt{14i}}{21}$ | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{14i}}{21}$ | 0 | 0 | 0 | |
| 889 | symmetry | | | | | | | | | | | | | $\sqrt{3}xz$ | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | $\frac{\sqrt{14}i}{21}$ | $-\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{21}$ | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}i}{21}$ | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 |
| | $\mathbb{Q}_{2,2}^{(1,1;a)}(E)$ | $\frac{\sqrt{14}i}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 |
| | | $-\frac{\sqrt{35}i}{42}$ | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{21}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | $\frac{\sqrt{14}i}{21}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{21}$ | 0 | 0 | 0 |
| 890 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------------------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| 891 | $\mathbb{Q}_4^{(1,1;a)}(A, 1)$ | 0 | 0 | $-\frac{\sqrt{110i}}{264}$ | 0 | 0 | $\frac{\sqrt{165}}{66}$ | 0 | $-\frac{\sqrt{165i}}{132}$ | 0 | 0 | $-\frac{\sqrt{66i}}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{132}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{110i}}{264}$ | $-\frac{\sqrt{165}}{66}$ | 0 | $-\frac{\sqrt{165i}}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66i}}{88}$ | $-\frac{\sqrt{11}}{132}$ | 0 |
| | | $\frac{\sqrt{110i}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{66}$ | 0 | $-\frac{\sqrt{165}}{132}$ | $-\frac{\sqrt{66i}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11i}}{132}$ |
| | | 0 | $-\frac{\sqrt{110i}}{264}$ | 0 | 0 | $-\frac{\sqrt{165i}}{66}$ | 0 | $\frac{\sqrt{165}}{132}$ | 0 | 0 | $\frac{\sqrt{66i}}{88}$ | 0 | 0 | $\frac{\sqrt{11i}}{132}$ | 0 |
| | | 0 | $-\frac{\sqrt{165}}{66}$ | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | 0 | $\frac{\sqrt{110i}}{66}$ | 0 | 0 | $-\frac{\sqrt{11}}{33}$ | 0 | $-\frac{\sqrt{11i}}{33}$ | 0 | 0 |
| | | $\frac{\sqrt{165}}{66}$ | 0 | $\frac{\sqrt{165i}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110i}}{66}$ | $\frac{\sqrt{11}}{33}$ | 0 | $-\frac{\sqrt{11i}}{33}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{165i}}{132}$ | 0 | $\frac{\sqrt{165}}{132}$ | $-\frac{\sqrt{110i}}{66}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11i}}{132}$ | 0 | $-\frac{5\sqrt{11}}{132}$ | 0 | 0 |
| | | $\frac{\sqrt{165i}}{132}$ | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | 0 | $\frac{\sqrt{110i}}{66}$ | 0 | 0 | $\frac{5\sqrt{11i}}{132}$ | 0 | $\frac{5\sqrt{11}}{132}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{66i}}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{33}$ | 0 | $-\frac{5\sqrt{11i}}{132}$ | 0 | 0 | $-\frac{5\sqrt{110i}}{264}$ | 0 | 0 | $\frac{\sqrt{165}}{132}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{66i}}{88}$ | $-\frac{\sqrt{11}}{33}$ | 0 | $-\frac{5\sqrt{11i}}{132}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{110i}}{264}$ | $-\frac{\sqrt{165}}{132}$ | 0 |
| | | $\frac{\sqrt{66i}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11i}}{33}$ | 0 | $\frac{5\sqrt{11}}{132}$ | $\frac{5\sqrt{110i}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{132}$ |
| | | 0 | $-\frac{\sqrt{66i}}{88}$ | 0 | 0 | $\frac{\sqrt{11i}}{33}$ | 0 | $-\frac{5\sqrt{11}}{132}$ | 0 | 0 | $-\frac{5\sqrt{110i}}{264}$ | 0 | 0 | $-\frac{\sqrt{165i}}{132}$ | 0 |
| | | 0 | $-\frac{\sqrt{11}}{132}$ | 0 | $-\frac{\sqrt{11i}}{132}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{132}$ | 0 | $\frac{\sqrt{165i}}{132}$ | 0 | 0 |
| | | $\frac{\sqrt{11}}{132}$ | 0 | $-\frac{\sqrt{11i}}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{132}$ | 0 | $\frac{\sqrt{165i}}{132}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----------------------|------------------------------|------------------------------|-----------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|
| $Q_4^{(1,1;a)}(A, 2)$ | 0 | 0 | $-\frac{5\sqrt{154i}}{1848}$ | 0 | 0 | $-\frac{2\sqrt{231}}{231}$ | 0 | $\frac{13\sqrt{231i}}{924}$ | 0 | 0 | $\frac{\sqrt{2310i}}{440}$ | 0 | 0 | $-\frac{\sqrt{385}}{660}$ |
| | 0 | 0 | 0 | $\frac{5\sqrt{154i}}{1848}$ | $\frac{2\sqrt{231}}{231}$ | 0 | $\frac{13\sqrt{231i}}{924}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310i}}{440}$ | $\frac{\sqrt{385}}{660}$ | 0 |
| | $\frac{5\sqrt{154i}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{231}}{231}$ | 0 | $\frac{13\sqrt{231}}{924}$ | $\frac{\sqrt{2310i}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385i}}{660}$ |
| | 0 | $-\frac{5\sqrt{154i}}{1848}$ | 0 | 0 | $\frac{2\sqrt{231}}{231}$ | 0 | $-\frac{13\sqrt{231}}{924}$ | 0 | 0 | $-\frac{\sqrt{2310i}}{440}$ | 0 | 0 | $-\frac{\sqrt{385i}}{660}$ | 0 |
| | 0 | $\frac{2\sqrt{231}}{231}$ | 0 | $-\frac{2\sqrt{231i}}{231}$ | 0 | 0 | $\frac{5\sqrt{154i}}{462}$ | 0 | 0 | $-\frac{13\sqrt{385}}{2310}$ | 0 | $-\frac{13\sqrt{385i}}{2310}$ | 0 | 0 |
| | $-\frac{2\sqrt{231}}{231}$ | 0 | $-\frac{2\sqrt{231i}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154i}}{462}$ | $\frac{13\sqrt{385}}{2310}$ | 0 | $-\frac{13\sqrt{385i}}{2310}$ | 0 | 0 | 0 |
| | 0 | $-\frac{13\sqrt{231i}}{924}$ | 0 | $-\frac{13\sqrt{231}}{924}$ | $-\frac{5\sqrt{154i}}{462}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{385i}}{4620}$ | 0 | $-\frac{19\sqrt{385}}{4620}$ | 0 | 0 |
| | $-\frac{13\sqrt{231i}}{924}$ | 0 | $\frac{13\sqrt{231}}{924}$ | 0 | 0 | $\frac{5\sqrt{154i}}{462}$ | 0 | 0 | $\frac{19\sqrt{385i}}{4620}$ | 0 | $\frac{19\sqrt{385}}{4620}$ | 0 | 0 | 0 |
| | 0 | 0 | $-\frac{\sqrt{2310i}}{440}$ | 0 | 0 | $\frac{13\sqrt{385}}{2310}$ | 0 | $-\frac{19\sqrt{385i}}{4620}$ | 0 | 0 | $-\frac{25\sqrt{154i}}{1848}$ | 0 | 0 | $\frac{5\sqrt{231}}{924}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{2310i}}{440}$ | $-\frac{13\sqrt{385}}{2310}$ | 0 | $-\frac{19\sqrt{385i}}{4620}$ | 0 | 0 | 0 | 0 | $\frac{25\sqrt{154i}}{1848}$ | $-\frac{5\sqrt{231}}{924}$ | 0 |
| | $-\frac{\sqrt{2310i}}{440}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{385i}}{2310}$ | 0 | $\frac{19\sqrt{385}}{4620}$ | $\frac{25\sqrt{154i}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231i}}{924}$ |
| | 0 | $\frac{\sqrt{2310i}}{440}$ | 0 | 0 | $\frac{13\sqrt{385i}}{2310}$ | 0 | $-\frac{19\sqrt{385}}{4620}$ | 0 | 0 | $-\frac{25\sqrt{154i}}{1848}$ | 0 | 0 | $-\frac{5\sqrt{231i}}{924}$ | 0 |
| | 0 | $\frac{\sqrt{385}}{660}$ | 0 | $\frac{\sqrt{385i}}{660}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}}{924}$ | 0 | $\frac{5\sqrt{231i}}{924}$ | 0 | 0 |
| | $-\frac{\sqrt{385}}{660}$ | 0 | $\frac{\sqrt{385i}}{660}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{924}$ | 0 | $\frac{5\sqrt{231i}}{924}$ | 0 | 0 | 0 |
| | 892 | symmetry | $\frac{\sqrt{35xy(x-y)(x+y)}}{2}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|--------------------------------|-----------------------------|----------------------------|----------------------------------------------|-----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| $\mathbb{Q}_4^{(1,1;a)}(A, 3)$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | $\frac{3\sqrt{11}}{44}$ | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{330}$ |
| | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | $-\frac{\sqrt{165}i}{330}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}}{44}$ | 0 | $-\frac{3\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | $\frac{\sqrt{165}}{330}$ |
| | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | $-\frac{3\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{110}i}{220}$ | $-\frac{\sqrt{165}}{330}$ | 0 |
| | 0 | $-\frac{3\sqrt{11}i}{44}$ | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $\frac{\sqrt{165}}{660}$ | 0 | 0 |
| | $-\frac{3\sqrt{11}i}{44}$ | 0 | $\frac{3\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 |
| | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{660}$ | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | 0 |
| | $\frac{3\sqrt{11}}{44}$ | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 |
| | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 | $\frac{\sqrt{165}i}{660}$ | 0 | $\frac{\sqrt{165}}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 | $-\frac{\sqrt{165}}{660}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{220}$ | $\frac{\sqrt{165}}{660}$ | 0 | $-\frac{\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{165}i}{330}$ | 0 | $-\frac{\sqrt{165}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $\frac{\sqrt{165}i}{330}$ | 0 | $\frac{\sqrt{165}}{330}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 893 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------|---------------------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|----------------------------|----------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $-\frac{\sqrt{1155}}{165}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{220}$ | $\frac{\sqrt{1155}}{165}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | $-\frac{\sqrt{770}i}{220}$ | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{165}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $\frac{\sqrt{77}}{308}$ | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $\frac{\sqrt{1155}i}{165}$ | 0 |
| | | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 |
| | | $-\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 |
| | $Q_4^{(1,1;a)}(B,1)$ | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{1155}i}{4620}$ | 0 | $\frac{23\sqrt{1155}}{4620}$ | $\frac{\sqrt{770}i}{110}$ | 0 |
| | | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{1155}i}{4620}$ | 0 | $-\frac{23\sqrt{1155}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}i}{110}$ |
| | | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{23\sqrt{1155}i}{4620}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{154}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{220}$ | $-\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{23\sqrt{1155}i}{4620}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{154}$ | 0 |
| | | $-\frac{\sqrt{770}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{23\sqrt{1155}}{4620}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{154}$ |
| | | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | $\frac{23\sqrt{1155}}{4620}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{154}$ | 0 |
| | | 0 | $\frac{\sqrt{1155}}{165}$ | 0 | $-\frac{\sqrt{1155}i}{165}$ | 0 | 0 | $-\frac{\sqrt{770}i}{110}$ | 0 | 0 | $\frac{\sqrt{77}}{154}$ | 0 | $\frac{\sqrt{77}i}{154}$ | 0 | 0 |
| | | $-\frac{\sqrt{1155}}{165}$ | 0 | $-\frac{\sqrt{1155}i}{165}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{110}$ | $-\frac{\sqrt{77}}{154}$ | 0 | $\frac{\sqrt{77}i}{154}$ | 0 | 0 | 0 |
| 894 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------|-----------------------------|-----------------------------|------------------------------------|----------------------------|--------------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|-------------------------------|----------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|
| $Q_4^{(1,1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | $-\frac{\sqrt{770}i}{220}$ | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{165}$ | | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $\frac{\sqrt{77}}{308}$ | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $\frac{\sqrt{1155}i}{165}$ | 0 | |
| | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | 0 | $-\frac{\sqrt{770}i}{220}$ | 0 | 0 | $\frac{\sqrt{1155}i}{165}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | $-\frac{\sqrt{1155}}{165}$ | 0 | |
| | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{1155}i}{4620}$ | 0 | $\frac{23\sqrt{1155}}{4620}$ | $\frac{\sqrt{770}i}{110}$ | 0 | |
| | $\frac{\sqrt{77}i}{308}$ | 0 | $\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{1155}i}{4620}$ | 0 | $-\frac{23\sqrt{1155}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}i}{110}$ |
| | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 |
| | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{23\sqrt{1155}i}{4620}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{154}$ |
| | 0 | $-\frac{\sqrt{770}i}{220}$ | 0 | 0 | $-\frac{23\sqrt{1155}i}{4620}$ | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}i}{154}$ | 0 |
| | 0 | 0 | $\frac{\sqrt{770}i}{220}$ | 0 | 0 | $-\frac{23\sqrt{1155}}{4620}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{154}$ |
| | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{220}$ | $\frac{23\sqrt{1155}}{4620}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{154}$ | 0 |
| | 0 | $-\frac{\sqrt{1155}i}{165}$ | 0 | $-\frac{\sqrt{1155}}{165}$ | $-\frac{\sqrt{770}i}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}i}{154}$ | 0 | $-\frac{\sqrt{77}}{154}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{1155}i}{165}$ | 0 | $\frac{\sqrt{1155}}{165}$ | 0 | 0 | $\frac{\sqrt{770}i}{110}$ | 0 | 0 | $\frac{\sqrt{77}i}{154}$ | 0 | $\frac{\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 |
| | 895 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|----------------------------|-----------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| $\mathbb{Q}_{4,1}^{(1,1;a)}(E, 1)$ | | 0 | 0 | 0 | $\frac{\sqrt{66i}}{264}$ | 0 | 0 | $\frac{\sqrt{11i}}{44}$ | 0 | 0 | $-\frac{3\sqrt{110}}{220}$ | 0 | $-\frac{\sqrt{110i}}{440}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{66i}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11i}}{44}$ | $\frac{3\sqrt{110}}{220}$ | 0 | $-\frac{\sqrt{110i}}{440}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{66i}}{264}$ | 0 | 0 | $-\frac{\sqrt{11i}}{44}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{110i}}{440}$ | 0 | 0 | $\frac{\sqrt{165i}}{165}$ | 0 |
| | | $-\frac{\sqrt{66i}}{264}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11i}}{44}$ | 0 | 0 | $\frac{7\sqrt{110i}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{165}$ |
| | | 0 | 0 | $\frac{\sqrt{11i}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66i}}{66}$ | 0 | 0 | $-\frac{7\sqrt{165i}}{660}$ | 0 | 0 | $\frac{3\sqrt{110}}{220}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11i}}{44}$ | 0 | 0 | $-\frac{\sqrt{66i}}{66}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{165i}}{660}$ | $-\frac{3\sqrt{110}}{220}$ | 0 |
| | | $-\frac{\sqrt{11i}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66i}}{66}$ | 0 | 0 | $\frac{\sqrt{165i}}{60}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110i}}{55}$ |
| | | 0 | $\frac{\sqrt{11i}}{44}$ | 0 | 0 | $\frac{\sqrt{66i}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165i}}{60}$ | 0 | 0 | $-\frac{\sqrt{110i}}{55}$ | 0 |
| | | 0 | $\frac{3\sqrt{110}}{220}$ | 0 | $-\frac{7\sqrt{110i}}{440}$ | 0 | 0 | $-\frac{\sqrt{165i}}{60}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{66i}}{264}$ | 0 | 0 |
| | | $-\frac{3\sqrt{110}}{220}$ | 0 | $-\frac{7\sqrt{110i}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165i}}{60}$ | 0 | 0 | $\frac{5\sqrt{66i}}{264}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{110i}}{440}$ | 0 | 0 | $\frac{7\sqrt{165i}}{660}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{66i}}{264}$ | 0 | 0 | $-\frac{\sqrt{11i}}{22}$ | 0 |
| | | $\frac{\sqrt{110i}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{165i}}{660}$ | 0 | 0 | $-\frac{5\sqrt{66i}}{264}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11i}}{22}$ |
| | | 0 | 0 | $-\frac{\sqrt{165i}}{165}$ | 0 | 0 | $-\frac{3\sqrt{110}}{220}$ | 0 | $\frac{\sqrt{110i}}{55}$ | 0 | 0 | $\frac{\sqrt{11i}}{22}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{165i}}{165}$ | $\frac{3\sqrt{110}}{220}$ | 0 | $\frac{\sqrt{110i}}{55}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11i}}{22}$ | 0 | 0 |
| | 896 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|------------------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{66}}{264}$ | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{110}}{440}$ | $-\frac{\sqrt{165}i}{165}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{66}}{264}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | $\frac{7\sqrt{110}}{440}$ | 0 | 0 | $\frac{\sqrt{165}i}{165}$ |
| | | 0 | $\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $\frac{\sqrt{110}}{440}$ | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | $-\frac{\sqrt{110}}{440}$ | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{66}$ | $\frac{7\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{220}$ |
| | | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | $-\frac{7\sqrt{165}i}{660}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{220}$ |
| | $\mathbb{Q}_{4,2}^{(1,1;a)}(E, 1)$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{\sqrt{66}}{66}$ | 0 | 0 | 0 | $\frac{\sqrt{165}i}{60}$ | 0 | 0 | $-\frac{\sqrt{110}}{55}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{44}$ | $\frac{\sqrt{66}}{66}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{60}$ | $\frac{\sqrt{110}}{55}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{110}}{440}$ | $-\frac{7\sqrt{165}i}{660}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{66}}{264}$ | $-\frac{\sqrt{11}i}{22}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{110}}{440}$ | 0 | 0 | $\frac{7\sqrt{165}i}{660}$ | 0 | 0 | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | 0 | $\frac{\sqrt{11}i}{22}$ |
| | | 0 | $\frac{7\sqrt{110}}{440}$ | 0 | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | $-\frac{\sqrt{165}i}{60}$ | 0 | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | 0 | 0 |
| | | $-\frac{7\sqrt{110}}{440}$ | 0 | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 | $\frac{\sqrt{165}i}{60}$ | $-\frac{5\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{165}i}{165}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | $\frac{\sqrt{110}}{55}$ | $\frac{\sqrt{11}i}{22}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{165}i}{165}$ | 0 | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | $-\frac{\sqrt{110}}{55}$ | 0 | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | 0 |
| 897 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|-----------|-----------------------------|---------------------------------------|---------------------------|----------------------------|--------------------------------|-------------------------------|----------------------------|-----------------------------|-------------------------------|--------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|
| $Q_{4,1}^{(1,1;a)}(E, 2)$ | | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1848}$ | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770i}}{110}$ | 0 | $\frac{3\sqrt{770}}{440}$ | $\frac{\sqrt{1155i}}{165}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{462}}{1848}$ | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | $\frac{\sqrt{770i}}{110}$ | 0 | $-\frac{3\sqrt{770}}{440}$ | 0 | 0 | $-\frac{\sqrt{1155i}}{165}$ |
| | | 0 | $\frac{\sqrt{462}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | $-\frac{\sqrt{770i}}{220}$ | 0 | 0 |
| | | $-\frac{\sqrt{462}}{1848}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | $-\frac{3\sqrt{770}}{440}$ | 0 | $-\frac{\sqrt{770i}}{220}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{462}$ | $\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770i}}{220}$ |
| | | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{462}$ | 0 | 0 | $-\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770i}}{220}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | $-\frac{\sqrt{462}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{924}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{308}$ | $\frac{\sqrt{462}}{462}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155i}}{924}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{770i}}{110}$ | 0 | $-\frac{3\sqrt{770}}{440}$ | $-\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1848}$ | $-\frac{\sqrt{77i}}{154}$ | 0 |
| | | $-\frac{\sqrt{770i}}{110}$ | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | 0 | $\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{1848}$ | 0 | 0 | $\frac{\sqrt{77i}}{154}$ |
| | | 0 | $-\frac{3\sqrt{770}}{440}$ | 0 | $\frac{\sqrt{770i}}{220}$ | 0 | 0 | $\frac{\sqrt{1155i}}{924}$ | 0 | 0 | $\frac{5\sqrt{462}}{1848}$ | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{770}}{440}$ | 0 | $\frac{\sqrt{770i}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{924}$ | $-\frac{5\sqrt{462}}{1848}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{1155i}}{165}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770i}}{220}$ | 0 | 0 | $\frac{\sqrt{77i}}{154}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{1155i}}{165}$ | 0 | 0 | $\frac{\sqrt{770i}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{154}$ | 0 | 0 | 0 | 0 |
| | 898 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|-------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-------------------------------|--------------------------------|----------------------------|-----------------------------|---|
| $\mathbb{Q}_{4,2}^{(1,1;a)}(E, 2)$ | 0 | 0 | 0 | $-\frac{\sqrt{462i}}{1848}$ | 0 | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | $-\frac{\sqrt{770}}{220}$ | 0 | $\frac{3\sqrt{770i}}{440}$ | 0 | 0 | |
| | 0 | 0 | $-\frac{\sqrt{462i}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | $\frac{\sqrt{770}}{220}$ | 0 | $\frac{3\sqrt{770i}}{440}$ | 0 | 0 | 0 | |
| | 0 | $\frac{\sqrt{462i}}{1848}$ | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{770i}}{440}$ | 0 | $\frac{\sqrt{770}}{110}$ | $\frac{\sqrt{1155i}}{165}$ | 0 | |
| | $\frac{\sqrt{462i}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | $\frac{3\sqrt{770i}}{440}$ | 0 | $-\frac{\sqrt{770}}{110}$ | 0 | 0 | $-\frac{\sqrt{1155i}}{165}$ | |
| | 0 | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462i}}{462}$ | 0 | 0 | $\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | $-\frac{\sqrt{770}}{220}$ | |
| | 0 | 0 | 0 | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | $\frac{\sqrt{462i}}{462}$ | 0 | 0 | 0 | $-\frac{23\sqrt{1155i}}{4620}$ | $\frac{\sqrt{770}}{220}$ | 0 | |
| | $\frac{\sqrt{77i}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462i}}{462}$ | 0 | 0 | $\frac{\sqrt{1155i}}{924}$ | 0 | 0 | 0 | 0 | 0 | |
| | 0 | $-\frac{\sqrt{77i}}{308}$ | 0 | 0 | $-\frac{\sqrt{462i}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{924}$ | 0 | 0 | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{770}}{220}$ | 0 | $-\frac{3\sqrt{770i}}{440}$ | 0 | 0 | $-\frac{\sqrt{1155i}}{924}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462i}}{1848}$ | 0 | 0 | |
| | $-\frac{\sqrt{770}}{220}$ | 0 | $-\frac{3\sqrt{770i}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155i}}{924}$ | 0 | 0 | $-\frac{5\sqrt{462i}}{1848}$ | 0 | 0 | 0 | |
| | 0 | $-\frac{3\sqrt{770i}}{440}$ | 0 | $-\frac{\sqrt{770}}{110}$ | $-\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462i}}{1848}$ | 0 | 0 | $\frac{\sqrt{77i}}{154}$ | 0 | |
| | $-\frac{3\sqrt{770i}}{440}$ | 0 | $\frac{\sqrt{770}}{110}$ | 0 | 0 | $\frac{23\sqrt{1155i}}{4620}$ | 0 | 0 | $\frac{5\sqrt{462i}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{154}$ | |
| | 0 | 0 | $-\frac{\sqrt{1155i}}{165}$ | 0 | 0 | $\frac{\sqrt{770}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77i}}{154}$ | 0 | 0 | 0 | |
| | 0 | 0 | 0 | $\frac{\sqrt{1155i}}{165}$ | $-\frac{\sqrt{770}}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{77i}}{154}$ | 0 | 0 | |
| 899 | symmetry | z | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| $\mathbb{G}_1^{(1,0;a)}(A)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 |
| 900 | symmetry | y | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-----|-----------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------------------------|------------------------|------------------------|--|
| | $\mathbb{G}_3^{(1,0;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{6}}{12}$ | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{12}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $-\frac{\sqrt{6}}{12}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | $\frac{\sqrt{6}}{12}$ | 0 | 0 | 0 | |
| 903 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|--------------------------|----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| $\mathbb{G}_3^{(1,0;a)}(B, 1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $\frac{\sqrt{6}}{24}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{i}{6}$ | $-\frac{\sqrt{6}}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 |
| | | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 |
| | | $-\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $-\frac{i}{6}$ | 0 |
| | | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{i}{6}$ |
| | | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{i}{6}$ | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 |
| | | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{24}$ |
| | | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{24}$ | 0 |
| | | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{i}{6}$ | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 |
| | 904 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-------------------------|-------------------------|------------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--|
| $\mathbb{G}_3^{(1,0;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | $-\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | |
| | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{i}{6}$ | $\frac{\sqrt{6}}{24}$ | 0 | |
| | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $-\frac{i}{6}$ | 0 | |
| | $\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{i}{6}$ | |
| | 0 | $\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | |
| | $-\frac{\sqrt{10}}{24}$ | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | |
| | $\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{24}$ | |
| | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{24}$ | 0 | |
| | 0 | 0 | $\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{24}$ | |
| | 0 | 0 | 0 | $-\frac{i}{6}$ | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{24}$ | 0 | |
| | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $\frac{\sqrt{10}}{24}$ | 0 | 0 | |
| | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | 0 | $-\frac{\sqrt{10}i}{24}$ | 0 | $-\frac{\sqrt{10}}{24}$ | 0 | 0 | 0 | |
| | 905 | symmetry | $-\frac{y(3x^2 - 2y^2 + 3z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|-------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
| $\mathbb{G}_{3,1}^{(1,0;a)}(E, 1)$ | | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 |
| | | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{i}{8}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 |
| | | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ |
| | | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ |
| | | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 |
| | | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ |
| | | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 |
| 906 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|------------------------------------|-----------|----------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|
| $\mathbb{G}_{3,2}^{(1,0;a)}(E, 1)$ | | 0 | 0 | 0 | $-\frac{1}{8}$ | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $\frac{\sqrt{10}i}{16}$ | 0 |
| | | 0 | 0 | $\frac{1}{8}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ |
| | | 0 | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 |
| | | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | $-\frac{\sqrt{15}}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | $\frac{\sqrt{15}}{24}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | $\frac{\sqrt{6}i}{48}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ |
| | | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{16}$ | $\frac{1}{8}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{10}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 |
| 907 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|-----------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | $-\frac{\sqrt{10i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{i}{6}$ | 0 | $\frac{1}{24}$ | $-\frac{\sqrt{6i}}{16}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | $\frac{\sqrt{10i}}{48}$ | 0 | 0 | $-\frac{i}{6}$ | 0 | $-\frac{1}{24}$ | 0 | 0 | $\frac{\sqrt{6i}}{16}$ |
| | | 0 | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10i}}{48}$ | 0 | 0 | $-\frac{1}{24}$ | 0 | $-\frac{i}{6}$ | 0 | 0 |
| | | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10i}}{48}$ | $\frac{1}{24}$ | 0 | $-\frac{i}{6}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{10i}}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $\frac{\sqrt{6i}}{16}$ | 0 | 0 | 0 | 0 | $-\frac{i}{6}$ |
| | | 0 | $-\frac{\sqrt{10i}}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 | $-\frac{i}{6}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{10i}}{48}$ | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 | $-\frac{1}{24}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{10i}}{48}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6i}}{16}$ | $\frac{1}{24}$ | 0 |
| | | 0 | $\frac{i}{6}$ | 0 | $\frac{1}{24}$ | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}}{24}$ | $\frac{\sqrt{10i}}{48}$ | 0 |
| | | $\frac{i}{6}$ | 0 | $-\frac{1}{24}$ | 0 | 0 | $\frac{\sqrt{6i}}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | $-\frac{\sqrt{10i}}{48}$ |
| | | 0 | $-\frac{1}{24}$ | 0 | $\frac{i}{6}$ | 0 | 0 | 0 | $\frac{\sqrt{6i}}{16}$ | 0 | $-\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 |
| | | $\frac{1}{24}$ | 0 | $\frac{i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6i}}{16}$ | $\frac{\sqrt{15}}{24}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6i}}{16}$ | 0 | 0 | 0 | 0 | $\frac{i}{6}$ | 0 | $\frac{1}{24}$ | $-\frac{\sqrt{10i}}{48}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6i}}{16}$ | 0 | 0 | $\frac{i}{6}$ | 0 | $-\frac{1}{24}$ | 0 | 0 | $\frac{\sqrt{10i}}{48}$ | 0 | 0 | 0 | 0 |
| 908 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|-------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| $\mathbb{G}_{3,2}^{(1,0;a)}(E, 2)$ | | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | $-\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{48}$ | $\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{i}{24}$ | 0 | $-\frac{1}{6}$ | $-\frac{\sqrt{6}i}{16}$ | 0 |
| | | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | $\frac{i}{24}$ | 0 | $\frac{1}{6}$ | 0 | 0 | $\frac{\sqrt{6}i}{16}$ |
| | | 0 | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $-\frac{1}{6}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | $\frac{1}{6}$ | 0 |
| | | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{i}{24}$ |
| | | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | $\frac{i}{24}$ | 0 |
| | | 0 | $\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 |
| | | $-\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 |
| | | 0 | $\frac{i}{24}$ | 0 | $\frac{1}{6}$ | $-\frac{\sqrt{6}i}{16}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 |
| | | $\frac{i}{24}$ | 0 | $-\frac{1}{6}$ | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{48}$ |
| | | 0 | 0 | $\frac{\sqrt{6}i}{16}$ | 0 | 0 | $\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | $\frac{\sqrt{10}i}{48}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{16}$ | $-\frac{1}{6}$ | 0 | $-\frac{i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{48}$ | 0 | 0 |
| | 909 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|
| 910 | $\mathbb{G}_5^{(1,0;a)}(A, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{10}}{20}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | $-\frac{\sqrt{10}}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 |
| | | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | $\frac{\sqrt{10}}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{10}}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | | | | |
|--------------------------------|----------------------------|---------------------------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---|--------------------------|---|---|---|---|
| $\mathbb{G}_5^{(1,0;a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14i}}{56}$ | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{210i}}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14i}}{56}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{3\sqrt{14i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{3\sqrt{14i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{84}$ | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{84}$ | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | $\frac{3\sqrt{14}}{56}$ | 0 | $\frac{3\sqrt{14i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{84}$ | 0 | $-\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{84}$ | 0 | $\frac{\sqrt{210}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 911 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|-----------------------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{20}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{10}i}{20}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{10}i}{20}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | $\frac{\sqrt{10}i}{20}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{24}$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{24}$ | 0 | $\frac{\sqrt{6}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | $\mathbb{G}_5^{(1,0;a)}(A, 3)$ | 0 | $-\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 |
| | | $\frac{\sqrt{6}}{24}$ | 0 | $\frac{\sqrt{6}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | $-\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | $-\frac{\sqrt{10}i}{40}$ | 0 | $\frac{\sqrt{10}i}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | $\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{10}i}{20}$ | 0 | $-\frac{\sqrt{10}i}{20}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 912 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-------------------------------|-----------|-------------------------|--------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| $\mathbb{G}_5^{(1,0;a)}(B,1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}}{30}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{30}$ | $-\frac{\sqrt{30}}{30}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | $-\frac{\sqrt{2}}{24}$ | $-\frac{\sqrt{5}i}{30}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{30}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | $\frac{\sqrt{2}}{24}$ | 0 | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $-\frac{\sqrt{30}i}{30}$ | 0 | |
| | | 0 | $\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | $\frac{\sqrt{2}}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}}{120}$ | $\frac{\sqrt{5}i}{15}$ | 0 | 0 |
| | | $-\frac{\sqrt{2}i}{24}$ | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | $-\frac{\sqrt{5}i}{15}$ |
| | | 0 | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $-\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{12}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{30}$ | $\frac{\sqrt{30}}{24}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{12}$ | 0 |
| | | $-\frac{\sqrt{5}i}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | $-\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ |
| | | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | $\frac{\sqrt{30}}{120}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ | 0 |
| | | 0 | $-\frac{\sqrt{30}}{30}$ | 0 | $\frac{\sqrt{30}i}{30}$ | 0 | 0 | $-\frac{\sqrt{5}i}{15}$ | 0 | 0 | $\frac{\sqrt{2}}{12}$ | 0 | $\frac{\sqrt{2}i}{12}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{30}}{30}$ | 0 | $\frac{\sqrt{30}i}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{5}i}{15}$ | $-\frac{\sqrt{2}}{12}$ | 0 | $\frac{\sqrt{2}i}{12}$ | 0 | 0 | 0 | 0 |
| | 913 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|--------------------------|----------------------------------------------------------------------|-------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-------------------------|-------------------------|
| $\mathbb{G}_5^{(1,0;a)}(B, 2)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | $\frac{\sqrt{2}}{24}$ | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | 0 | $\frac{\sqrt{30}i}{30}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | 0 | $-\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{30}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{30}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{24}$ | 0 | $\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{30}$ | $-\frac{\sqrt{30}i}{30}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | $\frac{\sqrt{2}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}i}{120}$ | $-\frac{\sqrt{5}i}{15}$ | 0 |
| | | $-\frac{\sqrt{2}i}{24}$ | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | 0 | $\frac{\sqrt{5}i}{15}$ |
| | | 0 | $-\frac{\sqrt{2}}{24}$ | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 |
| | | $\frac{\sqrt{2}}{24}$ | 0 | $-\frac{\sqrt{2}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{5}i}{30}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{12}$ |
| | | 0 | $\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{12}$ |
| | | 0 | 0 | $-\frac{\sqrt{5}i}{30}$ | 0 | 0 | $\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}}{12}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{5}i}{30}$ | $-\frac{\sqrt{30}i}{120}$ | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{12}$ | 0 |
| | | 0 | $-\frac{\sqrt{30}i}{30}$ | 0 | $-\frac{\sqrt{30}i}{30}$ | $\frac{\sqrt{5}i}{15}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ | 0 | $\frac{\sqrt{2}}{12}$ | 0 | 0 |
| | | $-\frac{\sqrt{30}i}{30}$ | 0 | $\frac{\sqrt{30}i}{30}$ | 0 | 0 | $-\frac{\sqrt{5}i}{15}$ | 0 | 0 | $-\frac{\sqrt{2}i}{12}$ | 0 | $-\frac{\sqrt{2}}{12}$ | 0 | 0 | 0 |
| | 914 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|----------------------------------------------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{G}_{5,1}^{(1,0;a)}(E, 1)$ | | 0 | 0 | 0 | $\frac{\sqrt{35i}}{224}$ | 0 | 0 | $-\frac{5\sqrt{210i}}{336}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{21i}}{96}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{35i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{210i}}{336}$ | 0 | 0 | $\frac{5\sqrt{21i}}{96}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{35i}}{224}$ | 0 | 0 | $-\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{96}$ | 0 | 0 | $-\frac{\sqrt{14i}}{32}$ | 0 |
| | | $-\frac{\sqrt{35i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{11\sqrt{210i}}{672}$ | 0 | 0 | $\frac{\sqrt{21i}}{96}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{32}$ |
| | | 0 | 0 | $\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{56}$ | 0 | 0 | 0 | $-\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{11\sqrt{210i}}{672}$ | 0 | 0 | $-\frac{\sqrt{35i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14i}}{224}$ | 0 | 0 |
| | | $\frac{5\sqrt{210i}}{336}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35i}}{56}$ | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{24}$ |
| | | 0 | $-\frac{5\sqrt{210i}}{336}$ | 0 | 0 | $\frac{\sqrt{35i}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{112}$ | 0 | 0 | $\frac{\sqrt{21i}}{24}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{96}$ | 0 | 0 | $\frac{\sqrt{14i}}{112}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35i}}{224}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{21i}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | 0 | 0 | $\frac{5\sqrt{35i}}{224}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{21i}}{96}$ | 0 | 0 | $\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35i}}{224}$ | 0 | 0 | $-\frac{\sqrt{210i}}{672}$ | 0 |
| | | $-\frac{5\sqrt{21i}}{96}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14i}}{224}$ | 0 | 0 | $-\frac{5\sqrt{35i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{210i}}{672}$ |
| | | 0 | 0 | $\frac{\sqrt{14i}}{32}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{24}$ | 0 | 0 | $\frac{\sqrt{210i}}{672}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{32}$ | 0 | 0 | $-\frac{\sqrt{21i}}{24}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210i}}{672}$ | 0 | 0 |
| 915 | symmetry | $\frac{x(8x^4 - 40x^2y^2 - 40x^2z^2 + 15y^4 + 30y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|------------------------------------|-----------------------------|---------------------------------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| $\mathbb{G}_{5,2}^{(1,0;a)}(E, 1)$ | 0 | 0 | 0 | $-\frac{\sqrt{35}}{224}$ | $-\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{96}$ | $\frac{\sqrt{14i}}{32}$ | 0 |
| | 0 | 0 | $\frac{\sqrt{35}}{224}$ | 0 | 0 | $\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{96}$ | 0 | 0 | $-\frac{\sqrt{14i}}{32}$ |
| | 0 | $\frac{\sqrt{35}}{224}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{210i}}{336}$ | 0 | 0 | $-\frac{5\sqrt{21}}{96}$ | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{35}}{224}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{210i}}{336}$ | $\frac{5\sqrt{21}}{96}$ | 0 | 0 | 0 | 0 | 0 |
| | $\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{56}$ | $\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 | 0 |
| | 0 | $-\frac{11\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{56}$ | 0 | 0 | $-\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 |
| | 0 | 0 | $-\frac{5\sqrt{210i}}{336}$ | 0 | 0 | $-\frac{\sqrt{35}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | 0 | 0 | $\frac{\sqrt{21}}{24}$ |
| | 0 | 0 | 0 | $\frac{5\sqrt{210i}}{336}$ | $\frac{\sqrt{35}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{112}$ | $-\frac{\sqrt{21}}{24}$ | 0 |
| | 0 | 0 | 0 | $\frac{5\sqrt{21}}{96}$ | $-\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}}{224}$ | $-\frac{\sqrt{210i}}{672}$ | 0 |
| | 0 | 0 | $-\frac{5\sqrt{21}}{96}$ | 0 | 0 | $\frac{5\sqrt{14i}}{224}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{35}}{224}$ | 0 | 0 | $\frac{\sqrt{210i}}{672}$ |
| | 0 | $\frac{\sqrt{21}}{96}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{112}$ | 0 | 0 | $\frac{5\sqrt{35}}{224}$ | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{21}}{96}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{112}$ | $-\frac{5\sqrt{35}}{224}$ | 0 | 0 | 0 | 0 | 0 |
| | $-\frac{\sqrt{14i}}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{24}$ | $\frac{\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{14i}}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{24}$ | 0 | 0 | $-\frac{\sqrt{210i}}{672}$ | 0 | 0 | 0 | 0 |
| 916 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|---------------------------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|
| $\mathbb{G}_{5,1}^{(1,0;a)}(E, 2)$ | | 0 | 0 | 0 | $\frac{i}{32}$ | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{\sqrt{15}}{15}$ | 0 | $-\frac{13\sqrt{15}i}{480}$ | 0 | 0 |
| | | 0 | 0 | $\frac{i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | $-\frac{\sqrt{15}}{15}$ | 0 | $-\frac{13\sqrt{15}i}{480}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{i}{32}$ | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{15}i}{160}$ | 0 | 0 | $\frac{9\sqrt{10}i}{160}$ | 0 |
| | | $-\frac{i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{3\sqrt{15}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{10}i}{160}$ |
| | | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}}{15}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | $\frac{\sqrt{15}}{15}$ | 0 |
| | | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{120}$ |
| | | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 | $-\frac{\sqrt{15}i}{120}$ | 0 |
| | | 0 | $-\frac{\sqrt{15}}{15}$ | 0 | $\frac{3\sqrt{15}i}{160}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{5i}{32}$ | 0 | 0 |
| | | $\frac{\sqrt{15}}{15}$ | 0 | $\frac{3\sqrt{15}i}{160}$ | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | 0 | 0 | $\frac{5i}{32}$ | 0 | 0 | 0 |
| | | 0 | $\frac{13\sqrt{15}i}{480}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{5i}{32}$ | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 |
| | | $\frac{13\sqrt{15}i}{480}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{5i}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{96}$ |
| | | 0 | 0 | $-\frac{9\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}}{15}$ | 0 | $\frac{\sqrt{15}i}{120}$ | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{9\sqrt{10}i}{160}$ | $-\frac{\sqrt{15}}{15}$ | 0 | $\frac{\sqrt{15}i}{120}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 |
| 917 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|------------------------------------|-----------|-------------------------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|---|
| $\mathbb{G}_{5,2}^{(1,0;a)}(E, 2)$ | | 0 | 0 | 0 | $-\frac{1}{32}$ | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{15}}{160}$ | $-\frac{9\sqrt{10}i}{160}$ | 0 | | |
| | | 0 | 0 | $\frac{1}{32}$ | 0 | 0 | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{15}}{160}$ | 0 | $\frac{9\sqrt{10}i}{160}$ | | |
| | | 0 | $\frac{1}{32}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | 0 | 0 | $\frac{13\sqrt{15}}{480}$ | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | |
| | | $-\frac{1}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | $-\frac{13\sqrt{15}}{480}$ | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | |
| | | $\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{8}$ | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | |
| | | 0 | $-\frac{\sqrt{6}i}{32}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | $\frac{\sqrt{15}i}{15}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{48}$ | 0 | 0 | $-\frac{1}{8}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | 0 | 0 | $-\frac{\sqrt{15}}{120}$ | |
| | | 0 | 0 | 0 | $\frac{\sqrt{6}i}{48}$ | $\frac{1}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | $\frac{\sqrt{15}}{120}$ | 0 | |
| | | 0 | 0 | 0 | $-\frac{13\sqrt{15}}{480}$ | $\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5}{32}$ | $-\frac{\sqrt{6}i}{96}$ | 0 | |
| | | 0 | 0 | $\frac{13\sqrt{15}}{480}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $\frac{5}{32}$ | 0 | 0 | $\frac{\sqrt{6}i}{96}$ | |
| | | 0 | $-\frac{3\sqrt{15}}{160}$ | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | $-\frac{3\sqrt{10}i}{80}$ | 0 | 0 | $\frac{5}{32}$ | 0 | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{15}}{160}$ | 0 | $\frac{\sqrt{15}i}{15}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}i}{80}$ | $-\frac{5}{32}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{9\sqrt{10}i}{160}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | $\frac{\sqrt{15}}{120}$ | $\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{9\sqrt{10}i}{160}$ | 0 | 0 | $-\frac{\sqrt{15}i}{15}$ | 0 | $-\frac{\sqrt{15}}{120}$ | 0 | 0 | $-\frac{\sqrt{6}i}{96}$ | 0 | 0 | 0 | 0 | |
| 918 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|------------------------------------|-----------|--------------------------|----------------------------------------|----------------------------|----------------------------|--------------------------|-------------------------|------------------------|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--------------------------|---|
| $\mathbb{G}_{5,2}^{(1,0;a)}(E, 3)$ | | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{48}$ | 0 | 0 | $-\frac{\sqrt{2}i}{6}$ | 0 | 0 | $\frac{\sqrt{5}}{30}$ | 0 | $-\frac{7\sqrt{5}i}{240}$ | 0 | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{3}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{6}$ | $-\frac{\sqrt{5}}{30}$ | 0 | $-\frac{7\sqrt{5}i}{240}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{3}i}{48}$ | 0 | 0 | $-\frac{7\sqrt{2}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{5}i}{240}$ | 0 | $-\frac{\sqrt{5}}{15}$ | $\frac{\sqrt{30}i}{80}$ | 0 | |
| | | $\frac{\sqrt{3}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{2}i}{48}$ | 0 | 0 | $\frac{13\sqrt{5}i}{240}$ | 0 | $\frac{\sqrt{5}}{15}$ | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | |
| | | 0 | 0 | $\frac{7\sqrt{2}i}{48}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{12}$ | 0 | 0 | $\frac{\sqrt{30}i}{80}$ | 0 | 0 | $\frac{\sqrt{5}}{30}$ | |
| | | 0 | 0 | 0 | $-\frac{7\sqrt{2}i}{48}$ | 0 | 0 | $\frac{\sqrt{3}i}{12}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | $-\frac{\sqrt{5}}{30}$ | 0 | |
| | | $\frac{\sqrt{2}i}{6}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{12}$ | |
| | | 0 | $-\frac{\sqrt{2}i}{6}$ | 0 | 0 | $-\frac{\sqrt{3}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{12}$ | 0 |
| | | 0 | $-\frac{\sqrt{5}}{30}$ | 0 | $-\frac{13\sqrt{5}i}{240}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{3}i}{48}$ | 0 | 0 | |
| | | $\frac{\sqrt{5}}{30}$ | 0 | $-\frac{13\sqrt{5}i}{240}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{3}i}{48}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{7\sqrt{5}i}{240}$ | 0 | $\frac{\sqrt{5}}{15}$ | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{3}i}{48}$ | 0 | 0 | $\frac{\sqrt{2}i}{48}$ | 0 | |
| | | $\frac{7\sqrt{5}i}{240}$ | 0 | $-\frac{\sqrt{5}}{15}$ | 0 | 0 | $\frac{\sqrt{30}i}{80}$ | 0 | 0 | $\frac{5\sqrt{3}i}{48}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{48}$ | |
| | | 0 | 0 | $-\frac{\sqrt{30}i}{80}$ | 0 | 0 | $-\frac{\sqrt{5}}{30}$ | 0 | $\frac{\sqrt{5}i}{12}$ | 0 | 0 | $-\frac{\sqrt{2}i}{48}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{30}i}{80}$ | $\frac{\sqrt{5}}{30}$ | 0 | $\frac{\sqrt{5}i}{12}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{48}$ | 0 | 0 | |
| | 920 | symmetry | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------------|-----------|--------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| $\mathbb{T}_2^{(1,0;a)}(A)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42i}}{168}$ | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42i}}{168}$ | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| 921 | symmetry | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 |
| | | $\frac{5\sqrt{14}i}{168}$ | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 |
| | $\mathbb{T}_2^{(1,0;\alpha)}(B, 1)$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | $\frac{\sqrt{35}}{21}$ | 0 |
| | | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{21}$ |
| | | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | $\frac{\sqrt{210}i}{168}$ | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | $\frac{\sqrt{14}i}{84}$ | 0 |
| | | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ |
| | | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{21}$ | 0 | 0 | $\frac{\sqrt{14}}{84}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{21}$ | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{21}$ | $\frac{\sqrt{14}i}{84}$ | 0 | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 |
| 922 | symmetry | $\sqrt{3}xy$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | $-\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | $-\frac{\sqrt{35}}{21}$ | 0 |
| | | $-\frac{5\sqrt{14}}{168}$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{21}$ |
| | $\mathbb{T}_2^{(1,0;a)}(B, 2)$ | 0 | $\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 |
| | | $-\frac{5\sqrt{14}i}{168}$ | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $-\frac{\sqrt{210}i}{168}$ | $\frac{\sqrt{21}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ |
| | | 0 | $\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 | 0 | $-\frac{\sqrt{14}i}{84}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | $-\frac{\sqrt{210}i}{168}$ | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | $\frac{\sqrt{21}}{21}$ | $\frac{\sqrt{14}i}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{21}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $-\frac{\sqrt{14}i}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{21}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | $\frac{\sqrt{14}i}{84}$ | 0 | 0 | 0 |
| 923 | symmetry | $\sqrt{3}yz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | 0 |
| | | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | $\frac{\sqrt{35i}}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ |
| | | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | $-\frac{\sqrt{35i}}{42}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35i}}{42}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{21i}}{42}$ | $\frac{\sqrt{14}}{84}$ | 0 |
| | | $\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{5\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21i}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ |
| | | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{21i}}{42}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | 0 |
| | | $-\frac{\sqrt{35i}}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $-\frac{\sqrt{21i}}{42}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $-\frac{\sqrt{35i}}{42}$ | $\frac{\sqrt{14}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{21}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{42}$ | 0 | $\frac{\sqrt{35i}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{21}}{21}$ | 0 |
| 924 | symmetry | $\sqrt{3}xz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------------|----------------------------------------------------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|-------------------------|--------------------------|
| | $\mathbb{T}_{2,2}^{(1,0;a)}(E)$ | 0 | $\frac{5\sqrt{21}i}{84}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 |
| | | $-\frac{5\sqrt{21}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | $\frac{\sqrt{35}i}{84}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{21}i}{84}$ | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{5\sqrt{21}i}{84}$ | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{35}i}{42}$ | 0 |
| | | $\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}}{42}$ |
| | | 0 | $-\frac{5\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{35}}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{35}i}{84}$ | 0 | $-\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{21}i}{84}$ | 0 | $\frac{\sqrt{21}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35}i}{84}$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $-\frac{5\sqrt{21}i}{84}$ | $-\frac{\sqrt{14}}{84}$ | 0 |
| | | $\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35}i}{84}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{\sqrt{21}}{42}$ | 0 | $\frac{5\sqrt{21}i}{84}$ | 0 | 0 | $\frac{\sqrt{14}}{84}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | $-\frac{\sqrt{14}}{84}$ | 0 | 0 | $-\frac{\sqrt{21}i}{21}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{42}$ | 0 | $-\frac{\sqrt{35}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{84}$ | $\frac{\sqrt{21}i}{21}$ | 0 |
| 925 | symmetry | $\frac{\sqrt{21}(x^4 - 3x^2y^2 - 3x^2z^2 + y^4 - 3y^2z^2 + z^4)}{6}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|--------------------------------------------------------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--------------------------|
| $\mathbb{T}_4^{(1,0;a)}(A, 1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{66}i}{88}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | $-\frac{\sqrt{66}i}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{88}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 |
| | | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | $-\frac{\sqrt{165}}{66}$ | 0 | 0 | $\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 |
| | | $\frac{\sqrt{110}i}{88}$ | 0 | $-\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$ | $-\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{110}}{88}$ | 0 | $-\frac{\sqrt{110}i}{88}$ | $-\frac{\sqrt{165}}{66}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | $\frac{5\sqrt{66}i}{264}$ | 0 | 0 |
| | | $\frac{\sqrt{110}}{88}$ | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | 0 | $\frac{\sqrt{165}}{66}$ | 0 | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | $-\frac{5\sqrt{66}i}{264}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{66}i}{88}$ | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | $-\frac{\sqrt{66}i}{88}$ | 0 | $\frac{5\sqrt{66}}{264}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 |
| | | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | $\frac{5\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{88}$ |
| | | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | $-\frac{5\sqrt{66}i}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{88}$ | 0 |
| | | 0 | $\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 |
| | | $-\frac{\sqrt{66}i}{88}$ | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}i}{88}$ | 0 | $\frac{\sqrt{110}}{88}$ | 0 | 0 | 0 |
| 926 | symmetry | $-\frac{\sqrt{15}(x^4 - 12x^2y^2 + 6x^2z^2 + y^4 + 6y^2z^2 - 2z^4)}{12}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|--------------------------------|----------------------------|-----------------------------|-----------------------------------|-----------------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------|-----------------------------|-----------------------------|
| $\mathbb{T}_4^{(1,0;a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154}i}{616}$ | 0 | $\frac{5\sqrt{154}}{616}$ | 0 | 0 | $-\frac{\sqrt{385}}{110}$ | 0 | 0 | $-\frac{\sqrt{2310}i}{440}$ |
| | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}i}{616}$ | 0 | $\frac{5\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{110}$ | $\frac{\sqrt{2310}i}{440}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154}}{616}$ | 0 | $-\frac{5\sqrt{154}i}{616}$ | $-\frac{\sqrt{385}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{440}$ |
| | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154}}{616}$ | 0 | $\frac{5\sqrt{154}i}{616}$ | 0 | 0 | $\frac{\sqrt{385}}{110}$ | 0 | 0 | $\frac{\sqrt{2310}}{440}$ | 0 |
| | 0 | $-\frac{5\sqrt{154}i}{616}$ | 0 | $-\frac{5\sqrt{154}}{616}$ | 0 | 0 | $\frac{\sqrt{231}}{66}$ | 0 | 0 | $\frac{9\sqrt{2310}i}{3080}$ | 0 | $-\frac{9\sqrt{2310}}{3080}$ | 0 | 0 |
| | $\frac{5\sqrt{154}i}{616}$ | 0 | $-\frac{5\sqrt{154}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{66}$ | $-\frac{9\sqrt{2310}i}{3080}$ | 0 | $-\frac{9\sqrt{2310}}{3080}$ | 0 | 0 | 0 |
| | 0 | $\frac{5\sqrt{154}}{616}$ | 0 | $-\frac{5\sqrt{154}i}{616}$ | $\frac{\sqrt{231}}{66}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{2310}}{9240}$ | 0 | $\frac{13\sqrt{2310}i}{9240}$ | 0 | 0 |
| | $\frac{5\sqrt{154}}{616}$ | 0 | $\frac{5\sqrt{154}i}{616}$ | 0 | 0 | $-\frac{\sqrt{231}}{66}$ | 0 | 0 | $\frac{13\sqrt{2310}}{9240}$ | 0 | $-\frac{13\sqrt{2310}i}{9240}$ | 0 | 0 | 0 |
| | 0 | 0 | $-\frac{\sqrt{385}}{110}$ | 0 | 0 | $\frac{9\sqrt{2310}i}{3080}$ | 0 | $\frac{13\sqrt{2310}}{9240}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}i}{616}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{385}}{110}$ | $-\frac{9\sqrt{2310}i}{3080}$ | 0 | $\frac{13\sqrt{2310}}{9240}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154}i}{616}$ | 0 |
| | $-\frac{\sqrt{385}}{110}$ | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{2310}}{3080}$ | 0 | $\frac{13\sqrt{2310}i}{9240}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}}{616}$ |
| | 0 | $\frac{\sqrt{385}}{110}$ | 0 | 0 | $-\frac{9\sqrt{2310}}{3080}$ | 0 | $-\frac{13\sqrt{2310}i}{9240}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}i}{616}$ | 0 |
| | 0 | $-\frac{\sqrt{2310}i}{440}$ | 0 | $\frac{\sqrt{2310}}{440}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}i}{616}$ | 0 | $\frac{5\sqrt{154}}{616}$ | 0 | 0 |
| | $\frac{\sqrt{2310}i}{440}$ | 0 | $\frac{\sqrt{2310}}{440}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{154}i}{616}$ | 0 | $\frac{5\sqrt{154}}{616}$ | 0 | 0 | 0 |
| | 927 | symmetry | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|---------------------------|----------------------------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|
| $\mathbb{T}_4^{(1,0;a)}(A, 3)$ | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{55}$ | 0 | 0 | 0 | $\frac{3\sqrt{110}}{220}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{55}$ | 0 | 0 | $\frac{3\sqrt{110}}{220}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{55}$ | 0 | 0 | $\frac{3\sqrt{110}i}{220}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{55}$ | $-\frac{3\sqrt{110}i}{220}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{11}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{220}$ | 0 | $-\frac{\sqrt{110}i}{220}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{11}$ | 0 | 0 | $-\frac{\sqrt{110}}{220}$ | 0 | $\frac{\sqrt{110}i}{220}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{11}$ | 0 | 0 | $-\frac{\sqrt{110}i}{220}$ | 0 | $\frac{\sqrt{110}}{220}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{11}$ | $\frac{\sqrt{110}i}{220}$ | 0 | $\frac{\sqrt{110}}{220}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{165}}{55}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{220}$ | 0 | $-\frac{\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{165}}{55}$ | 0 | 0 | $-\frac{\sqrt{110}}{220}$ | 0 | $\frac{\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{165}}{55}$ | 0 | 0 | $-\frac{\sqrt{110}i}{220}$ | 0 | $\frac{\sqrt{110}}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{165}}{55}$ | $\frac{\sqrt{110}i}{220}$ | 0 | $\frac{\sqrt{110}}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{110}}{220}$ | 0 | $\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{110}}{220}$ | 0 | $-\frac{3\sqrt{110}i}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 928 | symmetry | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|---------------------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{3\sqrt{770}i}{440}$ |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{1155}}{770}$ | $-\frac{3\sqrt{770}i}{440}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | $-\frac{3\sqrt{462}i}{616}$ | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{770}}{440}$ |
| | | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{3\sqrt{770}}{440}$ | 0 |
| | | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 |
| | | $\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | $\frac{19\sqrt{770}i}{3080}$ | $-\frac{\sqrt{1155}}{770}$ | 0 |
| | | $-\frac{3\sqrt{462}}{616}$ | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{770}i}{3080}$ | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | 0 | $\frac{\sqrt{1155}}{770}$ |
| | | 0 | 0 | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | 0 | $\frac{\sqrt{77}}{77}$ | 0 | 0 | $\frac{3\sqrt{462}i}{616}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | $-\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{77}$ | $-\frac{3\sqrt{462}i}{616}$ | 0 |
| | | $-\frac{3\sqrt{1155}}{770}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $\frac{19\sqrt{770}i}{3080}$ | $\frac{\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ |
| | | 0 | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $-\frac{19\sqrt{770}i}{3080}$ | 0 | 0 | $-\frac{\sqrt{77}}{77}$ | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 |
| | | 0 | $\frac{3\sqrt{770}i}{440}$ | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | 0 | $-\frac{\sqrt{1155}}{770}$ | 0 | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | 0 |
| | | $-\frac{3\sqrt{770}i}{440}$ | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{770}$ | $-\frac{3\sqrt{462}i}{616}$ | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 |
| 929 | symmetry | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-------------------------------------|----------------------------|-----------------------------|------------------------------------|-----------------------------|-------------------------------|------------------------------|----------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|-------------------------------|----------------------------|-----------------------------|-----------------------------|
| $\mathbb{T}_4^{(1,0;\alpha)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | $-\frac{3\sqrt{462}i}{616}$ | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{770}}{440}$ | |
| | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | |
| | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $-\frac{3\sqrt{770}i}{440}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | $\frac{3\sqrt{770}i}{440}$ | 0 | |
| | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | $\frac{19\sqrt{770}i}{3080}$ | $-\frac{\sqrt{1155}}{770}$ | 0 | |
| | $\frac{3\sqrt{462}}{616}$ | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | $-\frac{19\sqrt{770}i}{3080}$ | 0 | 0 | $\frac{\sqrt{1155}}{770}$ |
| | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 |
| | $\frac{3\sqrt{462}i}{616}$ | 0 | $\frac{3\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 |
| | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | $-\frac{\sqrt{770}i}{616}$ | $\frac{\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ |
| | 0 | $-\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $-\frac{19\sqrt{770}}{3080}$ | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | 0 | $-\frac{\sqrt{77}}{77}$ | 0 | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 |
| | 0 | 0 | $\frac{3\sqrt{1155}}{770}$ | 0 | 0 | $\frac{19\sqrt{770}i}{3080}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | $-\frac{\sqrt{77}}{77}$ | 0 | 0 | 0 | $-\frac{3\sqrt{462}i}{616}$ |
| | 0 | 0 | 0 | $-\frac{3\sqrt{1155}}{770}$ | $-\frac{19\sqrt{770}i}{3080}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{77}$ | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 |
| | 0 | $\frac{3\sqrt{770}}{440}$ | 0 | $-\frac{3\sqrt{770}i}{440}$ | $-\frac{\sqrt{1155}}{770}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | $-\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 |
| | $\frac{3\sqrt{770}}{440}$ | 0 | $\frac{3\sqrt{770}i}{440}$ | 0 | 0 | $\frac{\sqrt{1155}}{770}$ | 0 | 0 | $-\frac{3\sqrt{462}}{616}$ | 0 | $\frac{3\sqrt{462}i}{616}$ | 0 | 0 | 0 | 0 |
| | 930 | symmetry | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------------------------|-----------|-----------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| $\mathbb{T}_{4,1}^{(1,0;\alpha)}(E, 1)$ | | 0 | $-\frac{3\sqrt{11}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | $\frac{7\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | 0 |
| | | $\frac{3\sqrt{11}i}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{176}$ | $-\frac{7\sqrt{165}i}{440}$ | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{11}i}{88}$ | $\frac{\sqrt{66}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | $\frac{\sqrt{165}i}{88}$ | $-\frac{9\sqrt{110}}{880}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | $-\frac{\sqrt{165}i}{88}$ | 0 | 0 | $\frac{9\sqrt{110}}{880}$ |
| | | 0 | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | $\frac{3\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{88}$ | 0 | 0 | $\frac{7\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{165}i}{220}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | $-\frac{3\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{110}}{880}$ | $\frac{\sqrt{165}i}{220}$ | 0 |
| | | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{88}$ | 0 | $\frac{\sqrt{11}i}{11}$ | $-\frac{\sqrt{110}}{880}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{440}$ |
| | | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | $-\frac{\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11}i}{11}$ | 0 | 0 | $\frac{\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{165}}{440}$ | 0 |
| | | 0 | $\frac{7\sqrt{165}i}{440}$ | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $-\frac{\sqrt{110}}{880}$ | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 |
| | | $-\frac{7\sqrt{165}i}{440}$ | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{880}$ | $-\frac{3\sqrt{11}i}{88}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | $\frac{\sqrt{165}i}{88}$ | $\frac{7\sqrt{110}}{880}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | $-\frac{5\sqrt{11}i}{88}$ | $-\frac{\sqrt{66}}{176}$ | 0 |
| | | $-\frac{\sqrt{165}}{220}$ | 0 | $-\frac{\sqrt{165}i}{88}$ | 0 | 0 | $-\frac{7\sqrt{110}}{880}$ | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | $\frac{5\sqrt{11}i}{88}$ | 0 | 0 | $\frac{\sqrt{66}}{176}$ |
| | | 0 | 0 | $-\frac{9\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{165}i}{220}$ | 0 | $-\frac{\sqrt{165}}{440}$ | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | $-\frac{3\sqrt{11}i}{44}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{110}}{880}$ | $\frac{\sqrt{165}i}{220}$ | 0 | $-\frac{\sqrt{165}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{176}$ | $\frac{3\sqrt{11}i}{44}$ | 0 |
| 931 | symmetry | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------------------|------------------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | $\mathbb{T}_{4,2}^{(1,0;a)}(E, 1)$ | 0 | $\frac{3\sqrt{11}}{88}$ | 0 | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | 0 | $\frac{\sqrt{165}}{88}$ | 0 | $\frac{\sqrt{165i}}{110}$ | $\frac{9\sqrt{110}}{880}$ | 0 |
| | | $\frac{3\sqrt{11}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | $\frac{\sqrt{165}}{88}$ | 0 | $-\frac{\sqrt{165i}}{110}$ | 0 | $-\frac{9\sqrt{110}}{880}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{11}}{88}$ | 0 | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | $-\frac{\sqrt{165i}}{220}$ | 0 | $\frac{7\sqrt{165}}{440}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{11}}{88}$ | 0 | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | $\frac{\sqrt{165i}}{220}$ | 0 | $\frac{7\sqrt{165}}{440}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{66}}{176}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | $-\frac{\sqrt{11i}}{88}$ | $-\frac{7\sqrt{110}}{880}$ | 0 | 0 | 0 | $-\frac{\sqrt{165}}{220}$ |
| | | 0 | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | $-\frac{3\sqrt{11}}{44}$ | 0 | $\frac{\sqrt{11i}}{88}$ | 0 | 0 | $\frac{7\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{165}}{220}$ |
| | | 0 | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | $-\frac{\sqrt{11i}}{88}$ | 0 | $-\frac{\sqrt{11}}{11}$ | 0 | 0 | $-\frac{\sqrt{110}}{880}$ | 0 | $\frac{\sqrt{165i}}{440}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{66}}{176}$ | $\frac{\sqrt{11i}}{88}$ | 0 | $-\frac{\sqrt{11}}{11}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{880}$ | $-\frac{\sqrt{165i}}{440}$ | 0 |
| | | 0 | $\frac{\sqrt{165}}{88}$ | 0 | $-\frac{\sqrt{165i}}{220}$ | $-\frac{7\sqrt{110}}{880}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11i}}{44}$ | $-\frac{\sqrt{66}}{176}$ |
| | | $\frac{\sqrt{165}}{88}$ | 0 | $\frac{\sqrt{165i}}{220}$ | 0 | 0 | $\frac{7\sqrt{110}}{880}$ | 0 | 0 | $\frac{5\sqrt{11}}{88}$ | 0 | $\frac{\sqrt{11i}}{44}$ | 0 | $\frac{\sqrt{66}}{176}$ |
| | | 0 | $\frac{\sqrt{165i}}{110}$ | 0 | $\frac{7\sqrt{165}}{440}$ | 0 | 0 | $-\frac{\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{11i}}{44}$ | 0 | $-\frac{3\sqrt{11}}{88}$ | 0 |
| | | $-\frac{\sqrt{165i}}{110}$ | 0 | $\frac{7\sqrt{165}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{880}$ | $\frac{\sqrt{11i}}{44}$ | 0 | $-\frac{3\sqrt{11}}{88}$ | 0 | 0 |
| | | $\frac{9\sqrt{110}}{880}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | $\frac{\sqrt{165i}}{440}$ | $-\frac{\sqrt{66}}{176}$ | 0 | 0 | 0 | $\frac{3\sqrt{11}}{44}$ |
| | | 0 | $-\frac{9\sqrt{110}}{880}$ | 0 | 0 | $-\frac{\sqrt{165}}{220}$ | 0 | $-\frac{\sqrt{165i}}{440}$ | 0 | 0 | $\frac{\sqrt{66}}{176}$ | 0 | 0 | $\frac{3\sqrt{11}}{44}$ |
| 932 | symmetry | $\frac{\sqrt{5}yz(6x^2 - y^2 - z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------------------------|----------------------------|---------------------------------------|-------------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|----------------------------|----------------------------|--|
| $\mathbb{T}_{4,1}^{(1,0;a)}(E, 2)$ | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{3080}$ | 0 | $\frac{\sqrt{1155i}}{385}$ | $-\frac{9\sqrt{770}}{880}$ | 0 | |
| | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{3080}$ | 0 | $-\frac{\sqrt{1155i}}{385}$ | 0 | 0 | $\frac{9\sqrt{770}}{880}$ | |
| | 0 | 0 | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155i}}{140}$ | 0 | $-\frac{13\sqrt{1155}}{3080}$ | 0 | 0 | |
| | 0 | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | $\frac{\sqrt{1155i}}{140}$ | 0 | $-\frac{13\sqrt{1155}}{3080}$ | 0 | 0 | 0 | 0 | |
| | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 | $\frac{\sqrt{77i}}{88}$ | $\frac{17\sqrt{770}}{6160}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{1540}$ | |
| | 0 | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{77}}{44}$ | 0 | $-\frac{\sqrt{77i}}{88}$ | 0 | 0 | $-\frac{17\sqrt{770}}{6160}$ | 0 | 0 | $\frac{\sqrt{1155}}{1540}$ | 0 | |
| | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{77i}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155i}}{616}$ | |
| | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | $-\frac{\sqrt{77i}}{88}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | $-\frac{\sqrt{1155i}}{616}$ | 0 | 0 | |
| | 0 | $\frac{\sqrt{1155}}{3080}$ | 0 | $-\frac{\sqrt{1155i}}{140}$ | $\frac{17\sqrt{770}}{6160}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{616}$ | 0 | $-\frac{5\sqrt{77i}}{308}$ | $-\frac{\sqrt{462}}{1232}$ | 0 | |
| | $\frac{\sqrt{1155}}{3080}$ | 0 | $\frac{\sqrt{1155i}}{140}$ | 0 | 0 | $-\frac{17\sqrt{770}}{6160}$ | 0 | 0 | $-\frac{3\sqrt{77}}{616}$ | 0 | $\frac{5\sqrt{77i}}{308}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | |
| | 0 | $\frac{\sqrt{1155i}}{385}$ | 0 | $-\frac{13\sqrt{1155}}{3080}$ | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $-\frac{5\sqrt{77i}}{308}$ | 0 | $\frac{5\sqrt{77}}{616}$ | 0 | 0 | |
| | $-\frac{\sqrt{1155i}}{385}$ | 0 | $-\frac{13\sqrt{1155}}{3080}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | $\frac{5\sqrt{77i}}{308}$ | 0 | $\frac{5\sqrt{77}}{616}$ | 0 | 0 | 0 | |
| | $-\frac{9\sqrt{770}}{880}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{1540}$ | 0 | $\frac{\sqrt{1155i}}{616}$ | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{77}}{308}$ | |
| | 0 | $\frac{9\sqrt{770}}{880}$ | 0 | 0 | $\frac{\sqrt{1155}}{1540}$ | 0 | $-\frac{\sqrt{1155i}}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $\frac{3\sqrt{77}}{308}$ | 0 | |
| | 933 | symmetry | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|----------------------------|-----------------------------|--------------------------------|-------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|
| $\mathbb{T}_{4,2}^{(1,0;a)}(E, 2)$ | 0 | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $\frac{13\sqrt{1155}i}{3080}$ | 0 | $\frac{\sqrt{1155}}{140}$ | 0 | 0 |
| | $-\frac{3\sqrt{77}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | $-\frac{13\sqrt{1155}i}{3080}$ | 0 | $\frac{\sqrt{1155}}{140}$ | 0 | 0 | 0 |
| | 0 | 0 | 0 | $\frac{3\sqrt{77}i}{616}$ | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{385}$ | 0 | $-\frac{\sqrt{1155}i}{3080}$ | $-\frac{9\sqrt{770}}{880}$ | 0 |
| | 0 | 0 | $-\frac{3\sqrt{77}i}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155}}{385}$ | 0 | $\frac{\sqrt{1155}i}{3080}$ | 0 | 0 | $\frac{9\sqrt{770}}{880}$ |
| | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{77}i}{44}$ | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | 0 | $\frac{17\sqrt{770}}{6160}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{1540}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | $\frac{\sqrt{77}i}{44}$ | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{770}}{6160}$ | $\frac{\sqrt{1155}i}{1540}$ | 0 |
| | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{616}$ |
| | 0 | $-\frac{\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{77}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{616}$ | 0 |
| | 0 | $\frac{13\sqrt{1155}i}{3080}$ | 0 | $-\frac{\sqrt{1155}}{385}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{5\sqrt{77}i}{616}$ | 0 | $-\frac{5\sqrt{77}}{308}$ | 0 | 0 |
| | $-\frac{13\sqrt{1155}i}{3080}$ | 0 | $-\frac{\sqrt{1155}}{385}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{5\sqrt{77}i}{616}$ | 0 | $-\frac{5\sqrt{77}}{308}$ | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{1155}}{140}$ | 0 | $-\frac{\sqrt{1155}i}{3080}$ | $\frac{17\sqrt{770}}{6160}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{77}}{308}$ | 0 | $-\frac{3\sqrt{77}i}{616}$ | $\frac{\sqrt{462}}{1232}$ | 0 |
| | $\frac{\sqrt{1155}}{140}$ | 0 | $\frac{\sqrt{1155}i}{3080}$ | 0 | 0 | $-\frac{17\sqrt{770}}{6160}$ | 0 | 0 | $-\frac{5\sqrt{77}}{308}$ | 0 | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ |
| | 0 | 0 | $-\frac{9\sqrt{770}}{880}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{1540}$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{1232}$ | 0 | 0 | $\frac{3\sqrt{77}i}{308}$ |
| | 0 | 0 | 0 | $\frac{9\sqrt{770}}{880}$ | $\frac{\sqrt{1155}i}{1540}$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{1232}$ | $-\frac{3\sqrt{77}i}{308}$ | 0 |
| 934 | symmetry | $\frac{\sqrt{2}(2x^6 - 15x^4y^2 - 15x^4z^2 - 15x^2y^4 + 180x^2y^2z^2 - 15x^2z^4 + 2y^6 - 15y^4z^2 - 15y^2z^4 + 2z^6)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|---------------------------|----------------------------|--------------------------------------------------------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|
| 935 | $\mathbb{T}_6^{(1,0;a)}(A, 1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | $\frac{\sqrt{55}i}{88}$ |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | $-\frac{\sqrt{55}i}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{264}$ | 0 | $\frac{\sqrt{33}i}{44}$ | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}}{264}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 |
| | | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 | $-\frac{5\sqrt{33}}{264}$ | 0 | 0 | $\frac{\sqrt{22}}{22}$ | 0 | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 |
| | | $\frac{5\sqrt{33}i}{264}$ | 0 | $-\frac{5\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | $-\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{33}}{44}$ | 0 | $\frac{\sqrt{33}i}{44}$ | $\frac{\sqrt{22}}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | $-\frac{\sqrt{55}i}{44}$ | 0 | 0 |
| | | $-\frac{\sqrt{33}}{44}$ | 0 | $-\frac{\sqrt{33}i}{44}$ | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | $\frac{\sqrt{55}i}{44}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | $-\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 |
| | | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | $-\frac{\sqrt{55}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{264}$ |
| | | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | $\frac{\sqrt{55}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{264}$ | 0 |
| | | 0 | $\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ | 0 | $\frac{5\sqrt{33}}{264}$ | 0 | 0 |
| | | $-\frac{\sqrt{55}i}{88}$ | 0 | $-\frac{\sqrt{55}}{88}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{33}i}{264}$ | 0 | $\frac{5\sqrt{33}}{264}$ | 0 | 0 | 0 |
| | | 935 | symmetry | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|--------------------------------|-----------------------------|---------------------------------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|
| $\mathbb{T}_6^{(1,0;a)}(A, 2)$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{231}i}{616}$ | 0 | $\frac{\sqrt{231}}{924}$ | 0 | 0 | $-\frac{\sqrt{2310}}{924}$ | 0 | 0 | $-\frac{\sqrt{385}i}{616}$ |
| | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{231}i}{616}$ | 0 | $\frac{\sqrt{231}}{924}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{924}$ | $\frac{\sqrt{385}i}{616}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{231}}{616}$ | 0 | $-\frac{\sqrt{231}i}{924}$ | $-\frac{\sqrt{2310}}{924}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{616}$ |
| | 0 | 0 | 0 | 0 | $\frac{3\sqrt{231}}{616}$ | 0 | $\frac{\sqrt{231}i}{924}$ | 0 | 0 | $\frac{\sqrt{2310}}{924}$ | 0 | 0 | $\frac{\sqrt{385}}{616}$ | 0 |
| | 0 | $\frac{3\sqrt{231}i}{616}$ | 0 | $\frac{3\sqrt{231}}{616}$ | 0 | 0 | $-\frac{\sqrt{154}}{154}$ | 0 | 0 | $-\frac{5\sqrt{385}i}{616}$ | 0 | $\frac{5\sqrt{385}}{616}$ | 0 | 0 |
| | $-\frac{3\sqrt{231}i}{616}$ | 0 | $\frac{3\sqrt{231}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{154}$ | $\frac{5\sqrt{385}i}{616}$ | 0 | $\frac{5\sqrt{385}}{616}$ | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{231}}{924}$ | 0 | $-\frac{\sqrt{231}i}{924}$ | $-\frac{\sqrt{154}}{154}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | $-\frac{\sqrt{385}i}{308}$ | 0 | 0 |
| | $\frac{\sqrt{231}}{924}$ | 0 | $\frac{\sqrt{231}i}{924}$ | 0 | 0 | $\frac{\sqrt{154}}{154}$ | 0 | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | $\frac{\sqrt{385}i}{308}$ | 0 | 0 | 0 |
| | 0 | 0 | $-\frac{\sqrt{2310}}{924}$ | 0 | 0 | $-\frac{5\sqrt{385}i}{616}$ | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}i}{264}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{2310}}{924}$ | $\frac{5\sqrt{385}i}{616}$ | 0 | $-\frac{\sqrt{385}}{308}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}i}{264}$ | 0 |
| | $-\frac{\sqrt{2310}}{924}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{385}}{616}$ | 0 | $-\frac{\sqrt{385}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{264}$ |
| | 0 | $\frac{\sqrt{2310}}{924}$ | 0 | 0 | $\frac{5\sqrt{385}}{616}$ | 0 | $\frac{\sqrt{385}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{264}$ | 0 |
| | 0 | $-\frac{\sqrt{385}i}{616}$ | 0 | $\frac{\sqrt{385}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}i}{264}$ | 0 | $\frac{5\sqrt{231}}{264}$ | 0 | 0 |
| | $\frac{\sqrt{385}i}{616}$ | 0 | $\frac{\sqrt{385}}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{231}i}{264}$ | 0 | $\frac{5\sqrt{231}}{264}$ | 0 | 0 | 0 |
| 936 | symmetry | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|----------------------------|--------------------------------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|
| $\mathbb{T}_6^{(1,0;a)}(A, 3)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | $\frac{\sqrt{462}i}{168}$ | $\frac{\sqrt{1155}}{231}$ | 0 | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | $-\frac{\sqrt{462}i}{168}$ | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{\sqrt{770}i}{308}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{231}$ | $\frac{\sqrt{770}i}{308}$ | 0 |
| | | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | $\frac{\sqrt{462}i}{168}$ | $\frac{2\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{770}}{616}$ | 0 | $-\frac{3\sqrt{770}i}{616}$ | 0 | 0 |
| | | $-\frac{\sqrt{462}}{168}$ | 0 | $-\frac{\sqrt{462}i}{168}$ | 0 | 0 | $-\frac{2\sqrt{77}}{77}$ | 0 | 0 | $-\frac{3\sqrt{770}}{616}$ | 0 | $\frac{3\sqrt{770}i}{616}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | $-\frac{2\sqrt{77}}{77}$ | 0 | 0 | $-\frac{3\sqrt{770}i}{616}$ | 0 | $\frac{3\sqrt{770}}{616}$ | 0 | 0 |
| | | $-\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{77}}{77}$ | $\frac{3\sqrt{770}i}{616}$ | 0 | $\frac{3\sqrt{770}}{616}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{1155}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{770}}{616}$ | 0 | $-\frac{3\sqrt{770}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{3\sqrt{770}}{616}$ | 0 | $\frac{3\sqrt{770}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{3\sqrt{770}i}{616}$ | 0 | $\frac{3\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{1155}}{231}$ | $\frac{3\sqrt{770}i}{616}$ | 0 | $\frac{3\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{770}}{308}$ | 0 | $-\frac{\sqrt{770}i}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{770}}{308}$ | 0 | $\frac{\sqrt{770}i}{308}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 937 | symmetry | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-------------------------------------|-----------|-----------------------------------------------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|---------------------------|--------------------------|-------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| $\mathbb{T}_6^{(1,0;\alpha)}(B, 1)$ | | 0 | 0 | $-\frac{\sqrt{210}}{56}$ | 0 | 0 | $-\frac{\sqrt{35i}}{168}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21i}}{56}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{210}}{56}$ | $\frac{\sqrt{35i}}{168}$ | 0 | $\frac{\sqrt{35}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{168}$ | $\frac{\sqrt{21i}}{56}$ | 0 |
| | | $-\frac{\sqrt{210}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}}{168}$ | 0 | $\frac{\sqrt{35i}}{84}$ | $-\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{56}$ |
| | | 0 | $\frac{\sqrt{210}}{56}$ | 0 | 0 | $\frac{\sqrt{35}}{168}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | 0 | $\frac{\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{35i}}{168}$ | 0 | $\frac{\sqrt{35}}{168}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21i}}{24}$ | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | 0 |
| | | $\frac{\sqrt{35i}}{168}$ | 0 | $\frac{\sqrt{35}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21i}}{24}$ | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{35}}{84}$ | 0 | $\frac{\sqrt{35i}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{21i}}{84}$ | $\frac{\sqrt{14}}{42}$ | 0 |
| | | $\frac{\sqrt{35}}{84}$ | 0 | $-\frac{\sqrt{35i}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $-\frac{\sqrt{21i}}{84}$ | 0 | 0 | $-\frac{\sqrt{14}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21i}}{24}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | 0 | $\frac{\sqrt{210}}{168}$ | 0 | 0 | $\frac{5\sqrt{35i}}{168}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{14}}{168}$ | $\frac{\sqrt{21i}}{24}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | $-\frac{5\sqrt{35i}}{168}$ | 0 |
| | | $\frac{\sqrt{14}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | $\frac{\sqrt{21i}}{84}$ | $\frac{\sqrt{210}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ |
| | | 0 | $-\frac{\sqrt{14}}{168}$ | 0 | 0 | $-\frac{\sqrt{21}}{24}$ | 0 | $-\frac{\sqrt{21i}}{84}$ | 0 | 0 | $-\frac{\sqrt{210}}{168}$ | 0 | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 |
| | | 0 | $-\frac{\sqrt{21i}}{56}$ | 0 | $-\frac{\sqrt{21}}{56}$ | 0 | 0 | $\frac{\sqrt{14}}{42}$ | 0 | 0 | $\frac{5\sqrt{35i}}{168}$ | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{21i}}{56}$ | 0 | $-\frac{\sqrt{21}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{42}$ | $-\frac{5\sqrt{35i}}{168}$ | 0 | $-\frac{5\sqrt{35}}{168}$ | 0 | 0 | 0 |
| 938 | symmetry | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|-----------|-----------------------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| $\mathbb{T}_6^{(1,0;a)}(B, 2)$ | | 0 | 0 | $-\frac{\sqrt{462}}{56}$ | 0 | 0 | $-\frac{19\sqrt{77}i}{1848}$ | 0 | $\frac{\sqrt{77}}{132}$ | 0 | 0 | $-\frac{\sqrt{770}}{1848}$ | 0 | 0 | $\frac{\sqrt{1155}i}{616}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{462}}{56}$ | $\frac{19\sqrt{77}i}{1848}$ | 0 | $\frac{\sqrt{77}}{132}$ | 0 | 0 | 0 | $\frac{\sqrt{770}}{1848}$ | $-\frac{\sqrt{1155}i}{616}$ | 0 | 0 |
| | | $-\frac{\sqrt{462}}{56}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{77}i}{1848}$ | 0 | $\frac{\sqrt{77}i}{132}$ | $\frac{\sqrt{770}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{616}$ |
| | | 0 | $\frac{\sqrt{462}}{56}$ | 0 | 0 | $\frac{19\sqrt{77}i}{1848}$ | 0 | $-\frac{\sqrt{77}i}{132}$ | 0 | 0 | $-\frac{\sqrt{770}}{1848}$ | 0 | 0 | $\frac{\sqrt{1155}}{616}$ | 0 |
| | | 0 | $-\frac{19\sqrt{77}i}{1848}$ | 0 | $\frac{19\sqrt{77}i}{1848}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{264}$ | 0 | 0 |
| | | $\frac{19\sqrt{77}i}{1848}$ | 0 | $\frac{19\sqrt{77}i}{1848}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{264}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{132}$ | 0 | $\frac{\sqrt{77}i}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | $-\frac{\sqrt{770}}{462}$ | 0 |
| | | $\frac{\sqrt{77}}{132}$ | 0 | $-\frac{\sqrt{77}i}{132}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 | $\frac{\sqrt{770}}{462}$ |
| | | 0 | 0 | $\frac{\sqrt{770}}{1848}$ | 0 | 0 | $\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 | $-\frac{5\sqrt{462}}{1848}$ | 0 | 0 | $-\frac{25\sqrt{77}i}{1848}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{770}}{1848}$ | $-\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{1848}$ | $\frac{25\sqrt{77}i}{1848}$ | 0 |
| | | $-\frac{\sqrt{770}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{264}$ | 0 | $-\frac{\sqrt{1155}i}{924}$ | $-\frac{5\sqrt{462}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{25\sqrt{77}}{1848}$ |
| | | 0 | $\frac{\sqrt{770}}{1848}$ | 0 | 0 | $\frac{\sqrt{1155}}{264}$ | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | 0 | $\frac{5\sqrt{462}}{1848}$ | 0 | 0 | $\frac{25\sqrt{77}}{1848}$ | 0 |
| | | 0 | $\frac{\sqrt{1155}i}{616}$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | $-\frac{\sqrt{770}}{462}$ | 0 | 0 | $-\frac{25\sqrt{77}i}{1848}$ | 0 | $\frac{25\sqrt{77}}{1848}$ | 0 | 0 |
| | | $-\frac{\sqrt{1155}i}{616}$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{462}$ | $\frac{25\sqrt{77}i}{1848}$ | 0 | $\frac{25\sqrt{77}}{1848}$ | 0 | 0 | 0 |
| 939 | symmetry | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------------------|--------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|---|---|---|---|---|---|
| | $\mathbb{T}_6^{(1,0;a)}(B, 3)$ | $\frac{\sqrt{42}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{42}}{14}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{42}}{14}$ | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 940 | symmetry | $\frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|--------------------------------|----------------------------|--------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
| $\mathbb{T}_6^{(1,0;a)}(B, 4)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | $\frac{\sqrt{385}i}{924}$ | $-\frac{\sqrt{154}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{154}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | $-\frac{\sqrt{385}i}{924}$ | 0 | 0 | $\frac{\sqrt{154}}{462}$ | 0 | 0 | $-\frac{\sqrt{231}}{154}$ | 0 | |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}i}{924}$ | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | 0 | $-\frac{\sqrt{154}}{462}$ | 0 | 0 | $\frac{\sqrt{231}i}{154}$ | |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}i}{924}$ | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}}{462}$ | $-\frac{\sqrt{231}i}{154}$ | 0 | |
| | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | $-\frac{\sqrt{385}i}{924}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $\frac{\sqrt{231}i}{231}$ | $\frac{2\sqrt{154}}{231}$ | 0 | |
| | $-\frac{\sqrt{385}}{924}$ | 0 | $\frac{\sqrt{385}i}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $-\frac{\sqrt{231}i}{231}$ | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ |
| | 0 | $\frac{\sqrt{385}i}{924}$ | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{231}i}{66}$ | 0 | $\frac{\sqrt{231}}{66}$ | 0 | 0 |
| | $-\frac{\sqrt{385}i}{924}$ | 0 | $-\frac{\sqrt{385}}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}i}{66}$ | 0 | $\frac{\sqrt{231}}{66}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{154}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $\frac{\sqrt{231}i}{66}$ | $\frac{\sqrt{2310}}{462}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{385}}{462}$ |
| | 0 | $\frac{\sqrt{154}}{462}$ | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $-\frac{\sqrt{231}i}{66}$ | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 | 0 | 0 | $-\frac{5\sqrt{385}}{462}$ | 0 |
| | 0 | 0 | $-\frac{\sqrt{154}}{462}$ | 0 | 0 | $\frac{\sqrt{231}i}{231}$ | 0 | $\frac{\sqrt{231}}{66}$ | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 | 0 | $-\frac{5\sqrt{385}i}{462}$ | 0 |
| | 0 | 0 | 0 | $\frac{\sqrt{154}}{462}$ | $-\frac{\sqrt{231}i}{231}$ | 0 | $\frac{\sqrt{231}}{66}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{462}$ | $\frac{5\sqrt{385}i}{462}$ | 0 | 0 |
| | 0 | $-\frac{\sqrt{231}}{154}$ | 0 | $\frac{\sqrt{231}i}{154}$ | $\frac{2\sqrt{154}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{385}}{462}$ | 0 | $-\frac{5\sqrt{385}i}{462}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{231}}{154}$ | 0 | $-\frac{\sqrt{231}i}{154}$ | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | 0 | $-\frac{5\sqrt{385}}{462}$ | 0 | $\frac{5\sqrt{385}i}{462}$ | 0 | 0 | 0 | 0 |
| 941 | symmetry | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------------------------|-----------|----------------------------|--------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| $\mathbb{T}_{6,1}^{(1,0;\alpha)}(E, 1)$ | | 0 | $\frac{5\sqrt{77}i}{616}$ | 0 | $\frac{\sqrt{77}}{112}$ | 0 | 0 | $-\frac{\sqrt{462}}{132}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{264}$ | 0 | $-\frac{\sqrt{1155}}{528}$ | 0 | 0 |
| | | $-\frac{5\sqrt{77}i}{616}$ | 0 | $\frac{\sqrt{77}}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{132}$ | $\frac{\sqrt{1155}i}{264}$ | 0 | $-\frac{\sqrt{1155}}{528}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{77}}{112}$ | 0 | $-\frac{3\sqrt{77}i}{308}$ | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{1232}$ | 0 | $\frac{\sqrt{1155}i}{308}$ | $\frac{3\sqrt{770}}{1232}$ | 0 |
| | | $\frac{\sqrt{77}}{112}$ | 0 | $\frac{3\sqrt{77}i}{308}$ | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{1232}$ | 0 | $-\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $-\frac{3\sqrt{770}}{1232}$ |
| | | 0 | 0 | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{5\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}i}{924}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | $\frac{5\sqrt{77}i}{308}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{\sqrt{1155}i}{924}$ | 0 |
| | | $-\frac{\sqrt{462}}{132}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | $\frac{2\sqrt{77}i}{77}$ | $\frac{\sqrt{770}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1155}}{924}$ |
| | | 0 | $\frac{\sqrt{462}}{132}$ | 0 | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | $-\frac{2\sqrt{77}i}{77}$ | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | 0 | 0 | $-\frac{5\sqrt{1155}}{924}$ | 0 |
| | | 0 | $-\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{1232}$ | 0 | 0 | $\frac{\sqrt{770}}{308}$ | 0 | 0 | $-\frac{5\sqrt{77}i}{616}$ | 0 | $-\frac{25\sqrt{77}}{1232}$ | 0 | 0 |
| | | $\frac{\sqrt{1155}i}{264}$ | 0 | $\frac{\sqrt{1155}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | $\frac{5\sqrt{77}i}{616}$ | 0 | $-\frac{25\sqrt{77}}{1232}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{1155}}{528}$ | 0 | $\frac{\sqrt{1155}i}{308}$ | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{77}}{1232}$ | 0 | $-\frac{5\sqrt{77}i}{308}$ | $\frac{5\sqrt{462}}{3696}$ | 0 |
| | | $-\frac{\sqrt{1155}}{528}$ | 0 | $-\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $-\frac{25\sqrt{77}}{1232}$ | 0 | $\frac{5\sqrt{77}i}{308}$ | 0 | 0 | $-\frac{5\sqrt{462}}{3696}$ |
| | | 0 | 0 | $\frac{3\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{5\sqrt{1155}}{924}$ | 0 | 0 | $\frac{5\sqrt{462}}{3696}$ | 0 | 0 | $\frac{5\sqrt{77}i}{308}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{770}}{1232}$ | $-\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{5\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{3696}$ | $-\frac{5\sqrt{77}i}{308}$ | 0 |
| | 942 | symmetry | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|------------------------------|-----------------------------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|--|
| $\mathbb{T}_{6,2}^{(1,0;a)}(E, 1)$ | 0 | $\frac{3\sqrt{77}}{308}$ | 0 | $-\frac{\sqrt{77}i}{112}$ | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $\frac{\sqrt{1155}i}{1232}$ | $-\frac{3\sqrt{770}}{1232}$ | 0 | |
| | $\frac{3\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{112}$ | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $-\frac{\sqrt{1155}i}{1232}$ | 0 | 0 | $\frac{3\sqrt{770}}{1232}$ | |
| | 0 | $-\frac{\sqrt{77}i}{112}$ | 0 | $-\frac{5\sqrt{77}}{616}$ | 0 | 0 | $\frac{\sqrt{462}}{132}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{528}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | |
| | $\frac{\sqrt{77}i}{112}$ | 0 | $-\frac{5\sqrt{77}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{132}$ | $\frac{\sqrt{1155}i}{528}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | 0 | |
| | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | $-\frac{\sqrt{77}i}{308}$ | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | |
| | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | |
| | 0 | 0 | $\frac{\sqrt{462}}{132}$ | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{2\sqrt{77}}{77}$ | 0 | 0 | $\frac{\sqrt{770}}{308}$ | 0 | 0 | $\frac{5\sqrt{1155}i}{924}$ | |
| | 0 | 0 | 0 | $-\frac{\sqrt{462}}{132}$ | $\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{2\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | $-\frac{5\sqrt{1155}i}{924}$ | 0 | |
| | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $-\frac{\sqrt{1155}i}{528}$ | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | $\frac{25\sqrt{77}i}{1232}$ | $\frac{5\sqrt{462}}{3696}$ | 0 | |
| | $\frac{\sqrt{1155}}{308}$ | 0 | $\frac{\sqrt{1155}i}{528}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | $-\frac{25\sqrt{77}i}{1232}$ | 0 | 0 | $-\frac{5\sqrt{462}}{3696}$ | |
| | 0 | $\frac{\sqrt{1155}i}{1232}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | $\frac{\sqrt{770}}{308}$ | 0 | 0 | $\frac{25\sqrt{77}i}{1232}$ | 0 | $\frac{5\sqrt{77}}{616}$ | 0 | 0 | |
| | $-\frac{\sqrt{1155}i}{1232}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{308}$ | $-\frac{25\sqrt{77}i}{1232}$ | 0 | $\frac{5\sqrt{77}}{616}$ | 0 | 0 | 0 | |
| | $-\frac{3\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $\frac{5\sqrt{1155}i}{924}$ | $\frac{5\sqrt{462}}{3696}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{77}}{308}$ | |
| | 0 | $\frac{3\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{5\sqrt{1155}i}{924}$ | 0 | 0 | $-\frac{5\sqrt{462}}{3696}$ | 0 | 0 | $-\frac{5\sqrt{77}}{308}$ | 0 | |
| 943 | symmetry | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------------------------|-----------|----------------------------|-----------------------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| $\mathbb{T}_{6,1}^{(1,0;\alpha)}(E, 2)$ | | 0 | 0 | 0 | $\frac{\sqrt{42}i}{448}$ | $\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}i}{448}$ | $\frac{\sqrt{105}}{224}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{42}i}{448}$ | 0 | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}i}{448}$ | 0 | 0 | $-\frac{\sqrt{105}}{224}$ |
| | | 0 | $\frac{\sqrt{42}i}{448}$ | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | $\frac{\sqrt{70}i}{448}$ | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{448}$ | 0 | $\frac{\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{112}$ | $-\frac{\sqrt{70}i}{448}$ | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $\frac{\sqrt{42}i}{112}$ | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ |
| | | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | $-\frac{3\sqrt{42}}{112}$ | 0 | $-\frac{\sqrt{42}i}{112}$ | 0 | 0 | $-\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | $\frac{\sqrt{42}i}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | 0 | $\frac{\sqrt{70}i}{112}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}}{112}$ | $-\frac{\sqrt{42}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{112}$ | $-\frac{\sqrt{70}i}{112}$ | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}i}{448}$ | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}i}{448}$ | $\frac{5\sqrt{7}}{224}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}i}{448}$ | 0 | 0 | $-\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}i}{448}$ | 0 | 0 | $-\frac{5\sqrt{7}}{224}$ |
| | | 0 | $\frac{3\sqrt{70}i}{448}$ | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | 0 | $\frac{5\sqrt{42}i}{448}$ | 0 | $\frac{15\sqrt{42}}{224}$ | 0 | 0 |
| | | $-\frac{3\sqrt{70}i}{448}$ | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{112}$ | $-\frac{5\sqrt{42}i}{448}$ | 0 | $\frac{15\sqrt{42}}{224}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{70}i}{112}$ | $\frac{5\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{112}$ |
| | | 0 | $-\frac{\sqrt{105}}{224}$ | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | 0 | $-\frac{\sqrt{70}i}{112}$ | 0 | 0 | $-\frac{5\sqrt{7}}{224}$ | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{112}$ |
| | 944 | symmetry | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------------------|------------------------------------------------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|
| 945 | $\mathbb{T}_{6,2}^{(1,0;a)}(E, 2)$ | 0 | $\frac{\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{42}}{448}$ | 0 | 0 | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | $-\frac{3\sqrt{70}i}{224}$ | 0 | $-\frac{\sqrt{70}}{448}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{224}$ | 0 | $\frac{\sqrt{42}}{448}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{112}$ | $\frac{3\sqrt{70}i}{224}$ | 0 | $-\frac{\sqrt{70}}{448}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{448}$ | 0 | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{448}$ | 0 | 0 | $\frac{\sqrt{105}}{224}$ | 0 |
| | | $\frac{\sqrt{42}}{448}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}}{224}$ | 0 | 0 | $-\frac{3\sqrt{70}}{448}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{224}$ |
| | | 0 | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | $-\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | $\frac{3\sqrt{70}i}{112}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{7}}{224}$ | $\frac{3\sqrt{42}i}{112}$ | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{224}$ | $-\frac{3\sqrt{70}i}{112}$ | 0 |
| | | $-\frac{\sqrt{7}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | $\frac{\sqrt{105}}{112}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{112}$ |
| | | 0 | $\frac{\sqrt{7}}{112}$ | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | 0 | $\frac{\sqrt{70}}{112}$ | 0 |
| | | 0 | $-\frac{3\sqrt{70}i}{224}$ | 0 | $-\frac{3\sqrt{70}}{448}$ | 0 | 0 | $\frac{\sqrt{105}}{112}$ | 0 | 0 | $\frac{15\sqrt{42}i}{224}$ | 0 | $\frac{5\sqrt{42}}{448}$ | 0 | 0 |
| | | $\frac{3\sqrt{70}i}{224}$ | 0 | $-\frac{3\sqrt{70}}{448}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | $-\frac{15\sqrt{42}i}{224}$ | 0 | $\frac{5\sqrt{42}}{448}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{448}$ | 0 | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{448}$ | 0 | 0 | $-\frac{5\sqrt{7}}{224}$ | 0 |
| | | $-\frac{\sqrt{70}}{448}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{224}$ | 0 | 0 | $\frac{5\sqrt{42}}{448}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{224}$ |
| | | 0 | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | $\frac{3\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | $-\frac{5\sqrt{7}}{224}$ | 0 | 0 | $-\frac{5\sqrt{42}i}{112}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}}{224}$ | $-\frac{3\sqrt{70}i}{112}$ | 0 | $\frac{\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{224}$ | $\frac{5\sqrt{42}i}{112}$ | 0 |
| | | $\frac{\sqrt{210}yz(16x^4 - 16x^2y^2 - 16x^2z^2 + y^4 + 2y^2z^2 + z^4)}{16}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | |
|------------------------------------|-----------|------------------------------------------------------------------------------|---------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------------------|-------------------------------|------------------------------|------------------------------|---|
| $\mathbb{T}_{6,1}^{(1,0;a)}(E, 3)$ | | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 | $\frac{\sqrt{2310}i}{448}$ | $\frac{83\sqrt{385}}{7392}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{462}$ | 0 | $-\frac{113\sqrt{154}i}{14784}$ | $-\frac{9\sqrt{231}}{2464}$ | 0 | | |
| | | $-\frac{\sqrt{2310}i}{462}$ | 0 | $-\frac{\sqrt{2310}i}{448}$ | 0 | 0 | $-\frac{83\sqrt{385}}{7392}$ | 0 | 0 | $-\frac{\sqrt{154}}{462}$ | 0 | $\frac{113\sqrt{154}i}{14784}$ | 0 | 0 | $\frac{9\sqrt{231}}{2464}$ | | |
| | | 0 | $\frac{\sqrt{2310}i}{448}$ | 0 | $\frac{17\sqrt{2310}}{7392}$ | 0 | 0 | $-\frac{41\sqrt{385}}{3696}$ | 0 | 0 | $-\frac{17\sqrt{154}i}{1344}$ | 0 | $-\frac{\sqrt{154}}{7392}$ | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{2310}i}{448}$ | 0 | $\frac{17\sqrt{2310}}{7392}$ | 0 | 0 | 0 | 0 | $\frac{41\sqrt{385}}{3696}$ | $\frac{17\sqrt{154}i}{1344}$ | 0 | $-\frac{\sqrt{154}}{7392}$ | 0 | 0 | 0 | 0 | |
| | | $\frac{83\sqrt{385}}{7392}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{1232}$ | 0 | $-\frac{5\sqrt{2310}i}{1232}$ | $-\frac{43\sqrt{231}}{7392}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{154}}{3696}$ | $\frac{17\sqrt{154}i}{3696}$ | |
| | | 0 | $-\frac{83\sqrt{385}}{7392}$ | 0 | 0 | $-\frac{\sqrt{2310}}{1232}$ | 0 | $\frac{5\sqrt{2310}i}{1232}$ | 0 | 0 | $\frac{43\sqrt{231}}{7392}$ | 0 | 0 | 0 | $\frac{17\sqrt{154}}{3696}$ | $\frac{17\sqrt{154}i}{3696}$ | |
| | | 0 | 0 | $-\frac{41\sqrt{385}}{3696}$ | 0 | 0 | $-\frac{5\sqrt{2310}i}{1232}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{231}}{3696}$ | 0 | 0 | 0 | $\frac{37\sqrt{154}i}{3696}$ | |
| | | 0 | 0 | 0 | $\frac{41\sqrt{385}}{3696}$ | $\frac{5\sqrt{2310}i}{1232}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{231}}{3696}$ | $-\frac{37\sqrt{154}i}{3696}$ | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{154}}{462}$ | 0 | $-\frac{17\sqrt{154}i}{1344}$ | $-\frac{43\sqrt{231}}{7392}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | $\frac{37\sqrt{2310}i}{14784}$ | $\frac{5\sqrt{385}}{7392}$ | 0 | 0 | |
| | | $-\frac{\sqrt{154}}{462}$ | 0 | $\frac{17\sqrt{154}i}{1344}$ | 0 | 0 | $\frac{43\sqrt{231}}{7392}$ | 0 | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | $-\frac{37\sqrt{2310}i}{14784}$ | 0 | 0 | 0 | $-\frac{5\sqrt{385}}{7392}$ | |
| | | 0 | $-\frac{113\sqrt{154}i}{14784}$ | 0 | $-\frac{\sqrt{154}}{7392}$ | 0 | 0 | 0 | $\frac{19\sqrt{231}}{3696}$ | 0 | 0 | $\frac{37\sqrt{2310}i}{14784}$ | 0 | $-\frac{\sqrt{2310}}{7392}$ | 0 | 0 | 0 |
| | | $\frac{113\sqrt{154}i}{14784}$ | 0 | $-\frac{\sqrt{154}}{7392}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{231}}{3696}$ | $-\frac{37\sqrt{2310}i}{14784}$ | 0 | $-\frac{\sqrt{2310}}{7392}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{231}}{2464}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{154}}{3696}$ | 0 | $\frac{37\sqrt{154}i}{3696}$ | $\frac{5\sqrt{385}}{7392}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{2310}}{3696}$ | |
| | | 0 | $\frac{9\sqrt{231}}{2464}$ | 0 | 0 | $\frac{17\sqrt{154}}{3696}$ | 0 | $-\frac{37\sqrt{154}i}{3696}$ | 0 | 0 | $-\frac{5\sqrt{385}}{7392}$ | 0 | 0 | 0 | $-\frac{5\sqrt{2310}}{3696}$ | 0 | |
| 946 | symmetry | $\frac{\sqrt{210}xz(x^4 - 16x^2y^2 + 2x^2z^2 + 16y^4 - 16y^2z^2 + z^4)}{16}$ | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------------------|-----------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|
| $\mathbb{T}_{6,2}^{(1,0;a)}(E, 3)$ | | 0 | $\frac{17\sqrt{2310}i}{7392}$ | 0 | $\frac{\sqrt{2310}}{448}$ | 0 | 0 | $-\frac{41\sqrt{385}}{3696}$ | 0 | 0 | $\frac{\sqrt{154}i}{7392}$ | 0 | $\frac{17\sqrt{154}}{1344}$ | 0 | 0 |
| | | $-\frac{17\sqrt{2310}i}{7392}$ | 0 | $\frac{\sqrt{2310}}{448}$ | 0 | 0 | 0 | 0 | $\frac{41\sqrt{385}}{3696}$ | $-\frac{\sqrt{154}i}{7392}$ | 0 | $\frac{17\sqrt{154}}{1344}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2310}}{448}$ | 0 | $-\frac{\sqrt{2310}i}{462}$ | $-\frac{83\sqrt{385}}{7392}$ | 0 | 0 | 0 | 0 | $\frac{113\sqrt{154}}{14784}$ | 0 | $\frac{\sqrt{154}i}{462}$ | $-\frac{9\sqrt{231}}{2464}$ | 0 |
| | | $\frac{\sqrt{2310}}{448}$ | 0 | $\frac{\sqrt{2310}i}{462}$ | 0 | 0 | $\frac{83\sqrt{385}}{7392}$ | 0 | 0 | $\frac{113\sqrt{154}}{14784}$ | 0 | $-\frac{\sqrt{154}i}{462}$ | 0 | 0 | $\frac{9\sqrt{231}}{2464}$ |
| | | 0 | 0 | $-\frac{83\sqrt{385}}{7392}$ | 0 | 0 | $-\frac{\sqrt{2310}i}{1232}$ | 0 | $\frac{5\sqrt{2310}}{1232}$ | 0 | 0 | $-\frac{43\sqrt{231}}{7392}$ | 0 | 0 | $-\frac{17\sqrt{154}i}{3696}$ |
| | | 0 | 0 | 0 | $\frac{83\sqrt{385}}{7392}$ | $\frac{\sqrt{2310}i}{1232}$ | 0 | $\frac{5\sqrt{2310}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{43\sqrt{231}}{7392}$ | $\frac{17\sqrt{154}i}{3696}$ | 0 |
| | | $-\frac{41\sqrt{385}}{3696}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{2310}}{1232}$ | 0 | 0 | $-\frac{19\sqrt{231}}{3696}$ | 0 | 0 | 0 | 0 | $\frac{37\sqrt{154}}{3696}$ |
| | | 0 | $\frac{41\sqrt{385}}{3696}$ | 0 | 0 | $\frac{5\sqrt{2310}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{231}}{3696}$ | 0 | 0 | $\frac{37\sqrt{154}}{3696}$ | 0 |
| | | 0 | $\frac{\sqrt{154}i}{7392}$ | 0 | $\frac{113\sqrt{154}}{14784}$ | 0 | 0 | $-\frac{19\sqrt{231}}{3696}$ | 0 | 0 | $-\frac{\sqrt{2310}i}{7392}$ | 0 | $\frac{37\sqrt{2310}}{14784}$ | 0 | 0 |
| | | $-\frac{\sqrt{154}i}{7392}$ | 0 | $\frac{113\sqrt{154}}{14784}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{231}}{3696}$ | $\frac{\sqrt{2310}i}{7392}$ | 0 | $\frac{37\sqrt{2310}}{14784}$ | 0 | 0 | 0 |
| | | 0 | $\frac{17\sqrt{154}}{1344}$ | 0 | $\frac{\sqrt{154}i}{462}$ | $-\frac{43\sqrt{231}}{7392}$ | 0 | 0 | 0 | 0 | $\frac{37\sqrt{2310}}{14784}$ | 0 | $\frac{\sqrt{2310}i}{462}$ | $-\frac{5\sqrt{385}}{7392}$ | 0 |
| | | $\frac{17\sqrt{154}}{1344}$ | 0 | $-\frac{\sqrt{154}i}{462}$ | 0 | 0 | $\frac{43\sqrt{231}}{7392}$ | 0 | 0 | $\frac{37\sqrt{2310}}{14784}$ | 0 | $-\frac{\sqrt{2310}i}{462}$ | 0 | 0 | $\frac{5\sqrt{385}}{7392}$ |
| | | 0 | 0 | $-\frac{9\sqrt{231}}{2464}$ | 0 | 0 | $-\frac{17\sqrt{154}i}{3696}$ | 0 | $\frac{37\sqrt{154}}{3696}$ | 0 | 0 | $-\frac{5\sqrt{385}}{7392}$ | 0 | 0 | $-\frac{5\sqrt{2310}i}{3696}$ |
| | | 0 | 0 | 0 | $\frac{9\sqrt{231}}{2464}$ | $\frac{17\sqrt{154}i}{3696}$ | 0 | $\frac{37\sqrt{154}}{3696}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{385}}{7392}$ | $\frac{5\sqrt{2310}i}{3696}$ | 0 |
| 947 | symmetry | z | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|----------------|-----------|--------------------------|--------------------------|---------------------------|---------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---|---|
| $M_1^{(a)}(A)$ | | 0 | 0 | $-\frac{3\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{3\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 948 | symmetry | y | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 |
| | $M_{1,1}^{(a)}(E)$ | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 | 0 |
| 949 | symmetry | x | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|--------------------|--------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 |
| | $M_{1,2}^{(a)}(E)$ | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{21}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{35}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}i}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{14}$ | 0 | 0 | 0 |
| 950 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|---|---|---|
| | $M_3^{(a)}(A)$ | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 951 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|---|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | $M_3^{(a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{3}i}{6}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 952 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-------------------------------|--------------------------|------------------------|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--|
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | |
| | $M_{3,1}^{(a)}(E, 1)$ | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | |
| 954 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|----------------------------------|------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ |
| | | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 |
| | $M_{3,2}^{(a)}(E, 1)$ | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}i}{8}$ |
| | | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{30}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2}i}{8}$ | 0 | 0 |
| 955 | symmetry | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-----------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-----------------------|-----------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ |
| | | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 |
| | $M_{3,1}^{(a)}(E, 2)$ | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ |
| | | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 |
| 956 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|-------------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|-----------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{30i}}{24}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2i}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30i}}{24}$ | 0 | 0 | 0 | 0 |
| 957 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix |
|-----|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_5^{(a)}(A, 1)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 958 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|---------------------------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---|---|
| | | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{21}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{21}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{21}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{21}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42i}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42i}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42i}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 959 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix |
|-----|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_5^{(a)}(A, 3)$ | $ \begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} $ |
| 960 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|--------------------------------------------------|-------------------------|-------------------------|-------------------------|-----------------------|-----------------------|---|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | $M_5^{(a)}(B, 1)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{6}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{6}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 961 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-------------------|----------------------------------------------------------------------|------------------------|-------------------------|-------------------------|---|---|-----------------------|-----------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|
| | $M_5^{(a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{6}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{6}$ |
| | | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| 962 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | |
|-----|-----------|----------------------------------------------------------------------|----------------------------|----------------------------|------------------------|------------------------|---------------------------|---------------------------|--------------------------|--------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|
| 963 | symmetry | $M_{5,1}^{(a)}(E, 1)$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{48}$ | 0 | |
| | | | 0 | 0 | 0 | 0 | 0 | $\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{48}$ |
| | | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | $-\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | $-\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 |
| | | | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 |
| | | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{112}$ | 0 | 0 |
| | | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{112}$ | 0 |
| | | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | $-\frac{\sqrt{105}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | $-\frac{\sqrt{105}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{x(8x^4 - 40x^2y^2 - 40x^2z^2 + 15y^4 + 30y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----------------------|-----------|---------------------------------------------------|------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|--------------------------|----------------------------|----------------------------|---------------------------|
| $M_{5,2}^{(a)}(E, 1)$ | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{48}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{48}$ |
| | | 0 | 0 | $\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{336}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{13\sqrt{7}i}{112}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{336}$ | 0 |
| | | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{42}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{336}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ |
| | | 0 | 0 | $-\frac{\sqrt{105}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{112}$ | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{48}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{112}$ | 0 |
| 964 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix |
|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | $M_{5,1}^{(a)}(E, 2)$ | $ \begin{array}{cccccccccccc} 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{3}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{3}i}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{3}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 \end{array} $ |
| 965 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|-------------------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|-------------------------|-------------------------|----------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ |
| | | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 |
| | $M_{5,1}^{(a)}(E, 3)$ | $-\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ |
| | | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 |
| 967 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|---------------|---------------|--------------------------|--------------------------|
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{15}i}{12}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{i}{4}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15}i}{24}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{4}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{i}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{15}i}{24}$ | 0 | 0 | 0 | 0 |
| 968 | symmetry | z | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $M_1^{(1,-1;a)}(A)$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14}}{14}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14}}{14}$ |
| 969 | symmetry | y | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---|--------------------------|---|--------------------------|-------------------------|--------------------------|
| | $M_{1,1}^{(1,-1;a)}(E)$ | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{14i}}{14}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{14i}}{14}$ | 0 |
| 970 | symmetry | x | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---|
| | | $-\frac{\sqrt{70}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}}{28}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}}{28}$ | 0 | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{28}$ | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | 0 | |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | 0 | 0 | |
| | $M_3^{(1,-1;a)}(A)$ | 0 | $-\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | |
| | | $\frac{\sqrt{105i}}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7i}}{28}$ | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{3\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{3\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{105i}}{210}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7i}}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{140}$ | $-\frac{\sqrt{105i}}{210}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | $\frac{\sqrt{105i}}{210}$ | $\frac{\sqrt{70}}{35}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | $-\frac{\sqrt{105i}}{210}$ | 0 | 0 | $-\frac{\sqrt{70}}{35}$ | |
| 972 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|----------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|-------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 |
| | | $\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 |
| | $M_3^{(1,-1;a)}(B, 1)$ | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{70}}{42}$ | 0 |
| | | $-\frac{5\sqrt{7}}{84}$ | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{42}$ |
| | | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | $\frac{\sqrt{7}i}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{42}$ |
| | | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{42}$ | 0 | 0 | $-\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{42}$ | $\frac{\sqrt{7}i}{42}$ | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 |
| 973 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|------------------------|------------------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|-------------------------|------------------------|
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | $\frac{5\sqrt{7}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | $-\frac{\sqrt{70}}{42}$ | 0 |
| | | $\frac{5\sqrt{7}}{84}$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{42}$ |
| | $M_3^{(1,-1;a)}(B, 2)$ | 0 | $-\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 |
| | | $\frac{5\sqrt{7}i}{84}$ | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $\frac{\sqrt{105}i}{84}$ | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{42}$ |
| | | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | $\frac{\sqrt{7}i}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | $\frac{\sqrt{105}i}{84}$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ | $-\frac{\sqrt{7}i}{42}$ | 0 |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $\frac{\sqrt{7}i}{42}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $-\frac{\sqrt{7}i}{42}$ | 0 | 0 | 0 |
| 974 | symmetry | $-\frac{y(3x^2 - 2y^2 + 3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|-------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|----------------------------|-------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|
| | | 0 | $-\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42}i}{56}$ | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}i}{56}$ | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{70}i}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42}i}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ |
| | | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $\frac{\sqrt{42}}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{9\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 |
| | | $\frac{\sqrt{42}i}{56}$ | 0 | $\frac{\sqrt{42}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $-\frac{9\sqrt{70}i}{280}$ | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{42}}{84}$ | 0 | $-\frac{\sqrt{42}i}{56}$ | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | $-\frac{3\sqrt{70}i}{280}$ | $-\frac{\sqrt{105}}{210}$ | 0 | 0 |
| | | $-\frac{\sqrt{42}}{84}$ | 0 | $\frac{\sqrt{42}i}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ | 0 | $\frac{3\sqrt{70}i}{280}$ | 0 | 0 | $\frac{\sqrt{105}}{210}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | $-\frac{\sqrt{105}}{210}$ | 0 | 0 | $\frac{\sqrt{70}i}{70}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | $\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{210}$ | $-\frac{\sqrt{70}i}{70}$ | 0 |
| 975 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------|----------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42i}}{84}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42i}}{84}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ |
| | | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $\frac{\sqrt{42i}}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{84}$ | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $\frac{\sqrt{70i}}{70}$ | $-\frac{\sqrt{105}}{210}$ | 0 |
| | | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{3\sqrt{70}}{280}$ | 0 | $-\frac{\sqrt{70i}}{70}$ | 0 | $\frac{\sqrt{105}}{210}$ |
| | | 0 | $\frac{\sqrt{42i}}{84}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{70i}}{70}$ | 0 | $-\frac{9\sqrt{70}}{280}$ | 0 |
| | | $-\frac{\sqrt{42i}}{84}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{28}$ | $-\frac{\sqrt{70i}}{70}$ | 0 | $-\frac{9\sqrt{70}}{280}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | $-\frac{\sqrt{42i}}{42}$ | $-\frac{\sqrt{105}}{210}$ | 0 | 0 | 0 | $-\frac{\sqrt{70}}{70}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42i}}{42}$ | 0 | 0 | $\frac{\sqrt{105}}{210}$ | 0 | 0 | $-\frac{\sqrt{70}}{70}$ |
| 976 | symmetry | $\frac{\sqrt{15x(y-z)(y+z)}}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----------------------------|-----------------------------------|--------------------------|---|---|-------------------------|---|---|---|-------------------------|---|--------------------------|---|---|--------------------------|---|---|---|---|------------------------|---|---|-------------------------|---|-------------------------|---|---|---|---|---|---|---|-------------------------|---|---|-------------------------|---|-------------------------|---|---|---|---|---|--------------------------|---|---|---|---|------------------------|--------------------------|---|-------------------------|---|---|---|-------------------------|---|---|---|---|---|---|---|---|--------------------------|---|---|---|---|------------------------|---|---|---|-------------------------|---|---|---|---|---|---|---|---|--------------------------|---|---|-------------------------|---|---|---|------------------------|---|---|---|---|---|---|---|---|-------------------------|--------------------------|---|---|-------------------------|---|-------------------------|--------------------------|---|---|---|---|---------------------------|---|--------------------------|------------------------|---|-------------------------|---|--------------------------|---|---|-------------------------|---|---|---------------------------|---|-------------------------|---|---|-----------------------|---|--------------------------|---|-------------------------|---|---|--------------------------|---|---|--------------------------|---|--------------------------|---|---|---|-------------------------|---|-------------------------|---|---|---|---|---|-------------------------|-------------------------|---|--------------------------|---|---|---|---|---|---|---|---|------------------------|---|-------------------------|------------------------|---|---|---|---|-------------------------|---|---|---|---|------------------------|---|--------------------------|---|---|-----------------------|---|---|-------------------------|---|
| | $M_{3,1}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | $\frac{\sqrt{70}}{168}$ | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{168}$ | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | $-\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}i}{42}$ | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | $-\frac{\sqrt{70}i}{42}$ | 0 | 0 | $\frac{\sqrt{70}}{168}$ | 0 | $\frac{\sqrt{70}i}{84}$ | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{42}i}{42}$ | $-\frac{\sqrt{7}}{42}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{5\sqrt{42}}{168}$ | 0 | $\frac{\sqrt{42}i}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | $-\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | $\frac{\sqrt{70}i}{84}$ | 0 | $\frac{\sqrt{70}}{168}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42}i}{42}$ | 0 | $-\frac{\sqrt{42}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{70}i}{42}$ | $-\frac{\sqrt{7}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70}i}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 |
| 977 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|-------------------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|-------------------------|--------------------------|
| | | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | $-\frac{\sqrt{70i}}{168}$ | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 |
| | | $-\frac{5\sqrt{42i}}{168}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | $\frac{\sqrt{70i}}{168}$ | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{42i}}{168}$ | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70i}}{168}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{5\sqrt{42i}}{168}$ | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{70i}}{168}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{70i}}{84}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{70i}}{84}$ | 0 |
| | $M_{3,2}^{(1,-1;a)}(E, 2)$ | $-\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{42}$ |
| | | 0 | $\frac{5\sqrt{7}}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{42}$ | 0 |
| | | 0 | $-\frac{\sqrt{70i}}{168}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42i}}{168}$ | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 |
| | | $\frac{\sqrt{70i}}{168}$ | 0 | $\frac{\sqrt{70}}{84}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{84}$ | $\frac{\sqrt{42i}}{168}$ | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{70}}{84}$ | 0 | $-\frac{\sqrt{70i}}{168}$ | $-\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $-\frac{5\sqrt{42i}}{168}$ | $\frac{\sqrt{7}}{42}$ | 0 |
| | | $-\frac{\sqrt{70}}{84}$ | 0 | $\frac{\sqrt{70i}}{168}$ | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $-\frac{\sqrt{42}}{42}$ | 0 | $\frac{5\sqrt{42i}}{168}$ | 0 | 0 | $-\frac{\sqrt{7}}{42}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70i}}{84}$ | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | $\frac{\sqrt{7}}{42}$ | 0 | 0 | $-\frac{\sqrt{42i}}{42}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{70i}}{84}$ | 0 | $\frac{\sqrt{70}}{42}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{42}$ | $\frac{\sqrt{42i}}{42}$ | 0 |
| 978 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------|-----------|-----------------------------|------------------------------------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| $M_5^{(1,-1;a)}(A,1)$ | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | $\frac{3\sqrt{110}i}{110}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | $-\frac{3\sqrt{110}i}{110}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{110}i}{110}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $-\frac{3\sqrt{110}i}{110}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | $\frac{\sqrt{110}}{110}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | $\frac{\sqrt{110}i}{110}$ | 0 | $\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $\frac{\sqrt{110}i}{110}$ | 0 | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | $\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | $\frac{\sqrt{110}i}{110}$ | 0 | $\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $\frac{\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $\frac{3\sqrt{110}i}{110}$ | 0 | $-\frac{3\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $-\frac{3\sqrt{110}i}{110}$ | 0 | $-\frac{3\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 979 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------|-----------|-----------------------------|---------------------------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| $M_5^{(1,-1;a)}(A, 2)$ | | $\frac{\sqrt{385}}{154}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | $\frac{\sqrt{2310i}}{462}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{385}}{154}$ | 0 | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | $-\frac{\sqrt{2310i}}{462}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{385}}{154}$ | 0 | 0 | $-\frac{\sqrt{2310i}}{462}$ | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{385}}{154}$ | $\frac{\sqrt{2310i}}{462}$ | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | $-\frac{\sqrt{2310i}}{462}$ | $-\frac{\sqrt{385}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | $-\frac{2\sqrt{154i}}{231}$ | 0 | 0 |
| | | $\frac{\sqrt{2310}}{462}$ | 0 | $\frac{\sqrt{2310i}}{462}$ | 0 | 0 | $\frac{\sqrt{385}}{66}$ | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | $\frac{2\sqrt{154i}}{231}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2310i}}{462}$ | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | 0 | $-\frac{\sqrt{385}}{66}$ | 0 | 0 | $\frac{2\sqrt{154i}}{231}$ | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | 0 |
| | | $-\frac{\sqrt{2310i}}{462}$ | 0 | $\frac{\sqrt{2310}}{462}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{66}$ | $-\frac{2\sqrt{154i}}{231}$ | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | $\frac{2\sqrt{154i}}{231}$ | $\frac{\sqrt{385}}{462}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | $-\frac{2\sqrt{154i}}{231}$ | 0 | 0 | $-\frac{\sqrt{385}}{462}$ | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{154i}}{231}$ | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | 0 | $\frac{\sqrt{385}}{462}$ | 0 | 0 | $\frac{\sqrt{2310i}}{462}$ |
| | | 0 | 0 | 0 | 0 | $\frac{2\sqrt{154i}}{231}$ | 0 | $-\frac{2\sqrt{154}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{385}}{462}$ | $-\frac{\sqrt{2310i}}{462}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 | $\frac{\sqrt{2310i}}{462}$ | $\frac{\sqrt{385}}{77}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{462}$ | 0 | $-\frac{\sqrt{2310i}}{462}$ | 0 | 0 | $-\frac{\sqrt{385}}{77}$ |
| | 980 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|-----------------------|-----------------------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|
| | $M_5^{(1,-1;a)}(A,3)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 | $-\frac{3\sqrt{110}}{110}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $-\frac{3\sqrt{110}}{110}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | $-\frac{3\sqrt{110}i}{110}$ |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | $\frac{3\sqrt{110}i}{110}$ | 0 |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $\frac{\sqrt{110}i}{110}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}i}{110}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{22}$ | $-\frac{\sqrt{110}i}{110}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 | 0 |
| | | $-\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $\frac{\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $\frac{\sqrt{110}}{110}$ | 0 | $-\frac{\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | $\frac{\sqrt{110}i}{110}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{165}}{110}$ | $-\frac{\sqrt{110}i}{110}$ | 0 | $-\frac{\sqrt{110}}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{110}}{110}$ | 0 | $-\frac{3\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{110}}{110}$ | 0 | $\frac{3\sqrt{110}i}{110}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 981 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------|-----------|---------------------------|--------------------------------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
| $M_5^{(1,-1;a)}(B, 1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}i}{220}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | $\frac{\sqrt{330}i}{220}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | $-\frac{\sqrt{22}i}{44}$ | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{220}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 |
| | | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{132}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 |
| | | $\frac{\sqrt{22}i}{44}$ | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{132}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | $\frac{\sqrt{330}i}{220}$ | $\frac{\sqrt{55}}{110}$ | 0 |
| | | $-\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | $-\frac{\sqrt{330}i}{220}$ | 0 | 0 | $-\frac{\sqrt{55}}{110}$ |
| | | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{330}i}{132}$ | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | $-\frac{\sqrt{33}}{33}$ | 0 | 0 | $\frac{\sqrt{22}i}{44}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | $-\frac{\sqrt{330}i}{132}$ | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{33}$ | $-\frac{\sqrt{22}i}{44}$ | 0 |
| | | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | $\frac{\sqrt{330}i}{220}$ | $-\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ |
| | | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | $-\frac{\sqrt{330}i}{220}$ | 0 | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 |
| | | 0 | $-\frac{\sqrt{330}i}{220}$ | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | $\frac{\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 |
| | | $\frac{\sqrt{330}i}{220}$ | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{110}$ | $-\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 |
| | 982 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------------------------|-----------|--------------------------|----------------------------------------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|----------------------------|
| $M_5^{(1,-1;a)}(B, 2)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22}i}{44}$ | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{220}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}i}{220}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | $\frac{\sqrt{330}i}{220}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | $-\frac{\sqrt{330}i}{220}$ | $-\frac{\sqrt{55}}{110}$ | 0 |
| | | $-\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | $\frac{\sqrt{330}i}{220}$ | 0 | 0 | $\frac{\sqrt{55}}{110}$ |
| | | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}i}{132}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 |
| | | $-\frac{\sqrt{22}i}{44}$ | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{132}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 |
| | | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | $\frac{\sqrt{330}i}{132}$ | $\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ |
| | | 0 | $-\frac{3\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | $-\frac{\sqrt{330}i}{132}$ | 0 | 0 | $-\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ |
| | | 0 | 0 | $\frac{3\sqrt{55}}{110}$ | 0 | 0 | $-\frac{\sqrt{330}i}{220}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | $-\frac{\sqrt{33}}{33}$ | 0 | 0 | $\frac{\sqrt{22}i}{44}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{55}}{110}$ | $\frac{\sqrt{330}i}{220}$ | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{33}$ | $-\frac{\sqrt{22}i}{44}$ | 0 |
| | | 0 | $\frac{\sqrt{330}}{220}$ | 0 | $-\frac{\sqrt{330}i}{220}$ | $-\frac{\sqrt{55}}{110}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | $\frac{\sqrt{22}i}{44}$ | 0 | 0 |
| | | $\frac{\sqrt{330}}{220}$ | 0 | $\frac{\sqrt{330}i}{220}$ | 0 | 0 | $\frac{\sqrt{55}}{110}$ | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | $-\frac{\sqrt{22}i}{44}$ | 0 | 0 | 0 |
| | 983 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|----------------------------------------------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| | $M_{5,1}^{(1,-1;a)}(E, 1)$ | 0 | $-\frac{3\sqrt{385}i}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | $\frac{5\sqrt{231}i}{3696}$ | 0 | $-\frac{5\sqrt{231}}{462}$ | 0 | 0 |
| | | $\frac{3\sqrt{385}i}{1232}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | $-\frac{5\sqrt{231}i}{3696}$ | 0 | $-\frac{5\sqrt{231}}{462}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{385}i}{1232}$ | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $-\frac{65\sqrt{231}i}{3696}$ | $-\frac{\sqrt{154}}{88}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{385}i}{1232}$ | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | $\frac{65\sqrt{231}i}{3696}$ | 0 | 0 | $\frac{\sqrt{154}}{88}$ |
| | | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | $-\frac{\sqrt{385}i}{264}$ | 0 | $\frac{\sqrt{385}}{132}$ | 0 | 0 | $-\frac{5\sqrt{154}}{1848}$ | 0 | 0 | $\frac{5\sqrt{231}i}{1848}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | $\frac{\sqrt{385}i}{264}$ | 0 | $\frac{\sqrt{385}}{132}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{154}}{1848}$ | $-\frac{5\sqrt{231}i}{1848}$ | 0 |
| | | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{132}$ | 0 | $\frac{\sqrt{385}i}{66}$ | $\frac{19\sqrt{154}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{231}}{924}$ |
| | | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | $\frac{\sqrt{385}}{132}$ | 0 | $-\frac{\sqrt{385}i}{66}$ | 0 | 0 | $-\frac{19\sqrt{154}}{1848}$ | 0 | 0 | $-\frac{\sqrt{231}}{924}$ | 0 |
| | | 0 | $\frac{5\sqrt{231}i}{3696}$ | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | 0 | $\frac{19\sqrt{154}}{1848}$ | 0 | 0 | $-\frac{23\sqrt{385}i}{3696}$ | 0 | $\frac{\sqrt{385}}{462}$ | 0 | 0 |
| | | $-\frac{5\sqrt{231}i}{3696}$ | 0 | $-\frac{\sqrt{231}}{231}$ | 0 | 0 | 0 | $-\frac{19\sqrt{154}}{1848}$ | $\frac{23\sqrt{385}i}{3696}$ | 0 | $\frac{\sqrt{385}}{462}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{231}}{462}$ | 0 | $-\frac{65\sqrt{231}i}{3696}$ | $-\frac{5\sqrt{154}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{462}$ | 0 | $\frac{17\sqrt{385}i}{3696}$ | $\frac{\sqrt{2310}}{616}$ | 0 |
| | | $-\frac{5\sqrt{231}}{462}$ | 0 | $\frac{65\sqrt{231}i}{3696}$ | 0 | 0 | $\frac{5\sqrt{154}}{1848}$ | 0 | 0 | $\frac{\sqrt{385}}{462}$ | 0 | $-\frac{17\sqrt{385}i}{3696}$ | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ |
| | | 0 | 0 | $-\frac{\sqrt{154}}{88}$ | 0 | 0 | $\frac{5\sqrt{231}i}{1848}$ | 0 | $-\frac{\sqrt{231}}{924}$ | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | $-\frac{3\sqrt{385}i}{616}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{154}}{88}$ | $-\frac{5\sqrt{231}i}{1848}$ | 0 | $-\frac{\sqrt{231}}{924}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | $\frac{3\sqrt{385}i}{616}$ | 0 |
| 984 | symmetry | $\frac{x(8x^4 - 40x^2y^2 - 40x^2z^2 + 15y^4 + 30y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|----------------------------|------------------------------|------------------------------|---------------------------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|----------------------------|
| $M_{5,2}^{(1,-1;a)}(E, 1)$ | 0 | $\frac{3\sqrt{385}}{1232}$ | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{65\sqrt{231}}{3696}$ | 0 | $-\frac{\sqrt{231}i}{231}$ | $\frac{\sqrt{154}}{88}$ | 0 | |
| | $\frac{3\sqrt{385}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | $-\frac{65\sqrt{231}}{3696}$ | 0 | $\frac{\sqrt{231}i}{231}$ | 0 | 0 | $-\frac{\sqrt{154}}{88}$ | |
| | 0 | 0 | 0 | $\frac{3\sqrt{385}}{1232}$ | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | $-\frac{5\sqrt{231}i}{462}$ | 0 | $\frac{5\sqrt{231}}{3696}$ | 0 | 0 | |
| | 0 | 0 | $\frac{3\sqrt{385}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | $\frac{5\sqrt{231}i}{462}$ | 0 | $\frac{5\sqrt{231}}{3696}$ | 0 | 0 | 0 | |
| | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{264}$ | 0 | $\frac{\sqrt{385}i}{132}$ | $\frac{5\sqrt{154}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{1848}$ | |
| | 0 | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | $\frac{\sqrt{385}}{264}$ | 0 | $-\frac{\sqrt{385}i}{132}$ | 0 | 0 | $-\frac{5\sqrt{154}}{1848}$ | 0 | 0 | 0 | $\frac{5\sqrt{231}}{1848}$ | 0 |
| | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | $\frac{\sqrt{385}i}{132}$ | 0 | $-\frac{\sqrt{385}}{66}$ | 0 | 0 | $\frac{19\sqrt{154}}{1848}$ | 0 | 0 | 0 | $\frac{\sqrt{231}i}{924}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{2310}}{616}$ | $-\frac{\sqrt{385}i}{132}$ | 0 | $-\frac{\sqrt{385}}{66}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{154}}{1848}$ | $-\frac{\sqrt{231}i}{924}$ | 0 | 0 |
| | 0 | $-\frac{65\sqrt{231}}{3696}$ | 0 | $-\frac{5\sqrt{231}i}{462}$ | $\frac{5\sqrt{154}}{1848}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{385}}{3696}$ | 0 | $-\frac{\sqrt{385}i}{462}$ | $\frac{\sqrt{2310}}{616}$ | 0 | 0 |
| | $-\frac{65\sqrt{231}}{3696}$ | 0 | $\frac{5\sqrt{231}i}{462}$ | 0 | 0 | $-\frac{5\sqrt{154}}{1848}$ | 0 | 0 | $-\frac{17\sqrt{385}}{3696}$ | 0 | $\frac{\sqrt{385}i}{462}$ | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ |
| | 0 | $-\frac{\sqrt{231}i}{231}$ | 0 | $\frac{5\sqrt{231}}{3696}$ | 0 | 0 | $\frac{19\sqrt{154}}{1848}$ | 0 | 0 | $-\frac{\sqrt{385}i}{462}$ | 0 | $\frac{23\sqrt{385}}{3696}$ | 0 | 0 | 0 |
| | $\frac{\sqrt{231}i}{231}$ | 0 | $\frac{5\sqrt{231}}{3696}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{154}}{1848}$ | $\frac{\sqrt{385}i}{462}$ | 0 | $\frac{23\sqrt{385}}{3696}$ | 0 | 0 | 0 | 0 |
| | $\frac{\sqrt{154}}{88}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{231}}{1848}$ | 0 | $\frac{\sqrt{231}i}{924}$ | $\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{385}}{616}$ |
| | 0 | $-\frac{\sqrt{154}}{88}$ | 0 | 0 | $\frac{5\sqrt{231}}{1848}$ | 0 | $-\frac{\sqrt{231}i}{924}$ | 0 | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | 0 | 0 | $\frac{3\sqrt{385}}{616}$ | 0 |
| | 985 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|---------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|
| | | 0 | $-\frac{3\sqrt{11}i}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{7\sqrt{165}i}{880}$ | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 |
| | | $\frac{3\sqrt{11}i}{176}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | $-\frac{7\sqrt{165}i}{880}$ | 0 | $\frac{\sqrt{165}}{110}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{11}i}{176}$ | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{55}$ | 0 | $\frac{\sqrt{165}i}{176}$ | $\frac{9\sqrt{110}}{440}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{11}i}{176}$ | 0 | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $-\frac{\sqrt{165}}{55}$ | 0 | $-\frac{\sqrt{165}i}{176}$ | 0 | 0 | $-\frac{9\sqrt{110}}{440}$ |
| | | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{3\sqrt{11}i}{88}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | $-\frac{7\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}i}{440}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | $-\frac{3\sqrt{11}i}{88}$ | 0 | $\frac{\sqrt{11}}{44}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{110}}{440}$ | $\frac{\sqrt{165}i}{440}$ | 0 |
| | | $\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | $\frac{\sqrt{11}i}{22}$ | $\frac{\sqrt{110}}{440}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{220}$ |
| | | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{11}}{44}$ | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | $-\frac{\sqrt{110}}{440}$ | 0 | 0 | $\frac{\sqrt{165}}{220}$ | 0 |
| | | 0 | $\frac{7\sqrt{165}i}{880}$ | 0 | $-\frac{\sqrt{165}}{55}$ | 0 | 0 | $\frac{\sqrt{110}}{440}$ | 0 | 0 | $\frac{3\sqrt{11}i}{176}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 |
| | | $-\frac{7\sqrt{165}i}{880}$ | 0 | $-\frac{\sqrt{165}}{55}$ | 0 | 0 | 0 | $-\frac{\sqrt{110}}{440}$ | $-\frac{3\sqrt{11}i}{176}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{165}}{110}$ | 0 | $\frac{\sqrt{165}i}{176}$ | $-\frac{7\sqrt{110}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | $-\frac{5\sqrt{11}i}{176}$ | $\frac{\sqrt{66}}{88}$ | 0 |
| | | $\frac{\sqrt{165}}{110}$ | 0 | $-\frac{\sqrt{165}i}{176}$ | 0 | 0 | $\frac{7\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | $\frac{5\sqrt{11}i}{176}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ |
| | | 0 | 0 | $\frac{9\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}i}{440}$ | 0 | $\frac{\sqrt{165}}{220}$ | 0 | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $-\frac{3\sqrt{11}i}{88}$ |
| | | 0 | 0 | 0 | $-\frac{9\sqrt{110}}{440}$ | $\frac{\sqrt{165}i}{440}$ | 0 | $\frac{\sqrt{165}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | $\frac{3\sqrt{11}i}{88}$ | 0 |
| 986 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|----------------------------|-------------------------------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|
| 987 | $M_{5,2}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{3\sqrt{11}}{176}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{176}$ | 0 | $-\frac{\sqrt{165}i}{55}$ | $-\frac{9\sqrt{110}}{440}$ | 0 |
| | | $\frac{3\sqrt{11}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{165}}{176}$ | 0 | $\frac{\sqrt{165}i}{55}$ | 0 | 0 | $\frac{9\sqrt{110}}{440}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{11}}{176}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{165}i}{110}$ | 0 | $\frac{7\sqrt{165}}{880}$ | 0 | 0 |
| | | 0 | 0 | $\frac{3\sqrt{11}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | $-\frac{\sqrt{165}i}{110}$ | 0 | $\frac{7\sqrt{165}}{880}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{11}}{88}$ | 0 | $\frac{\sqrt{11}i}{44}$ | $\frac{7\sqrt{110}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{440}$ |
| | | 0 | $\frac{\sqrt{66}}{88}$ | 0 | 0 | $-\frac{3\sqrt{11}}{88}$ | 0 | $-\frac{\sqrt{11}i}{44}$ | 0 | 0 | $-\frac{7\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}}{440}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | $\frac{\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}i}{220}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{66}}{88}$ | $-\frac{\sqrt{11}i}{44}$ | 0 | $-\frac{\sqrt{11}}{22}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{440}$ | $\frac{\sqrt{165}i}{220}$ | 0 |
| | | 0 | $\frac{\sqrt{165}}{176}$ | 0 | $\frac{\sqrt{165}i}{110}$ | $\frac{7\sqrt{110}}{440}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{11}}{176}$ | 0 | $\frac{\sqrt{11}i}{22}$ | $\frac{\sqrt{66}}{88}$ | 0 |
| | | $\frac{\sqrt{165}}{176}$ | 0 | $-\frac{\sqrt{165}i}{110}$ | 0 | 0 | $-\frac{7\sqrt{110}}{440}$ | 0 | 0 | $\frac{5\sqrt{11}}{176}$ | 0 | $-\frac{\sqrt{11}i}{22}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ |
| | | 0 | $-\frac{\sqrt{165}i}{55}$ | 0 | $\frac{7\sqrt{165}}{880}$ | 0 | 0 | $\frac{\sqrt{110}}{440}$ | 0 | 0 | $\frac{\sqrt{11}i}{22}$ | 0 | $-\frac{3\sqrt{11}}{176}$ | 0 | 0 |
| | | $\frac{\sqrt{165}i}{55}$ | 0 | $\frac{7\sqrt{165}}{880}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{110}}{440}$ | $-\frac{\sqrt{11}i}{22}$ | 0 | $-\frac{3\sqrt{11}}{176}$ | 0 | 0 | 0 |
| | | $-\frac{9\sqrt{110}}{440}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{440}$ | 0 | $-\frac{\sqrt{165}i}{220}$ | $\frac{\sqrt{66}}{88}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{11}}{88}$ |
| | | 0 | $\frac{9\sqrt{110}}{440}$ | 0 | 0 | $-\frac{\sqrt{165}}{440}$ | 0 | $\frac{\sqrt{165}i}{220}$ | 0 | 0 | $-\frac{\sqrt{66}}{88}$ | 0 | 0 | $\frac{3\sqrt{11}}{88}$ | 0 |
| 987 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|-------------------------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|----------------------------|---------------------------|----------------------------|--------------------------|---------------------------|
| | $M_{5,1}^{(1,-1;a)}(E,3)$ | 0 | $\frac{\sqrt{33}}{88}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{440}$ | 0 | $\frac{\sqrt{55i}}{55}$ | $\frac{\sqrt{330}}{220}$ | 0 |
| | | $\frac{\sqrt{33}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{55}}{440}$ | 0 | $-\frac{\sqrt{55i}}{55}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}}{88}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{55i}}{55}$ | 0 | $-\frac{13\sqrt{55}}{440}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{33}}{88}$ | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | $-\frac{\sqrt{55i}}{55}$ | 0 | $-\frac{13\sqrt{55}}{440}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{33}}{132}$ | 0 | $-\frac{\sqrt{33i}}{33}$ | $\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{220}$ |
| | | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | $-\frac{7\sqrt{33}}{132}$ | 0 | $\frac{\sqrt{33i}}{33}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | $\frac{\sqrt{55}}{220}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $-\frac{\sqrt{33i}}{33}$ | 0 | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | $\frac{\sqrt{33i}}{33}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{55}}{440}$ | 0 | $\frac{\sqrt{55i}}{55}$ | $\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 |
| | | $\frac{\sqrt{55}}{440}$ | 0 | $-\frac{\sqrt{55i}}{55}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | $-\frac{\sqrt{33}}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ |
| | | 0 | $\frac{\sqrt{55i}}{55}$ | 0 | $-\frac{13\sqrt{55}}{440}$ | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{33}}{264}$ | 0 | 0 |
| | | $-\frac{\sqrt{55i}}{55}$ | 0 | $-\frac{13\sqrt{55}}{440}$ | 0 | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | $\frac{5\sqrt{33}}{264}$ | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{55}}{220}$ | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{44}$ |
| | | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | $\frac{\sqrt{55}}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{33}}{44}$ | 0 |
| 988 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|---------------------------|-------------------------------------------------------|----------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
| | | 0 | $\frac{\sqrt{33}i}{88}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{13\sqrt{55}i}{440}$ | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | 0 |
| | | $-\frac{\sqrt{33}i}{88}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | $-\frac{13\sqrt{55}i}{440}$ | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{33}i}{88}$ | $\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | $-\frac{\sqrt{55}i}{440}$ | $\frac{\sqrt{330}}{220}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{33}i}{88}$ | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | $\frac{\sqrt{55}i}{440}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ |
| | | 0 | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | $-\frac{7\sqrt{33}i}{132}$ | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | 0 | $-\frac{\sqrt{55}i}{220}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | $\frac{7\sqrt{33}i}{132}$ | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | $\frac{\sqrt{55}i}{220}$ | 0 |
| | $M_{5,2}^{(1,-1;a)}(E,3)$ | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{33}}{33}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{330}}{132}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{13\sqrt{55}i}{440}$ | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | 0 | $-\frac{\sqrt{330}}{132}$ | 0 | 0 | $\frac{5\sqrt{33}i}{264}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{13\sqrt{55}i}{440}$ | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | 0 | 0 | $\frac{\sqrt{330}}{132}$ | $-\frac{5\sqrt{33}i}{264}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{55}}{55}$ | 0 | $-\frac{\sqrt{55}i}{440}$ | $\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{33}i}{88}$ | $-\frac{\sqrt{22}}{44}$ | 0 |
| | | $-\frac{\sqrt{55}}{55}$ | 0 | $\frac{\sqrt{55}i}{440}$ | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{33}i}{88}$ | 0 | 0 | $\frac{\sqrt{22}}{44}$ |
| | | 0 | 0 | $\frac{\sqrt{330}}{220}$ | 0 | 0 | $-\frac{\sqrt{55}i}{220}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}}{44}$ | 0 | 0 | $\frac{\sqrt{33}i}{44}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{330}}{220}$ | $\frac{\sqrt{55}i}{220}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{22}}{44}$ | $-\frac{\sqrt{33}i}{44}$ | 0 |
| 989 | symmetry | $-\frac{\sqrt{231}xyz(x-y)(x+y)(3x^2+3y^2-10z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-----|-----------|-------------------------------------------------------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|
| 990 | symmetry | $M_7^{(1,-1;a)}(A,1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | 0 | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | $-\frac{\sqrt{455}i}{182}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{273}i}{364}$ | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | $\frac{\sqrt{455}i}{182}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $\frac{\sqrt{273}i}{364}$ | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{455}}{182}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{\sqrt{455}}{182}$ | 0 | |
| | | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | 0 | 0 | $\frac{3\sqrt{182}}{182}$ | 0 | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | 0 |
| | | $\frac{\sqrt{273}i}{364}$ | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{182}}{182}$ | $\frac{3\sqrt{455}i}{364}$ | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $\frac{\sqrt{273}i}{364}$ | $\frac{3\sqrt{182}}{182}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | 0 | |
| | | $-\frac{\sqrt{273}}{364}$ | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | 0 | $-\frac{3\sqrt{182}}{182}$ | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 | |
| | | 0 | 0 | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | $\frac{3\sqrt{455}i}{364}$ | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{455}i}{182}$ | 0 | $\frac{\sqrt{455}}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $\frac{\sqrt{455}i}{182}$ | 0 | $\frac{\sqrt{455}}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | $z(35x^6+105x^4y^2-210x^4z^2+105x^2y^4-420x^2y^2z^2+168x^2z^4+35y^6-210y^4z^2+168y^2z^4-16z^6)$ | | | | | | | | | | | | | | |
| | | 16 | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----|------------------------|----------------------------------------------------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|-----------------------------|-----------------------------|----------------------------|
| | $M_7^{(1,-1;a)}(A, 2)$ | $-\frac{\sqrt{858}}{1716}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | $-\frac{\sqrt{143i}}{572}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{858}}{1716}$ | 0 | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | $\frac{\sqrt{143i}}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | 0 | 0 | $\frac{\sqrt{143i}}{572}$ | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{858}}{1716}$ | $-\frac{\sqrt{143i}}{572}$ | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | $\frac{\sqrt{143i}}{572}$ | $\frac{\sqrt{858}}{286}$ | 0 | 0 | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | $\frac{\sqrt{2145i}}{572}$ | 0 | 0 |
| | | $-\frac{\sqrt{143}}{572}$ | 0 | $-\frac{\sqrt{143i}}{572}$ | 0 | 0 | $-\frac{\sqrt{858}}{286}$ | 0 | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | $-\frac{\sqrt{2145i}}{572}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{143i}}{572}$ | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | 0 | $\frac{\sqrt{858}}{286}$ | 0 | $-\frac{\sqrt{2145i}}{572}$ | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | 0 |
| | | $\frac{\sqrt{143i}}{572}$ | 0 | $-\frac{\sqrt{143}}{572}$ | 0 | 0 | 0 | $-\frac{\sqrt{858}}{286}$ | $\frac{\sqrt{2145i}}{572}$ | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | $-\frac{\sqrt{2145i}}{572}$ | $-\frac{5\sqrt{858}}{572}$ | 0 | 0 | 0 | $-\frac{5\sqrt{143}}{286}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | $\frac{\sqrt{2145i}}{572}$ | 0 | 0 | $\frac{5\sqrt{858}}{572}$ | 0 | 0 | $-\frac{5\sqrt{143}}{286}$ |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145i}}{572}$ | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | 0 | $-\frac{5\sqrt{858}}{572}$ | 0 | $\frac{5\sqrt{143i}}{286}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2145i}}{572}$ | 0 | $\frac{\sqrt{2145}}{572}$ | 0 | 0 | 0 | $\frac{5\sqrt{858}}{572}$ | $-\frac{5\sqrt{143i}}{286}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{143}}{286}$ | 0 | $\frac{5\sqrt{143i}}{286}$ | $\frac{5\sqrt{858}}{429}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{143}}{286}$ | 0 | $-\frac{5\sqrt{143i}}{286}$ | 0 | $-\frac{5\sqrt{858}}{429}$ |
| 991 | symmetry | $-\frac{\sqrt{231}z(x^2-2xy-y^2)(x^2+2xy-y^2)(3x^2+3y^2-10z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------|-----------|------------------------------------------------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|
| $M_7^{(1,-1;a)}(A,3)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $\frac{\sqrt{273}i}{364}$ | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{455}}{182}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{\sqrt{455}}{182}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{273}i}{364}$ | 0 | $\frac{\sqrt{273}}{364}$ | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{\sqrt{455}i}{182}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | $\frac{\sqrt{273}}{364}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2730}}{364}$ | $-\frac{\sqrt{455}i}{182}$ | 0 |
| | | 0 | $-\frac{\sqrt{273}}{364}$ | 0 | $\frac{\sqrt{273}i}{364}$ | $\frac{3\sqrt{182}}{182}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | 0 |
| | | $-\frac{\sqrt{273}}{364}$ | 0 | $-\frac{\sqrt{273}i}{364}$ | 0 | 0 | $-\frac{3\sqrt{182}}{182}$ | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{273}i}{364}$ | 0 | $\frac{\sqrt{273}}{364}$ | 0 | 0 | $-\frac{3\sqrt{182}}{182}$ | 0 | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | $-\frac{3\sqrt{455}}{364}$ | 0 | 0 |
| | | $-\frac{\sqrt{273}i}{364}$ | 0 | $\frac{\sqrt{273}}{364}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{182}}{182}$ | $-\frac{3\sqrt{455}i}{364}$ | 0 | $-\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{2730}}{364}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{3\sqrt{455}}{364}$ | 0 | $-\frac{3\sqrt{455}i}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{2730}}{364}$ | 0 | 0 | $\frac{3\sqrt{455}i}{364}$ | 0 | $-\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{2730}}{364}$ | $-\frac{3\sqrt{455}i}{364}$ | 0 | $-\frac{3\sqrt{455}}{364}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{455}}{182}$ | 0 | $\frac{\sqrt{455}i}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{455}}{182}$ | 0 | $-\frac{\sqrt{455}i}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 992 | symmetry | $\frac{\sqrt{91}xyz(3x^4-5x^2y^2-5x^2z^2+3y^4-5y^2z^2+3z^4)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------|----------------------------------------------------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|
| 993 | symmetry | 0 | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | $-\frac{3\sqrt{77}i}{154}$ | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{462}}{168}$ | $\frac{3\sqrt{77}i}{154}$ | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | $\frac{\sqrt{1155}i}{924}$ | 0 |
| | | $\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | $\frac{5\sqrt{77}i}{308}$ | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ |
| | | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | $-\frac{5\sqrt{77}i}{308}$ | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 |
| | | 0 | $-\frac{3\sqrt{77}i}{154}$ | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{77}i}{154}$ | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | $\frac{5\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{308}$ | 0 | $\frac{\sqrt{1155}i}{308}$ | $\frac{\sqrt{770}}{154}$ | 0 |
| | | $\frac{5\sqrt{77}}{308}$ | 0 | $-\frac{5\sqrt{77}i}{308}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{308}$ | 0 | $-\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $-\frac{\sqrt{770}}{154}$ |
| | | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{308}$ | 0 | 0 | $\frac{5\sqrt{462}}{616}$ | 0 | 0 | $-\frac{5\sqrt{77}i}{308}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | $-\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{616}$ | $\frac{5\sqrt{77}i}{308}$ | 0 |
| | | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{308}$ | $\frac{5\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{77}}{308}$ |
| | | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $-\frac{5\sqrt{462}}{616}$ | 0 | 0 | $\frac{5\sqrt{77}}{308}$ | 0 |
| | | 0 | $-\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | 0 | $\frac{\sqrt{770}}{154}$ | 0 | 0 | $-\frac{5\sqrt{77}i}{308}$ | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | 0 |
| | | $\frac{\sqrt{1155}i}{924}$ | 0 | $-\frac{\sqrt{1155}}{924}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{154}$ | $\frac{5\sqrt{77}i}{308}$ | 0 | $\frac{5\sqrt{77}}{308}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{77}xyz(3x^4-20x^2y^2+10x^2z^2+3y^4+10y^2z^2-6z^4)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | |
|-----|-----------|---------------------------------------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|---------------------------|
| 994 | symmetry | $M_7^{(1,-1;a)}(B, 2)$ | 0 | 0 | $-\frac{\sqrt{546}}{168}$ | 0 | 0 | $\frac{3\sqrt{91}i}{182}$ | 0 | $-\frac{\sqrt{91}}{52}$ | 0 | 0 | $\frac{\sqrt{910}}{728}$ | 0 | 0 | $-\frac{\sqrt{1365}i}{1092}$ | |
| | | | 0 | 0 | 0 | $\frac{\sqrt{546}}{168}$ | $-\frac{3\sqrt{91}i}{182}$ | 0 | $-\frac{\sqrt{91}}{52}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{910}}{728}$ | $\frac{\sqrt{1365}i}{1092}$ | 0 | |
| | | | $-\frac{\sqrt{546}}{168}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{91}i}{182}$ | 0 | $-\frac{\sqrt{91}i}{52}$ | $-\frac{\sqrt{910}}{728}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1365}i}{1092}$ | |
| | | | 0 | $\frac{\sqrt{546}}{168}$ | 0 | 0 | $-\frac{3\sqrt{91}i}{182}$ | 0 | $\frac{\sqrt{91}i}{52}$ | 0 | 0 | $\frac{\sqrt{910}}{728}$ | 0 | 0 | $-\frac{\sqrt{1365}i}{1092}$ | 0 | |
| | | | 0 | $\frac{3\sqrt{91}i}{182}$ | 0 | $-\frac{3\sqrt{91}i}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | $-\frac{3\sqrt{91}i}{182}$ | 0 | $-\frac{3\sqrt{91}i}{182}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 0 | $-\frac{\sqrt{91}}{52}$ | 0 | $-\frac{\sqrt{91}i}{52}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | $\frac{\sqrt{1365}i}{364}$ | $\frac{\sqrt{910}}{182}$ | 0 |
| | | | $-\frac{\sqrt{91}}{52}$ | 0 | $\frac{\sqrt{91}i}{52}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | 0 | $-\frac{\sqrt{910}}{182}$ |
| | | | 0 | 0 | $-\frac{\sqrt{910}}{728}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | 0 | $\frac{5\sqrt{546}}{728}$ | 0 | 0 | $-\frac{5\sqrt{91}i}{364}$ | |
| | | | 0 | 0 | 0 | $\frac{\sqrt{910}}{728}$ | 0 | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{546}}{728}$ | $\frac{5\sqrt{91}i}{364}$ | 0 | |
| | | | $\frac{\sqrt{910}}{728}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1365}i}{364}$ | $\frac{5\sqrt{546}}{728}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{91}i}{364}$ | |
| | | | 0 | $-\frac{\sqrt{910}}{728}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1365}i}{364}$ | 0 | 0 | $-\frac{5\sqrt{546}}{728}$ | 0 | 0 | $\frac{5\sqrt{91}i}{364}$ | 0 | |
| | | | 0 | $-\frac{\sqrt{1365}i}{1092}$ | 0 | $-\frac{\sqrt{1365}i}{1092}$ | 0 | 0 | $\frac{\sqrt{910}}{182}$ | 0 | 0 | $-\frac{5\sqrt{91}i}{364}$ | 0 | $\frac{5\sqrt{91}i}{364}$ | 0 | 0 | |
| | | | $\frac{\sqrt{1365}i}{1092}$ | 0 | $-\frac{\sqrt{1365}i}{1092}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{910}}{182}$ | $\frac{5\sqrt{91}i}{364}$ | 0 | $\frac{5\sqrt{91}i}{364}$ | 0 | 0 | 0 | |
| | | $\frac{\sqrt{6006}z(x-y)(x+y)(x^2-4xy+y^2)(x^2+4xy+y^2)}{32}$ | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----|-----------------------|---------------------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|---|---|---|---|---|---|
| | $M_7^{(1,-1;a)}(B,3)$ | $\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{7}}{14}$ | $-\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}}{28}$ | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{42}}{28}$ | 0 | $-\frac{\sqrt{42}i}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{42}i}{28}$ | 0 | $-\frac{\sqrt{42}}{28}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 995 | symmetry | $\frac{\sqrt{42}z(x-y)(x+y)(15x^4+30x^2y^2-80x^2z^2+15y^4-80y^2z^2+48z^4)}{32}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------|------------------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------|-----------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 996 | symmetry | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | $-\frac{\sqrt{6006i}}{4004}$ | $-\frac{\sqrt{15015}}{2002}$ | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{2002}$ | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | $\frac{\sqrt{6006i}}{4004}$ | 0 | 0 | $\frac{\sqrt{15015}}{2002}$ | 0 | 0 | $-\frac{\sqrt{10010}}{2002}$ | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006i}}{4004}$ | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | 0 | $-\frac{\sqrt{15015}}{2002}$ | 0 | $\frac{\sqrt{10010i}}{2002}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{6006i}}{4004}$ | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | 0 | 0 | $\frac{\sqrt{15015}}{2002}$ | $-\frac{\sqrt{10010i}}{2002}$ | 0 | |
| | | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | $\frac{\sqrt{6006i}}{4004}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{2002}$ | 0 | $\frac{3\sqrt{10010i}}{2002}$ | $\frac{2\sqrt{15015}}{1001}$ | 0 |
| | | $\frac{\sqrt{6006}}{4004}$ | 0 | $-\frac{\sqrt{6006i}}{4004}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{2002}$ | 0 | $-\frac{3\sqrt{10010i}}{2002}$ | 0 | 0 | $-\frac{2\sqrt{15015}}{1001}$ |
| | | 0 | $-\frac{\sqrt{6006i}}{4004}$ | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{\sqrt{6006i}}{4004}$ | 0 | $\frac{\sqrt{6006}}{4004}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{15015}}{2002}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{2002}$ | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{2002}$ |
| | | 0 | $\frac{\sqrt{15015}}{2002}$ | 0 | 0 | $-\frac{3\sqrt{10010}}{2002}$ | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{1001}}{2002}$ | 0 | 0 | $\frac{5\sqrt{6006}}{2002}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{15015}}{2002}$ | 0 | 0 | $\frac{3\sqrt{10010i}}{2002}$ | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{1001}}{2002}$ | 0 | 0 | $\frac{5\sqrt{6006i}}{2002}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{15015}}{2002}$ | $-\frac{3\sqrt{10010i}}{2002}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | $-\frac{5\sqrt{6006i}}{2002}$ | 0 |
| | | 0 | $-\frac{\sqrt{10010}}{2002}$ | 0 | $\frac{\sqrt{10010i}}{2002}$ | $\frac{2\sqrt{15015}}{1001}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{2002}$ | 0 | $\frac{5\sqrt{6006i}}{2002}$ | 0 | 0 |
| | | $-\frac{\sqrt{10010}}{2002}$ | 0 | $-\frac{\sqrt{10010i}}{2002}$ | 0 | 0 | $-\frac{2\sqrt{15015}}{1001}$ | 0 | 0 | $\frac{5\sqrt{6006}}{2002}$ | 0 | $-\frac{5\sqrt{6006i}}{2002}$ | 0 | 0 | 0 |
| $-\frac{y(35x^6 - 210x^4y^2 + 105x^4z^2 + 168x^2y^4 - 420x^2y^2z^2 + 105x^2z^4 - 16y^6 + 168y^4z^2 - 210y^2z^4 + 35z^6)}{16}$ | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | | |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------------------|------------------------------|------------------------------|---|
| 997 | $M_{7,1}^{(1,-1;a)}(E, 1)$ | 0 | $\frac{113\sqrt{858}i}{13728}$ | 0 | $-\frac{3\sqrt{858}}{416}$ | 0 | 0 | $-\frac{7\sqrt{143}}{1144}$ | 0 | 0 | $\frac{7\sqrt{1430}i}{4576}$ | 0 | $-\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | | | |
| | | $-\frac{113\sqrt{858}i}{13728}$ | 0 | $-\frac{3\sqrt{858}}{416}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{143}}{1144}$ | $-\frac{7\sqrt{1430}i}{4576}$ | 0 | $-\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | 0 | 0 | | |
| | | 0 | $-\frac{3\sqrt{858}}{416}$ | 0 | $-\frac{59\sqrt{858}i}{6864}$ | $-\frac{19\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{4576}$ | 0 | $-\frac{7\sqrt{1430}i}{2288}$ | $-\frac{3\sqrt{2145}}{2288}$ | 0 | 0 | 0 | |
| | | $-\frac{3\sqrt{858}}{416}$ | 0 | $\frac{59\sqrt{858}i}{6864}$ | 0 | 0 | $\frac{19\sqrt{143}}{2288}$ | 0 | 0 | $-\frac{5\sqrt{1430}}{4576}$ | 0 | $\frac{7\sqrt{1430}i}{2288}$ | 0 | 0 | 0 | $\frac{3\sqrt{2145}}{2288}$ | 0 | |
| | | 0 | 0 | $-\frac{19\sqrt{143}}{2288}$ | 0 | 0 | $\frac{\sqrt{858}i}{176}$ | 0 | $-\frac{3\sqrt{858}}{1144}$ | 0 | 0 | $-\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | 0 | $\frac{7\sqrt{1430}i}{2288}$ | 0 | |
| | | 0 | 0 | 0 | $\frac{19\sqrt{143}}{2288}$ | $-\frac{\sqrt{858}i}{176}$ | 0 | $-\frac{3\sqrt{858}}{1144}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{2145}}{2288}$ | $-\frac{7\sqrt{1430}i}{2288}$ | 0 | 0 | 0 | |
| | | $-\frac{7\sqrt{143}}{1144}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{858}}{1144}$ | 0 | $-\frac{\sqrt{858}i}{286}$ | $-\frac{\sqrt{2145}}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1430}}{1144}$ | |
| | | 0 | $\frac{7\sqrt{143}}{1144}$ | 0 | 0 | $-\frac{3\sqrt{858}}{1144}$ | 0 | $\frac{\sqrt{858}i}{286}$ | 0 | 0 | $\frac{\sqrt{2145}}{1144}$ | 0 | 0 | 0 | $-\frac{\sqrt{1430}}{1144}$ | 0 | 0 | 0 |
| | | 0 | $\frac{7\sqrt{1430}i}{4576}$ | 0 | $-\frac{5\sqrt{1430}}{4576}$ | 0 | 0 | $-\frac{\sqrt{2145}}{1144}$ | 0 | 0 | $\frac{5\sqrt{858}i}{4576}$ | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{7\sqrt{1430}i}{4576}$ | 0 | $-\frac{5\sqrt{1430}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145}}{1144}$ | $-\frac{5\sqrt{858}i}{4576}$ | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{7\sqrt{1430}}{4576}$ | 0 | $-\frac{7\sqrt{1430}i}{2288}$ | $-\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | $-\frac{15\sqrt{858}i}{2288}$ | $-\frac{25\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{7\sqrt{1430}}{4576}$ | 0 | $\frac{7\sqrt{1430}i}{2288}$ | 0 | 0 | $\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | $\frac{15\sqrt{858}i}{2288}$ | 0 | 0 | 0 | $\frac{25\sqrt{143}}{2288}$ | 0 | 0 |
| | | 0 | 0 | $-\frac{3\sqrt{2145}}{2288}$ | 0 | 0 | $\frac{7\sqrt{1430}i}{2288}$ | 0 | $-\frac{\sqrt{1430}}{1144}$ | 0 | 0 | $-\frac{25\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{25\sqrt{858}i}{6864}$ | 0 |
| | | 0 | 0 | 0 | $\frac{3\sqrt{2145}}{2288}$ | $-\frac{7\sqrt{1430}i}{2288}$ | 0 | $-\frac{\sqrt{1430}}{1144}$ | 0 | 0 | 0 | 0 | $\frac{25\sqrt{143}}{2288}$ | $-\frac{25\sqrt{858}i}{6864}$ | 0 | 0 | 0 | 0 |
| 997 | symmetry | $\frac{x(16x^6 - 168x^4y^2 - 168x^4z^2 + 210x^2y^4 + 420x^2y^2z^2 + 210x^2z^4 - 35y^6 - 105y^4z^2 - 105y^2z^4 - 35z^6)}{16}$ | | | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-----|----------------------------|----------------------------------------------------------------------|-------------------------------|--------------------------------|--------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|
| 998 | $M_{7,2}^{(1,-1;a)}(E, 1)$ | 0 | $\frac{59\sqrt{858}}{6864}$ | 0 | $\frac{3\sqrt{858}i}{416}$ | $-\frac{19\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{1430}}{2288}$ | 0 | $-\frac{5\sqrt{1430}i}{4576}$ | $\frac{3\sqrt{2145}}{2288}$ | 0 | |
| | | $\frac{59\sqrt{858}i}{6864}$ | 0 | $-\frac{3\sqrt{858}i}{416}$ | 0 | 0 | $\frac{19\sqrt{143}}{2288}$ | 0 | 0 | $-\frac{7\sqrt{1430}}{2288}$ | 0 | $\frac{5\sqrt{1430}i}{4576}$ | 0 | 0 | $-\frac{3\sqrt{2145}}{2288}$ | 0 |
| | | 0 | $\frac{3\sqrt{858}i}{416}$ | 0 | $-\frac{113\sqrt{858}}{13728}$ | 0 | 0 | $\frac{7\sqrt{143}}{1144}$ | 0 | 0 | $-\frac{7\sqrt{1430}i}{4576}$ | 0 | $\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{858}i}{416}$ | 0 | $-\frac{113\sqrt{858}}{13728}$ | 0 | 0 | 0 | $-\frac{7\sqrt{143}}{1144}$ | $\frac{7\sqrt{1430}i}{4576}$ | 0 | $\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{19\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{176}$ | 0 | $-\frac{3\sqrt{858}i}{1144}$ | $\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | 0 | 0 | 0 | $\frac{7\sqrt{1430}}{2288}$ |
| | | 0 | $\frac{19\sqrt{143}}{2288}$ | 0 | 0 | $-\frac{\sqrt{858}}{176}$ | 0 | $\frac{3\sqrt{858}i}{1144}$ | 0 | 0 | $-\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | 0 | $\frac{7\sqrt{1430}}{2288}$ | 0 |
| | | 0 | 0 | $\frac{7\sqrt{143}}{1144}$ | 0 | 0 | $-\frac{3\sqrt{858}i}{1144}$ | 0 | $\frac{\sqrt{858}}{286}$ | 0 | 0 | $-\frac{\sqrt{2145}}{1144}$ | 0 | 0 | 0 | $\frac{\sqrt{1430}i}{1144}$ |
| | | 0 | 0 | 0 | $-\frac{7\sqrt{143}}{1144}$ | $\frac{3\sqrt{858}i}{1144}$ | 0 | $\frac{\sqrt{858}}{286}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145}}{1144}$ | $-\frac{\sqrt{1430}i}{1144}$ | 0 | 0 |
| | | 0 | $-\frac{7\sqrt{1430}}{2288}$ | 0 | $-\frac{7\sqrt{1430}i}{4576}$ | $\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{858}}{2288}$ | 0 | $\frac{5\sqrt{858}i}{4576}$ | $-\frac{25\sqrt{143}}{2288}$ | 0 | 0 |
| | | $-\frac{7\sqrt{1430}}{2288}$ | 0 | $\frac{7\sqrt{1430}i}{4576}$ | 0 | 0 | $-\frac{7\sqrt{2145}}{2288}$ | 0 | 0 | $\frac{15\sqrt{858}}{2288}$ | 0 | $-\frac{5\sqrt{858}i}{4576}$ | 0 | 0 | 0 | $\frac{25\sqrt{143}}{2288}$ |
| | | 0 | $-\frac{5\sqrt{1430}i}{4576}$ | 0 | $\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | $-\frac{\sqrt{2145}}{1144}$ | 0 | 0 | $\frac{5\sqrt{858}i}{4576}$ | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{1430}i}{4576}$ | 0 | $\frac{7\sqrt{1430}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2145}}{1144}$ | $-\frac{5\sqrt{858}i}{4576}$ | 0 | $-\frac{5\sqrt{858}}{4576}$ | 0 | 0 | 0 | 0 |
| | | $\frac{3\sqrt{2145}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{7\sqrt{1430}}{2288}$ | 0 | $\frac{\sqrt{1430}i}{1144}$ | $-\frac{25\sqrt{143}}{2288}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{858}}{6864}$ |
| | | 0 | $-\frac{3\sqrt{2145}}{2288}$ | 0 | 0 | $\frac{7\sqrt{1430}}{2288}$ | 0 | $-\frac{\sqrt{1430}i}{1144}$ | 0 | 0 | $\frac{25\sqrt{143}}{2288}$ | 0 | 0 | 0 | $-\frac{25\sqrt{858}}{6864}$ | 0 |
| 998 | symmetry | $-\frac{\sqrt{231}y(x^2-2xz-z^2)(x^2+2xz-z^2)(3x^2-10y^2+3z^2)}{16}$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|----------------------------|-----------|-------------------------------|---------------------------------------------------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|------------------------------|-----------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|
| $M_{7,1}^{(1,-1;a)}(E, 2)$ | | 0 | $\frac{15\sqrt{182}i}{2912}$ | 0 | $-\frac{29\sqrt{182}}{2912}$ | 0 | 0 | $\frac{\sqrt{273}}{104}$ | 0 | 0 | $-\frac{\sqrt{2730}i}{416}$ | 0 | $\frac{\sqrt{2730}}{416}$ | 0 | 0 |
| | | $-\frac{15\sqrt{182}i}{2912}$ | 0 | $-\frac{29\sqrt{182}}{2912}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{273}}{104}$ | $\frac{\sqrt{2730}i}{416}$ | 0 | $\frac{\sqrt{2730}}{416}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{29\sqrt{182}}{2912}$ | 0 | $-\frac{9\sqrt{182}i}{1456}$ | $\frac{11\sqrt{273}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{2730}}{2912}$ | 0 | $\frac{3\sqrt{2730}i}{1456}$ | $\frac{\sqrt{455}}{1456}$ | 0 |
| | | $-\frac{29\sqrt{182}}{2912}$ | 0 | $\frac{9\sqrt{182}i}{1456}$ | 0 | 0 | $-\frac{11\sqrt{273}}{1456}$ | 0 | 0 | $\frac{5\sqrt{2730}}{2912}$ | 0 | $-\frac{3\sqrt{2730}i}{1456}$ | 0 | 0 | $-\frac{\sqrt{455}}{1456}$ |
| | | 0 | 0 | $\frac{11\sqrt{273}}{1456}$ | 0 | 0 | $-\frac{15\sqrt{182}i}{1456}$ | 0 | $\frac{9\sqrt{182}}{728}$ | 0 | 0 | $-\frac{3\sqrt{455}}{1456}$ | 0 | 0 | $\frac{\sqrt{2730}i}{1456}$ |
| | | 0 | 0 | 0 | $-\frac{11\sqrt{273}}{1456}$ | $\frac{15\sqrt{182}i}{1456}$ | 0 | $\frac{9\sqrt{182}}{728}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{455}}{1456}$ | $-\frac{\sqrt{2730}i}{1456}$ | 0 |
| | | $\frac{\sqrt{273}}{104}$ | 0 | 0 | 0 | 0 | $\frac{9\sqrt{182}}{728}$ | 0 | $\frac{3\sqrt{182}i}{182}$ | $\frac{3\sqrt{455}}{728}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2730}}{728}$ |
| | | 0 | $-\frac{\sqrt{273}}{104}$ | 0 | 0 | $\frac{9\sqrt{182}}{728}$ | 0 | $-\frac{3\sqrt{182}i}{182}$ | 0 | 0 | $-\frac{3\sqrt{455}}{728}$ | 0 | 0 | $\frac{\sqrt{2730}}{728}$ | 0 |
| | | 0 | $-\frac{\sqrt{2730}i}{416}$ | 0 | $\frac{5\sqrt{2730}}{2912}$ | 0 | 0 | $\frac{3\sqrt{455}}{728}$ | 0 | 0 | $-\frac{15\sqrt{182}i}{2912}$ | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | 0 |
| | | $\frac{\sqrt{2730}i}{416}$ | 0 | $\frac{5\sqrt{2730}}{2912}$ | 0 | 0 | 0 | $-\frac{3\sqrt{455}}{728}$ | $\frac{15\sqrt{182}i}{2912}$ | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{2730}}{416}$ | 0 | $\frac{3\sqrt{2730}i}{1456}$ | $-\frac{3\sqrt{455}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | $-\frac{15\sqrt{182}i}{1456}$ | $-\frac{15\sqrt{273}}{1456}$ | 0 |
| | | $\frac{\sqrt{2730}}{416}$ | 0 | $-\frac{3\sqrt{2730}i}{1456}$ | 0 | 0 | $\frac{3\sqrt{455}}{1456}$ | 0 | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | $\frac{15\sqrt{182}i}{1456}$ | 0 | 0 | $\frac{15\sqrt{273}}{1456}$ |
| | | 0 | 0 | $\frac{\sqrt{455}}{1456}$ | 0 | 0 | $\frac{\sqrt{2730}i}{1456}$ | 0 | $\frac{\sqrt{2730}}{728}$ | 0 | 0 | $-\frac{15\sqrt{273}}{1456}$ | 0 | 0 | $\frac{15\sqrt{182}i}{1456}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{455}}{1456}$ | $-\frac{\sqrt{2730}i}{1456}$ | 0 | $\frac{\sqrt{2730}}{728}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{273}}{1456}$ | $-\frac{15\sqrt{182}i}{1456}$ | 0 |
| | 999 | symmetry | $\frac{\sqrt{231}x(10x^2-3y^2-3z^2)(y^2-2yz-z^2)(y^2+2yz-z^2)}{16}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|----------------------------|---------------------------------------------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| | $M_{7,2}^{(1,-1;a)}(E, 2)$ | 0 | $\frac{9\sqrt{182}}{1456}$ | 0 | $\frac{29\sqrt{182i}}{2912}$ | $\frac{11\sqrt{273}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2730}}{1456}$ | 0 | $\frac{5\sqrt{2730i}}{2912}$ | $-\frac{\sqrt{455}}{1456}$ | 0 |
| | | $\frac{9\sqrt{182}}{1456}$ | 0 | $-\frac{29\sqrt{182i}}{2912}$ | 0 | 0 | $-\frac{11\sqrt{273}}{1456}$ | 0 | 0 | $\frac{3\sqrt{2730}}{1456}$ | 0 | $-\frac{5\sqrt{2730i}}{2912}$ | 0 | 0 | $\frac{\sqrt{455}}{1456}$ |
| | | 0 | $\frac{29\sqrt{182i}}{2912}$ | 0 | $-\frac{15\sqrt{182}}{2912}$ | 0 | 0 | $-\frac{\sqrt{273}}{104}$ | 0 | 0 | $\frac{\sqrt{2730i}}{416}$ | 0 | $-\frac{\sqrt{2730}}{416}$ | 0 | 0 |
| | | $-\frac{29\sqrt{182i}}{2912}$ | 0 | $-\frac{15\sqrt{182}}{2912}$ | 0 | 0 | 0 | $\frac{\sqrt{273}}{104}$ | $-\frac{\sqrt{2730i}}{416}$ | 0 | $-\frac{\sqrt{2730}}{416}$ | 0 | 0 | 0 | 0 |
| | | $\frac{11\sqrt{273}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{182}}{1456}$ | 0 | $\frac{9\sqrt{182i}}{728}$ | $\frac{3\sqrt{455}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2730}}{1456}$ |
| | | 0 | $-\frac{11\sqrt{273}}{1456}$ | 0 | 0 | $\frac{15\sqrt{182}}{1456}$ | 0 | $-\frac{9\sqrt{182i}}{728}$ | 0 | 0 | $-\frac{3\sqrt{455}}{1456}$ | 0 | 0 | $\frac{\sqrt{2730}}{1456}$ | 0 |
| | | 0 | 0 | $-\frac{\sqrt{273}}{104}$ | 0 | 0 | $\frac{9\sqrt{182i}}{728}$ | 0 | $-\frac{3\sqrt{182}}{182}$ | 0 | 0 | $\frac{3\sqrt{455}}{728}$ | 0 | 0 | $-\frac{\sqrt{2730i}}{728}$ |
| | | 0 | 0 | 0 | $\frac{\sqrt{273}}{104}$ | $-\frac{9\sqrt{182i}}{728}$ | 0 | $-\frac{3\sqrt{182}}{182}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{455}}{728}$ | $\frac{\sqrt{2730i}}{728}$ | 0 |
| | | 0 | $\frac{3\sqrt{2730}}{1456}$ | 0 | $\frac{\sqrt{2730i}}{416}$ | $\frac{3\sqrt{455}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{182}}{1456}$ | 0 | $-\frac{15\sqrt{182i}}{2912}$ | $-\frac{15\sqrt{273}}{1456}$ | 0 |
| | | $\frac{3\sqrt{2730}}{1456}$ | 0 | $-\frac{\sqrt{2730i}}{416}$ | 0 | 0 | $-\frac{3\sqrt{455}}{1456}$ | 0 | 0 | $\frac{15\sqrt{182}}{1456}$ | 0 | $\frac{15\sqrt{182i}}{2912}$ | 0 | 0 | $\frac{15\sqrt{273}}{1456}$ |
| | | 0 | $\frac{5\sqrt{2730i}}{2912}$ | 0 | $-\frac{\sqrt{2730}}{416}$ | 0 | 0 | $\frac{3\sqrt{455}}{728}$ | 0 | 0 | $-\frac{15\sqrt{182i}}{2912}$ | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | 0 |
| | | $-\frac{5\sqrt{2730i}}{2912}$ | 0 | $-\frac{\sqrt{2730}}{416}$ | 0 | 0 | 0 | $-\frac{3\sqrt{455}}{728}$ | $\frac{15\sqrt{182i}}{2912}$ | 0 | $\frac{15\sqrt{182}}{2912}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{455}}{1456}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2730}}{1456}$ | 0 | $-\frac{\sqrt{2730i}}{728}$ | $-\frac{15\sqrt{273}}{1456}$ | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{182}}{1456}$ |
| | | 0 | $\frac{\sqrt{455}}{1456}$ | 0 | 0 | $\frac{\sqrt{2730}}{1456}$ | 0 | $\frac{\sqrt{2730i}}{728}$ | 0 | 0 | $\frac{15\sqrt{273}}{1456}$ | 0 | 0 | $-\frac{15\sqrt{182}}{1456}$ | 0 |
| 1000 | symmetry | $\frac{\sqrt{6006}x(y-z)(y+z)(y^2-4yz+z^2)(y^2+4yz+z^2)}{32}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|------|---------------------------|----------------------------------------------------------------|-----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|
| | $M_{7,1}^{(1,-1;a)}(E,3)$ | 0 | 0 | 0 | $-\frac{3\sqrt{7}i}{224}$ | $-\frac{3\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{105}i}{224}$ | $-\frac{3\sqrt{70}}{224}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{7}i}{224}$ | 0 | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | 0 | 0 | $\frac{3\sqrt{105}i}{224}$ | 0 | 0 | $\frac{3\sqrt{70}}{224}$ |
| | | 0 | $-\frac{3\sqrt{7}i}{224}$ | 0 | $\frac{\sqrt{7}}{224}$ | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 | $-\frac{\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 |
| | | $\frac{3\sqrt{7}i}{224}$ | 0 | $\frac{\sqrt{7}}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | $\frac{\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{7}}{112}$ | 0 | $-\frac{3\sqrt{7}i}{56}$ | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | $-\frac{\sqrt{105}}{112}$ |
| | | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | 0 | $-\frac{3\sqrt{7}}{112}$ | 0 | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{112}$ |
| | | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | $\frac{3\sqrt{70}}{112}$ | 0 | 0 | $-\frac{\sqrt{105}i}{56}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | $\frac{3\sqrt{7}i}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | $\frac{\sqrt{105}i}{56}$ | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{224}$ | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{7}i}{224}$ | $-\frac{5\sqrt{42}}{224}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}i}{224}$ | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | $\frac{15\sqrt{7}i}{224}$ | 0 | 0 | $\frac{5\sqrt{42}}{224}$ |
| | | 0 | $-\frac{3\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | $\frac{3\sqrt{70}}{112}$ | 0 | 0 | $-\frac{15\sqrt{7}i}{224}$ | 0 | $\frac{15\sqrt{7}}{224}$ | 0 |
| | | $\frac{3\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | $\frac{15\sqrt{7}i}{224}$ | 0 | $\frac{15\sqrt{7}}{224}$ | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | $-\frac{\sqrt{105}i}{56}$ | $-\frac{5\sqrt{42}}{224}$ | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{112}$ |
| | | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | $\frac{\sqrt{105}i}{56}$ | 0 | 0 | $\frac{5\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}}{112}$ |
| 1001 | symmetry | $-\frac{\sqrt{6006}y(x-z)(x+z)(x^2-4xz+z^2)(x^2+4xz+z^2)}{32}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|---------------------------|---------------------------------------------------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
| | $M_{7,2}^{(1,-1;a)}(E,3)$ | 0 | $\frac{\sqrt{7}i}{224}$ | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | $\frac{\sqrt{42}}{112}$ | 0 | 0 | $-\frac{\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 |
| | | $-\frac{\sqrt{7}i}{224}$ | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{112}$ | $\frac{\sqrt{105}i}{224}$ | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{105}}{224}$ | 0 | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 |
| | | $-\frac{3\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{224}$ | 0 | 0 | $\frac{3\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ |
| | | 0 | 0 | $\frac{3\sqrt{42}}{224}$ | 0 | 0 | $-\frac{3\sqrt{7}i}{112}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{112}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{42}}{224}$ | $\frac{3\sqrt{7}i}{112}$ | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | $-\frac{\sqrt{105}i}{112}$ | 0 |
| | | $\frac{\sqrt{42}}{112}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{56}$ |
| | | 0 | $-\frac{\sqrt{42}}{112}$ | 0 | 0 | $\frac{3\sqrt{7}}{56}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{112}$ | 0 | 0 | $-\frac{\sqrt{105}}{56}$ | 0 |
| | | 0 | $-\frac{\sqrt{105}i}{224}$ | 0 | $\frac{3\sqrt{105}}{224}$ | 0 | 0 | $-\frac{3\sqrt{70}}{112}$ | 0 | 0 | $\frac{15\sqrt{7}i}{224}$ | 0 | $-\frac{15\sqrt{7}}{224}$ | 0 | 0 |
| | | $\frac{\sqrt{105}i}{224}$ | 0 | $\frac{3\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{112}$ | $-\frac{15\sqrt{7}i}{224}$ | 0 | $-\frac{15\sqrt{7}}{224}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}}{224}$ | 0 | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{7}}{224}$ | 0 | 0 | $\frac{5\sqrt{42}}{224}$ | 0 |
| | | $\frac{\sqrt{105}}{224}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | 0 | 0 | $-\frac{15\sqrt{7}}{224}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ |
| | | 0 | 0 | $-\frac{3\sqrt{70}}{224}$ | 0 | 0 | $\frac{\sqrt{105}i}{112}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | $\frac{5\sqrt{42}}{224}$ | 0 | 0 | $-\frac{5\sqrt{7}i}{112}$ |
| | | 0 | 0 | 0 | $\frac{3\sqrt{70}}{224}$ | $-\frac{\sqrt{105}i}{112}$ | 0 | $-\frac{\sqrt{105}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{42}}{224}$ | $\frac{5\sqrt{7}i}{112}$ | 0 |
| 1002 | symmetry | $\frac{\sqrt{42}x(y-z)(y+z)(48x^4-80x^2y^2-80x^2z^2+15y^4+30y^2z^2+15z^4)}{32}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|----------------------------|---------------------------------|----------------------------------------------------------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|-------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------------|--|
| $M_{7,1}^{(1,-1;a)}(E, 4)$ | 0 | $-\frac{15\sqrt{1001}}{2002}$ | 0 | $-\frac{23\sqrt{1001i}}{2912}$ | $-\frac{\sqrt{6006}}{2464}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15015}}{2002}$ | 0 | $\frac{3\sqrt{15015i}}{32032}$ | $\frac{19\sqrt{10010}}{32032}$ | 0 | |
| | $-\frac{15\sqrt{1001}}{2002}$ | 0 | $\frac{23\sqrt{1001i}}{2912}$ | 0 | 0 | $\frac{\sqrt{6006}}{2464}$ | 0 | 0 | $-\frac{\sqrt{15015}}{2002}$ | 0 | $-\frac{3\sqrt{15015i}}{32032}$ | 0 | 0 | $-\frac{19\sqrt{10010}}{32032}$ | |
| | 0 | $-\frac{23\sqrt{1001i}}{2912}$ | 0 | $\frac{255\sqrt{1001}}{32032}$ | 0 | 0 | $-\frac{\sqrt{6006}}{16016}$ | 0 | 0 | $\frac{\sqrt{15015i}}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | |
| | $\frac{23\sqrt{1001i}}{2912}$ | 0 | $\frac{255\sqrt{1001}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006}}{16016}$ | $-\frac{\sqrt{15015i}}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | 0 | |
| | $-\frac{\sqrt{6006}}{2464}$ | 0 | 0 | 0 | 0 | $-\frac{45\sqrt{1001}}{16016}$ | 0 | $\frac{3\sqrt{1001i}}{8008}$ | $\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{15015}}{16016}$ | |
| | 0 | $\frac{\sqrt{6006}}{2464}$ | 0 | 0 | $-\frac{45\sqrt{1001}}{16016}$ | 0 | $-\frac{3\sqrt{1001i}}{8008}$ | 0 | 0 | $-\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | $\frac{17\sqrt{15015}}{16016}$ | 0 | |
| | 0 | 0 | $-\frac{\sqrt{6006}}{16016}$ | 0 | 0 | $\frac{3\sqrt{1001i}}{8008}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{16016}$ | 0 | 0 | $\frac{\sqrt{15015i}}{8008}$ | |
| | 0 | 0 | 0 | $\frac{\sqrt{6006}}{16016}$ | $-\frac{3\sqrt{1001i}}{8008}$ | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10010}}{16016}$ | $-\frac{\sqrt{15015i}}{8008}$ | 0 | 0 | |
| | 0 | $-\frac{\sqrt{15015}}{2002}$ | 0 | $\frac{\sqrt{15015i}}{32032}$ | $\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | 0 | $\frac{15\sqrt{1001i}}{32032}$ | $-\frac{75\sqrt{6006}}{32032}$ | 0 | |
| | $-\frac{\sqrt{15015}}{2002}$ | 0 | $-\frac{\sqrt{15015i}}{32032}$ | 0 | 0 | $-\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | 0 | $-\frac{15\sqrt{1001i}}{32032}$ | 0 | 0 | $\frac{75\sqrt{6006}}{32032}$ | |
| | 0 | $\frac{3\sqrt{15015i}}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | $-\frac{3\sqrt{10010}}{16016}$ | 0 | 0 | $\frac{15\sqrt{1001i}}{32032}$ | 0 | $-\frac{15\sqrt{1001}}{32032}$ | 0 | 0 | |
| | $-\frac{3\sqrt{15015i}}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10010}}{16016}$ | $-\frac{15\sqrt{1001i}}{32032}$ | 0 | $-\frac{15\sqrt{1001}}{32032}$ | 0 | 0 | 0 | |
| | $\frac{19\sqrt{10010}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{15015}}{16016}$ | 0 | $\frac{\sqrt{15015i}}{8008}$ | $-\frac{75\sqrt{6006}}{32032}$ | 0 | 0 | 0 | 0 | $-\frac{75\sqrt{1001}}{16016}$ | |
| | 0 | $-\frac{19\sqrt{10010}}{32032}$ | 0 | 0 | $\frac{17\sqrt{15015}}{16016}$ | 0 | $-\frac{\sqrt{15015i}}{8008}$ | 0 | 0 | $\frac{75\sqrt{6006}}{32032}$ | 0 | 0 | $-\frac{75\sqrt{1001}}{16016}$ | 0 | |
| 1003 | symmetry | $-\frac{\sqrt{42}y(x-z)(x+z)(15x^4-80x^2y^2+30x^2z^2+48y^4-80y^2z^2+15z^4)}{32}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | | |
|------|-----------|----------------------------|----------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|----------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|---|
| 1004 | symmetry | $M_{7,2}^{(1,-1;a)}(E, 4)$ | 0 | $\frac{255\sqrt{1001}i}{32032}$ | 0 | $-\frac{23\sqrt{1001}}{2912}$ | 0 | 0 | $-\frac{\sqrt{6006}}{16016}$ | 0 | 0 | $\frac{\sqrt{15015}i}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | |
| | | | $-\frac{255\sqrt{1001}i}{32032}$ | 0 | $-\frac{23\sqrt{1001}}{2912}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006}}{16016}$ | $-\frac{\sqrt{15015}i}{32032}$ | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | 0 | 0 | |
| | | | 0 | $-\frac{23\sqrt{1001}}{2912}$ | 0 | $-\frac{15\sqrt{1001}i}{2002}$ | $\frac{\sqrt{6006}}{2464}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{15015}}{32032}$ | 0 | $\frac{\sqrt{15015}i}{2002}$ | $\frac{19\sqrt{10010}}{32032}$ | 0 | |
| | | | $-\frac{23\sqrt{1001}}{2912}$ | 0 | $\frac{15\sqrt{1001}i}{2002}$ | 0 | 0 | $-\frac{\sqrt{6006}}{2464}$ | 0 | 0 | $-\frac{3\sqrt{15015}}{32032}$ | 0 | $-\frac{\sqrt{15015}i}{2002}$ | 0 | 0 | $-\frac{19\sqrt{10010}}{32032}$ | |
| | | | 0 | 0 | $\frac{\sqrt{6006}}{2464}$ | 0 | 0 | $-\frac{45\sqrt{1001}i}{16016}$ | 0 | $-\frac{3\sqrt{1001}}{8008}$ | 0 | 0 | $\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | $-\frac{17\sqrt{15015}i}{16016}$ | |
| | | | 0 | 0 | 0 | $-\frac{\sqrt{6006}}{2464}$ | $\frac{45\sqrt{1001}i}{16016}$ | 0 | $-\frac{3\sqrt{1001}}{8008}$ | 0 | 0 | 0 | 0 | $-\frac{51\sqrt{10010}}{32032}$ | $\frac{17\sqrt{15015}i}{16016}$ | 0 | |
| | | | $-\frac{\sqrt{6006}}{16016}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{1001}}{8008}$ | 0 | 0 | $\frac{3\sqrt{10010}}{16016}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15015}}{8008}$ | |
| | | | 0 | $\frac{\sqrt{6006}}{16016}$ | 0 | 0 | $-\frac{3\sqrt{1001}}{8008}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{16016}$ | 0 | 0 | 0 | $\frac{\sqrt{15015}}{8008}$ | 0 |
| | | | 0 | $\frac{\sqrt{15015}i}{32032}$ | 0 | $-\frac{3\sqrt{15015}}{32032}$ | 0 | 0 | $\frac{3\sqrt{10010}}{16016}$ | 0 | 0 | 0 | $-\frac{15\sqrt{1001}i}{32032}$ | 0 | $\frac{15\sqrt{1001}}{32032}$ | 0 | 0 |
| | | | $-\frac{\sqrt{15015}i}{32032}$ | 0 | $-\frac{3\sqrt{15015}}{32032}$ | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{16016}$ | $\frac{15\sqrt{1001}i}{32032}$ | 0 | $\frac{15\sqrt{1001}}{32032}$ | 0 | 0 | 0 | 0 | |
| | | | 0 | $-\frac{\sqrt{15015}}{32032}$ | 0 | $\frac{\sqrt{15015}i}{2002}$ | $\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | 0 | 0 | $\frac{15\sqrt{1001}}{32032}$ | 0 | $\frac{15\sqrt{1001}i}{2002}$ | $\frac{75\sqrt{6006}}{32032}$ | 0 | |
| | | | $-\frac{\sqrt{15015}}{32032}$ | 0 | $-\frac{\sqrt{15015}i}{2002}$ | 0 | 0 | $-\frac{51\sqrt{10010}}{32032}$ | 0 | 0 | $\frac{15\sqrt{1001}}{32032}$ | 0 | $-\frac{15\sqrt{1001}i}{2002}$ | 0 | 0 | $-\frac{75\sqrt{6006}}{32032}$ | |
| | | | 0 | 0 | $\frac{19\sqrt{10010}}{32032}$ | 0 | 0 | $-\frac{17\sqrt{15015}i}{16016}$ | 0 | $\frac{\sqrt{15015}}{8008}$ | 0 | 0 | $\frac{75\sqrt{6006}}{32032}$ | 0 | 0 | $-\frac{75\sqrt{1001}i}{16016}$ | |
| | | | 0 | 0 | 0 | $-\frac{19\sqrt{10010}}{32032}$ | $\frac{17\sqrt{15015}i}{16016}$ | 0 | $\frac{\sqrt{15015}}{8008}$ | 0 | 0 | 0 | 0 | $-\frac{75\sqrt{6006}}{32032}$ | $\frac{75\sqrt{1001}i}{16016}$ | 0 | |

z

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|--------------------------|----------------------------|
| | $M_1^{(1,1;\alpha)}(A)$ | $-\frac{\sqrt{105}}{42}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{105}}{42}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{105}}{42}$ | 0 | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{42}$ | $\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | $-\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 |
| | | $\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 |
| | | $-\frac{\sqrt{70i}}{56}$ | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{42i}}{56}$ | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | $-\frac{\sqrt{70i}}{140}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42i}}{56}$ | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{70}$ | $\frac{\sqrt{70i}}{140}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 | $-\frac{\sqrt{70i}}{140}$ | $\frac{2\sqrt{105}}{105}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 | $\frac{\sqrt{70i}}{140}$ | 0 | 0 | $-\frac{2\sqrt{105}}{105}$ |
| 1005 | symmetry | y | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|-----------|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|
| | | 0 | $-\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{70}}{56}$ | $\frac{\sqrt{7}i}{28}$ | 0 | $\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{105}i}{84}$ | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}i}{84}$ | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{7}i}{14}$ | 0 |
| | | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{3\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $-\frac{3\sqrt{105}i}{140}$ | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $-\frac{\sqrt{105}i}{140}$ | $\frac{\sqrt{70}}{140}$ | 0 |
| | | $\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | $\frac{\sqrt{105}i}{140}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | $\frac{\sqrt{70}}{140}$ | 0 | 0 | $\frac{\sqrt{105}i}{105}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{140}$ | $-\frac{\sqrt{105}i}{105}$ | 0 |
| 1006 | symmetry | x | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|-----------------------------|--------------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | $M_{1,2}^{(1,1;\alpha)}(E)$ | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 |
| | | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{105}}{84}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 |
| | | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ |
| | | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 |
| | | 0 | 0 | $\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{7}i}{14}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $-\frac{\sqrt{7}i}{14}$ | 0 |
| | | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | $\frac{\sqrt{7}i}{28}$ | $\frac{\sqrt{42}}{56}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $-\frac{\sqrt{105}i}{70}$ | $\frac{\sqrt{70}}{140}$ | 0 |
| | | $-\frac{\sqrt{7}}{28}$ | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | 0 | $\frac{\sqrt{105}}{140}$ | 0 | $\frac{\sqrt{105}i}{70}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ |
| | | 0 | $-\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | $\frac{\sqrt{42}}{56}$ | 0 | 0 | $-\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | 0 |
| | | $\frac{\sqrt{7}i}{28}$ | 0 | $-\frac{\sqrt{7}}{28}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}}{56}$ | $\frac{\sqrt{105}i}{70}$ | 0 | $-\frac{3\sqrt{105}}{140}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $\frac{\sqrt{7}i}{14}$ | $\frac{\sqrt{70}}{140}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{105}}{105}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}}{14}$ | 0 | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | $-\frac{\sqrt{70}}{140}$ | 0 | 0 | $-\frac{\sqrt{105}}{105}$ | 0 |
| 1007 | symmetry | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|------|--------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| | | $\frac{\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | $-\frac{5\sqrt{462}i}{924}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{77}}{77}$ | 0 | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | $\frac{5\sqrt{462}i}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{\sqrt{77}}{77}$ | 0 | 0 | $\frac{5\sqrt{462}i}{924}$ | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{\sqrt{77}}{77}$ | $-\frac{5\sqrt{462}i}{924}$ | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | $\frac{5\sqrt{462}i}{924}$ | $-\frac{\sqrt{77}}{33}$ | 0 | 0 | 0 | $\frac{\sqrt{770}}{231}$ | 0 | $\frac{\sqrt{770}i}{231}$ | 0 | 0 |
| | | $-\frac{5\sqrt{462}}{924}$ | 0 | $-\frac{5\sqrt{462}i}{924}$ | 0 | 0 | $\frac{\sqrt{77}}{33}$ | 0 | 0 | $\frac{\sqrt{770}}{231}$ | 0 | $-\frac{\sqrt{770}i}{231}$ | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{462}i}{924}$ | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | 0 | $-\frac{\sqrt{77}}{33}$ | 0 | 0 | $-\frac{\sqrt{770}i}{231}$ | 0 | $\frac{\sqrt{770}}{231}$ | 0 |
| | $M_3^{(1,1;a)}(A)$ | $\frac{5\sqrt{462}i}{924}$ | 0 | $-\frac{5\sqrt{462}}{924}$ | 0 | 0 | 0 | $\frac{\sqrt{77}}{33}$ | $\frac{\sqrt{770}i}{231}$ | 0 | $\frac{\sqrt{770}}{231}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{231}$ | 0 | $-\frac{\sqrt{770}i}{231}$ | $\frac{\sqrt{77}}{231}$ | 0 | 0 | 0 | $\frac{5\sqrt{462}}{924}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{231}$ | 0 | $\frac{\sqrt{770}i}{231}$ | 0 | $-\frac{\sqrt{77}}{231}$ | 0 | 0 | $\frac{5\sqrt{462}}{924}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{231}$ | 0 | $\frac{\sqrt{770}}{231}$ | 0 | $\frac{\sqrt{77}}{231}$ | 0 | 0 | $-\frac{5\sqrt{462}i}{924}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{231}$ | 0 | $\frac{\sqrt{770}}{231}$ | 0 | 0 | 0 | $-\frac{\sqrt{77}}{231}$ | $\frac{5\sqrt{462}i}{924}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{924}$ | 0 | $-\frac{5\sqrt{462}i}{924}$ | $\frac{2\sqrt{77}}{77}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{924}$ | 0 | $\frac{5\sqrt{462}i}{924}$ | 0 | $-\frac{2\sqrt{77}}{77}$ |
| 1008 | symmetry | $\sqrt{15}xyz$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|----------------------|-----------|----------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|
| $M_3^{(1,1;a)}(B,1)$ | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | 0 | 0 | $-\frac{\sqrt{462}i}{88}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | $\frac{\sqrt{462}i}{88}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $-\frac{\sqrt{770}i}{616}$ | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}}{88}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | 0 | 0 | $-\frac{\sqrt{462}}{88}$ | 0 |
| | | 0 | $-\frac{\sqrt{770}i}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 |
| | | $\frac{\sqrt{770}i}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | $-\frac{\sqrt{770}i}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $-\frac{\sqrt{462}i}{616}$ | $-\frac{\sqrt{77}}{154}$ | 0 |
| | | $-\frac{\sqrt{770}}{616}$ | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $\frac{\sqrt{462}i}{616}$ | 0 | 0 | $\frac{\sqrt{77}}{154}$ |
| | | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | $\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{616}$ | 0 | 0 | $\frac{\sqrt{1155}}{231}$ | 0 | 0 | $\frac{\sqrt{770}i}{616}$ |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | $-\frac{\sqrt{462}i}{168}$ | 0 | $\frac{\sqrt{462}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | $-\frac{\sqrt{770}i}{616}$ | 0 |
| | | $-\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{168}$ | 0 | $-\frac{\sqrt{462}i}{616}$ | $\frac{\sqrt{1155}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{616}$ |
| | | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | $\frac{\sqrt{462}}{168}$ | 0 | $\frac{\sqrt{462}i}{616}$ | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | 0 |
| | | 0 | $-\frac{\sqrt{462}i}{88}$ | 0 | $-\frac{\sqrt{462}}{88}$ | 0 | 0 | 0 | $-\frac{\sqrt{77}}{154}$ | 0 | 0 | $\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 |
| | | $\frac{\sqrt{462}i}{88}$ | 0 | $-\frac{\sqrt{462}}{88}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{154}$ | $-\frac{\sqrt{770}i}{616}$ | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 |
| 1009 | symmetry | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|-----------------------|-----------|------------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---|
| $M_3^{(1,1;a)}(B, 2)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $-\frac{\sqrt{770i}}{616}$ | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | $-\frac{\sqrt{462}}{88}$ | | |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $\frac{\sqrt{770i}}{616}$ | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | 0 | 0 | $-\frac{\sqrt{462}}{88}$ | 0 | |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770i}}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | $\frac{\sqrt{462i}}{88}$ | |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770i}}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | $-\frac{\sqrt{462i}}{88}$ | 0 | |
| | | 0 | $\frac{\sqrt{770}}{616}$ | 0 | $\frac{\sqrt{770i}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $-\frac{\sqrt{462i}}{616}$ | $-\frac{\sqrt{77}}{154}$ | 0 | |
| | | $\frac{\sqrt{770}}{616}$ | 0 | $-\frac{\sqrt{770i}}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $\frac{\sqrt{462i}}{616}$ | 0 | $\frac{\sqrt{77}}{154}$ | |
| | | 0 | $-\frac{\sqrt{770i}}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462i}}{168}$ | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | 0 | |
| | | $\frac{\sqrt{770i}}{616}$ | 0 | $\frac{\sqrt{770}}{616}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462i}}{168}$ | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 | |
| | | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $-\frac{\sqrt{462i}}{168}$ | $\frac{\sqrt{1155}}{231}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | |
| | | 0 | $-\frac{3\sqrt{77}}{154}$ | 0 | 0 | $\frac{\sqrt{462}}{616}$ | 0 | $\frac{\sqrt{462i}}{168}$ | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{77}}{154}$ | 0 | 0 | $-\frac{\sqrt{462i}}{616}$ | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | 0 | $-\frac{\sqrt{1155}}{231}$ | 0 | 0 | $-\frac{\sqrt{770i}}{616}$ | |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{154}$ | $\frac{\sqrt{462i}}{616}$ | 0 | $-\frac{\sqrt{462}}{168}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{231}$ | $\frac{\sqrt{770i}}{616}$ | 0 | |
| | | 0 | $-\frac{\sqrt{462}}{88}$ | 0 | $\frac{\sqrt{462i}}{88}$ | $-\frac{\sqrt{77}}{154}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | $-\frac{\sqrt{770i}}{616}$ | 0 | 0 | |
| | | $-\frac{\sqrt{462}}{88}$ | 0 | $-\frac{\sqrt{462i}}{88}$ | 0 | 0 | $\frac{\sqrt{77}}{154}$ | 0 | 0 | $-\frac{\sqrt{770}}{616}$ | 0 | $\frac{\sqrt{770i}}{616}$ | 0 | 0 | 0 | |
| 1010 | symmetry | $-\frac{y(3x^2 - 2y^2 + 3z^2)}{2}$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|-----------|-------------------------------|-----------------------------|-------------------------------|--------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|--------------------------------|-----------------------------|----------------------------|
| $M_{3,1}^{(1,1;a)}(E, 1)$ | | 0 | $-\frac{3\sqrt{77}i}{616}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}i}{1848}$ | 0 | $\frac{5\sqrt{1155}}{924}$ | 0 | 0 |
| | | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | $-\frac{\sqrt{1155}i}{1848}$ | 0 | $\frac{5\sqrt{1155}}{924}$ | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{77}i}{616}$ | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{462}$ | 0 | $-\frac{13\sqrt{1155}i}{1848}$ | $\frac{\sqrt{770}}{176}$ | 0 |
| | | 0 | 0 | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{462}$ | 0 | $\frac{13\sqrt{1155}i}{1848}$ | 0 | 0 | $-\frac{\sqrt{770}}{176}$ |
| | | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{77}i}{132}$ | 0 | $-\frac{5\sqrt{77}}{264}$ | 0 | 0 | $\frac{5\sqrt{770}}{3696}$ | 0 | 0 | $\frac{\sqrt{1155}i}{924}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | $\frac{\sqrt{77}i}{132}$ | 0 | $-\frac{5\sqrt{77}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{3696}$ | $-\frac{\sqrt{1155}i}{924}$ | 0 |
| | | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{77}}{264}$ | 0 | $\frac{\sqrt{77}i}{33}$ | $-\frac{19\sqrt{770}}{3696}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{1848}$ |
| | | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{5\sqrt{77}}{264}$ | 0 | $-\frac{\sqrt{77}i}{33}$ | 0 | 0 | $\frac{19\sqrt{770}}{3696}$ | 0 | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 |
| | | 0 | $\frac{\sqrt{1155}i}{1848}$ | 0 | $\frac{\sqrt{1155}}{462}$ | 0 | 0 | $-\frac{19\sqrt{770}}{3696}$ | 0 | 0 | $-\frac{23\sqrt{77}i}{1848}$ | 0 | $-\frac{5\sqrt{77}}{924}$ | 0 | 0 |
| | | $-\frac{\sqrt{1155}i}{1848}$ | 0 | $\frac{\sqrt{1155}}{462}$ | 0 | 0 | 0 | $\frac{19\sqrt{770}}{3696}$ | $\frac{23\sqrt{77}i}{1848}$ | 0 | $-\frac{5\sqrt{77}}{924}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{5\sqrt{1155}}{924}$ | 0 | $-\frac{13\sqrt{1155}i}{1848}$ | $\frac{5\sqrt{770}}{3696}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{77}}{924}$ | 0 | $\frac{17\sqrt{77}i}{1848}$ | $-\frac{5\sqrt{462}}{1232}$ | 0 |
| | | $\frac{5\sqrt{1155}}{924}$ | 0 | $\frac{13\sqrt{1155}i}{1848}$ | 0 | 0 | $-\frac{5\sqrt{770}}{3696}$ | 0 | 0 | $-\frac{5\sqrt{77}}{924}$ | 0 | $-\frac{17\sqrt{77}i}{1848}$ | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ |
| | | 0 | 0 | $\frac{\sqrt{770}}{176}$ | 0 | 0 | $\frac{\sqrt{1155}i}{924}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{3\sqrt{77}i}{308}$ |
| | | 0 | 0 | 0 | $-\frac{\sqrt{770}}{176}$ | $-\frac{\sqrt{1155}i}{924}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | $\frac{3\sqrt{77}i}{308}$ | 0 |
| 1011 | symmetry | $\frac{x(2x^2-3y^2-3z^2)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|---------------------------|-------------------------------|----------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|
| $M_{3,2}^{(1,1;a)}(E, 1)$ | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{1155}}{1848}$ | 0 | $\frac{\sqrt{1155}i}{462}$ | $-\frac{\sqrt{770}}{176}$ | 0 |
| | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{13\sqrt{1155}}{1848}$ | 0 | $-\frac{\sqrt{1155}i}{462}$ | 0 | 0 | $\frac{\sqrt{770}}{176}$ |
| | 0 | 0 | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $\frac{5\sqrt{1155}i}{924}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 |
| | 0 | 0 | $\frac{3\sqrt{77}}{616}$ | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | $-\frac{5\sqrt{1155}i}{924}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 | 0 | 0 |
| | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{132}$ | 0 | $-\frac{5\sqrt{77}i}{264}$ | $-\frac{5\sqrt{770}}{3696}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ |
| | 0 | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{77}}{132}$ | 0 | $\frac{5\sqrt{77}i}{264}$ | 0 | 0 | $\frac{5\sqrt{770}}{3696}$ | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 |
| | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{5\sqrt{77}i}{264}$ | 0 | $-\frac{\sqrt{77}}{33}$ | 0 | 0 | $-\frac{19\sqrt{770}}{3696}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{1848}$ |
| | 0 | 0 | 0 | $-\frac{5\sqrt{462}}{1232}$ | $\frac{5\sqrt{77}i}{264}$ | 0 | $-\frac{\sqrt{77}}{33}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{770}}{3696}$ | $\frac{\sqrt{1155}i}{1848}$ | 0 |
| | 0 | $-\frac{13\sqrt{1155}}{1848}$ | 0 | $\frac{5\sqrt{1155}i}{924}$ | $-\frac{5\sqrt{770}}{3696}$ | 0 | 0 | 0 | 0 | $-\frac{17\sqrt{77}}{1848}$ | 0 | $\frac{5\sqrt{77}i}{924}$ | $-\frac{5\sqrt{462}}{1232}$ | 0 |
| | $-\frac{13\sqrt{1155}}{1848}$ | 0 | $-\frac{5\sqrt{1155}i}{924}$ | 0 | 0 | $\frac{5\sqrt{770}}{3696}$ | 0 | 0 | $-\frac{17\sqrt{77}}{1848}$ | 0 | $-\frac{5\sqrt{77}i}{924}$ | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ |
| | 0 | $\frac{\sqrt{1155}i}{462}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 | $-\frac{19\sqrt{770}}{3696}$ | 0 | 0 | $\frac{5\sqrt{77}i}{924}$ | 0 | $\frac{23\sqrt{77}}{1848}$ | 0 | 0 |
| | $-\frac{\sqrt{1155}i}{462}$ | 0 | $\frac{\sqrt{1155}}{1848}$ | 0 | 0 | 0 | 0 | $\frac{19\sqrt{770}}{3696}$ | $-\frac{5\sqrt{77}i}{924}$ | 0 | $\frac{23\sqrt{77}}{1848}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{770}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $-\frac{\sqrt{1155}i}{1848}$ | $-\frac{5\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{77}}{308}$ |
| | 0 | $\frac{\sqrt{770}}{176}$ | 0 | 0 | $\frac{\sqrt{1155}}{924}$ | 0 | $\frac{\sqrt{1155}i}{1848}$ | 0 | 0 | $\frac{5\sqrt{462}}{1232}$ | 0 | 0 | $\frac{3\sqrt{77}}{308}$ | 0 |
| 1012 | symmetry | $\frac{\sqrt{15x(y-z)(y+z)}}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|----------------------------|-----------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|---|
| $M_{3,1}^{(1,1;a)}(E, 2)$ | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{616}$ | 0 | $-\frac{2\sqrt{77}i}{77}$ | $\frac{\sqrt{462}}{176}$ | 0 | |
| | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{77}}{616}$ | 0 | $\frac{2\sqrt{77}i}{77}$ | 0 | 0 | $-\frac{\sqrt{462}}{176}$ | |
| | 0 | 0 | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{13\sqrt{77}}{616}$ | 0 | 0 | |
| | 0 | 0 | $\frac{\sqrt{1155}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{13\sqrt{77}}{616}$ | 0 | 0 | 0 | |
| | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{132}$ | 0 | $\frac{\sqrt{1155}i}{264}$ | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{308}$ | |
| | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155}}{132}$ | 0 | $-\frac{\sqrt{1155}i}{264}$ | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | $\frac{\sqrt{77}}{308}$ | 0 |
| | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}i}{264}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{462}}{3696}$ | 0 | 0 | $-\frac{3\sqrt{77}i}{616}$ | |
| | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{\sqrt{1155}i}{264}$ | 0 | 0 | 0 | 0 | 0 | $\frac{13\sqrt{462}}{3696}$ | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | |
| | 0 | $\frac{\sqrt{77}}{616}$ | 0 | $\frac{\sqrt{77}i}{308}$ | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{616}$ | 0 | $\frac{\sqrt{1155}i}{308}$ | $-\frac{5\sqrt{770}}{1232}$ | 0 | |
| | $\frac{\sqrt{77}}{616}$ | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155}}{616}$ | 0 | $-\frac{\sqrt{1155}i}{308}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | |
| | 0 | $-\frac{2\sqrt{77}i}{77}$ | 0 | $-\frac{13\sqrt{77}}{616}$ | 0 | 0 | $-\frac{13\sqrt{462}}{3696}$ | 0 | 0 | $\frac{\sqrt{1155}i}{308}$ | 0 | $\frac{5\sqrt{1155}}{1848}$ | 0 | 0 | |
| | $\frac{2\sqrt{77}i}{77}$ | 0 | $-\frac{13\sqrt{77}}{616}$ | 0 | 0 | 0 | 0 | $\frac{13\sqrt{462}}{3696}$ | $-\frac{\sqrt{1155}i}{308}$ | 0 | $\frac{5\sqrt{1155}}{1848}$ | 0 | 0 | 0 | |
| | $\frac{\sqrt{462}}{176}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $-\frac{3\sqrt{77}i}{616}$ | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | |
| | 0 | $-\frac{\sqrt{462}}{176}$ | 0 | 0 | $\frac{\sqrt{77}}{308}$ | 0 | $\frac{3\sqrt{77}i}{616}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | |
| 1013 | symmetry | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|---------------------------|-----------|-------------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|---|
| $M_{3,2}^{(1,1;a)}(E, 2)$ | | 0 | $\frac{\sqrt{1155}i}{616}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{13\sqrt{77}i}{616}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | |
| | | $-\frac{\sqrt{1155}i}{616}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{13\sqrt{77}i}{616}$ | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | 0 | 0 | |
| | | 0 | 0 | 0 | $\frac{\sqrt{1155}i}{616}$ | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{77}}{77}$ | 0 | $-\frac{\sqrt{77}i}{616}$ | $\frac{\sqrt{462}}{176}$ | 0 | |
| | | 0 | 0 | $-\frac{\sqrt{1155}i}{616}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{2\sqrt{77}}{77}$ | 0 | $\frac{\sqrt{77}i}{616}$ | 0 | 0 | $-\frac{\sqrt{462}}{176}$ | |
| | | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155}i}{132}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | |
| | | 0 | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | $\frac{\sqrt{1155}i}{132}$ | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | $\frac{\sqrt{77}i}{308}$ | 0 | |
| | | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | $\frac{13\sqrt{462}}{3696}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{616}$ | |
| | | 0 | $-\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $-\frac{\sqrt{1155}}{264}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{462}}{3696}$ | 0 | 0 | 0 | $-\frac{3\sqrt{77}}{616}$ | |
| | | 0 | $\frac{13\sqrt{77}i}{616}$ | 0 | $\frac{2\sqrt{77}}{77}$ | 0 | 0 | 0 | $\frac{13\sqrt{462}}{3696}$ | 0 | 0 | $\frac{5\sqrt{1155}i}{1848}$ | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | 0 |
| | | $-\frac{13\sqrt{77}i}{616}$ | 0 | $\frac{2\sqrt{77}}{77}$ | 0 | 0 | 0 | 0 | $-\frac{13\sqrt{462}}{3696}$ | $-\frac{5\sqrt{1155}i}{1848}$ | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | 0 | 0 | |
| | | 0 | $-\frac{\sqrt{77}}{308}$ | 0 | $-\frac{\sqrt{77}i}{616}$ | $-\frac{9\sqrt{462}}{1232}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $-\frac{\sqrt{1155}i}{616}$ | $\frac{5\sqrt{770}}{1232}$ | 0 | |
| | | $-\frac{\sqrt{77}}{308}$ | 0 | $\frac{\sqrt{77}i}{616}$ | 0 | 0 | $\frac{9\sqrt{462}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}}{308}$ | 0 | $\frac{\sqrt{1155}i}{616}$ | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | |
| | | 0 | 0 | $\frac{\sqrt{462}}{176}$ | 0 | 0 | $-\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{3\sqrt{77}}{616}$ | 0 | 0 | $\frac{5\sqrt{770}}{1232}$ | 0 | 0 | $\frac{\sqrt{1155}i}{308}$ | |
| | | 0 | 0 | 0 | $-\frac{\sqrt{462}}{176}$ | $\frac{\sqrt{77}i}{308}$ | 0 | $-\frac{3\sqrt{77}}{616}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{770}}{1232}$ | $-\frac{\sqrt{1155}i}{308}$ | 0 | |
| 1014 | symmetry | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------|-----------|-----------------------------|------------------------------------------------------------|----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|----------------------------|---------------------------|
| $M_5^{(1,1;a)}(A, 1)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | 0 | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | $\frac{\sqrt{286}i}{572}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{4290}i}{312}$ | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | $-\frac{\sqrt{286}i}{572}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $-\frac{\sqrt{4290}i}{312}$ | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{286}}{572}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{\sqrt{286}}{572}$ | 0 |
| | | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | 0 | $\frac{\sqrt{715}}{143}$ | 0 | 0 | $\frac{3\sqrt{286}i}{1144}$ | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | 0 |
| | | $-\frac{\sqrt{4290}i}{312}$ | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{715}}{143}$ | $-\frac{3\sqrt{286}i}{1144}$ | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $-\frac{\sqrt{4290}i}{312}$ | $\frac{\sqrt{715}}{143}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | 0 |
| | | $\frac{\sqrt{4290}}{312}$ | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | 0 | $-\frac{\sqrt{715}}{143}$ | 0 | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | $\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 |
| | | 0 | 0 | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | $\frac{3\sqrt{286}i}{1144}$ | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | $-\frac{3\sqrt{286}i}{1144}$ | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $\frac{3\sqrt{286}i}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{286}i}{572}$ | 0 | $-\frac{\sqrt{286}}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{286}i}{572}$ | 0 | $-\frac{\sqrt{286}}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1015 | symmetry | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----------------------|-----------|---------------------------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|
| $M_5^{(1,1;a)}(A, 2)$ | | $-\frac{\sqrt{1001}}{2002}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | $\frac{\sqrt{6006i}}{3432}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{1001}}{2002}$ | 0 | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | $-\frac{\sqrt{6006i}}{3432}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{\sqrt{1001}}{2002}$ | 0 | 0 | $-\frac{\sqrt{6006i}}{3432}$ | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{\sqrt{1001}}{2002}$ | $\frac{\sqrt{6006i}}{3432}$ | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | $-\frac{\sqrt{6006i}}{3432}$ | $\frac{3\sqrt{1001}}{1001}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | $-\frac{\sqrt{10010i}}{1144}$ | 0 |
| | | $\frac{\sqrt{6006}}{3432}$ | 0 | $\frac{\sqrt{6006i}}{3432}$ | 0 | 0 | $-\frac{3\sqrt{1001}}{1001}$ | 0 | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | $\frac{\sqrt{10010i}}{1144}$ | 0 | 0 |
| | | 0 | $\frac{\sqrt{6006i}}{3432}$ | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | 0 | $\frac{3\sqrt{1001}}{1001}$ | 0 | 0 | $\frac{\sqrt{10010i}}{1144}$ | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 |
| | | $-\frac{\sqrt{6006i}}{3432}$ | 0 | $\frac{\sqrt{6006}}{3432}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{1001}}{1001}$ | $-\frac{\sqrt{10010i}}{1144}$ | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | $\frac{\sqrt{10010i}}{1144}$ | $-\frac{15\sqrt{1001}}{2002}$ | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{1716}$ |
| | | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | $-\frac{\sqrt{10010i}}{1144}$ | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | 0 | 0 | $\frac{5\sqrt{6006}}{1716}$ |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10010i}}{1144}$ | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | 0 | $-\frac{15\sqrt{1001}}{2002}$ | 0 | $-\frac{5\sqrt{6006i}}{1716}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{10010i}}{1144}$ | 0 | $-\frac{\sqrt{10010}}{1144}$ | 0 | 0 | 0 | $\frac{15\sqrt{1001}}{2002}$ | $\frac{5\sqrt{6006i}}{1716}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{1716}$ | 0 | $-\frac{5\sqrt{6006i}}{1716}$ | $\frac{10\sqrt{1001}}{1001}$ |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{1716}$ | 0 | $\frac{5\sqrt{6006i}}{1716}$ | 0 | $-\frac{10\sqrt{1001}}{1001}$ | |
| 1016 | symmetry | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|-----------------------|-----------|----------------------------|-----------------------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|---------------------------|----------------------------|
| $M_5^{(1,1;a)}(A, 3)$ | | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $-\frac{\sqrt{4290}i}{312}$ | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{286}}{572}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{\sqrt{286}}{572}$ | 0 |
| | | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{4290}i}{312}$ | 0 | $-\frac{\sqrt{4290}}{312}$ | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{\sqrt{286}i}{572}$ |
| | | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | $-\frac{\sqrt{4290}}{312}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{429}}{858}$ | $\frac{\sqrt{286}i}{572}$ | 0 |
| | | 0 | $\frac{\sqrt{4290}}{312}$ | 0 | $-\frac{\sqrt{4290}i}{312}$ | $\frac{\sqrt{715}}{143}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | 0 |
| | | $\frac{\sqrt{4290}}{312}$ | 0 | $\frac{\sqrt{4290}i}{312}$ | 0 | 0 | $-\frac{\sqrt{715}}{143}$ | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $\frac{3\sqrt{286}i}{1144}$ | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{4290}i}{312}$ | 0 | $-\frac{\sqrt{4290}}{312}$ | 0 | 0 | $-\frac{\sqrt{715}}{143}$ | 0 | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | $\frac{3\sqrt{286}}{1144}$ | 0 | 0 |
| | | $\frac{\sqrt{4290}i}{312}$ | 0 | $-\frac{\sqrt{4290}}{312}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{715}}{143}$ | $\frac{3\sqrt{286}i}{1144}$ | 0 | $\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 |
| | | $\frac{5\sqrt{429}}{858}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{3\sqrt{286}}{1144}$ | 0 | $\frac{3\sqrt{286}i}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | $-\frac{5\sqrt{429}}{858}$ | 0 | 0 | $-\frac{3\sqrt{286}i}{1144}$ | 0 | $\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | $\frac{5\sqrt{429}}{858}$ | $\frac{3\sqrt{286}i}{1144}$ | 0 | $\frac{3\sqrt{286}}{1144}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 0 | $-\frac{\sqrt{286}}{572}$ | 0 | $-\frac{\sqrt{286}i}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | $-\frac{\sqrt{286}}{572}$ | 0 | $\frac{\sqrt{286}i}{572}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1017 | symmetry | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|----------------------|-----------------------------|--------------------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|
| $M_5^{(1,1;a)}(B,1)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{\sqrt{858i}}{286}$ |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{143}}{429}$ | $\frac{\sqrt{858i}}{286}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1430}}{3432}$ | 0 | $-\frac{\sqrt{1430i}}{3432}$ | $\frac{2\sqrt{143}}{429}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{286}$ |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{1430}}{3432}$ | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{\sqrt{858}}{286}$ | 0 |
| | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | $\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 |
| | $\frac{\sqrt{1430i}}{3432}$ | 0 | $\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 | 0 |
| | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{23\sqrt{858}}{3432}$ | 0 | $\frac{23\sqrt{858i}}{3432}$ | $-\frac{8\sqrt{143}}{429}$ | 0 |
| | $-\frac{\sqrt{1430}}{3432}$ | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{23\sqrt{858}}{3432}$ | 0 | $-\frac{23\sqrt{858i}}{3432}$ | 0 | 0 | $\frac{8\sqrt{143}}{429}$ |
| | 0 | 0 | $\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{23\sqrt{858}}{3432}$ | 0 | 0 | $-\frac{2\sqrt{2145}}{429}$ | 0 | 0 | $-\frac{5\sqrt{1430i}}{1716}$ |
| | 0 | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | $\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{23\sqrt{858}}{3432}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{2145}}{429}$ | $\frac{5\sqrt{1430i}}{1716}$ | 0 |
| | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | $\frac{23\sqrt{858i}}{3432}$ | $-\frac{2\sqrt{2145}}{429}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{1430}}{1716}$ |
| | 0 | $\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | $-\frac{23\sqrt{858i}}{3432}$ | 0 | 0 | $\frac{2\sqrt{2145}}{429}$ | 0 | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 |
| | 0 | $-\frac{\sqrt{858i}}{286}$ | 0 | $-\frac{\sqrt{858}}{286}$ | 0 | 0 | 0 | $-\frac{8\sqrt{143}}{429}$ | 0 | 0 | $-\frac{5\sqrt{1430i}}{1716}$ | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 |
| | $\frac{\sqrt{858i}}{286}$ | 0 | $-\frac{\sqrt{858}}{286}$ | 0 | 0 | 0 | 0 | $\frac{8\sqrt{143}}{429}$ | $\frac{5\sqrt{1430i}}{1716}$ | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | 0 |
| 1018 | symmetry | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|-----------------------|------------------------------|----------------------------------------------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|
| $M_5^{(1,1;a)}(B, 2)$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | $\frac{\sqrt{1430i}}{3432}$ | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | 0 | $\frac{\sqrt{858}}{286}$ | |
| | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | $\frac{2\sqrt{143}}{429}$ | 0 | 0 | $\frac{\sqrt{858}}{286}$ | 0 |
| | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{\sqrt{858i}}{286}$ |
| | 0 | 0 | 0 | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | $\frac{2\sqrt{143}}{429}$ | $\frac{\sqrt{858i}}{286}$ | 0 | 0 |
| | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | $-\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{858}}{3432}$ | 0 | $-\frac{23\sqrt{858i}}{3432}$ | $\frac{8\sqrt{143}}{429}$ | 0 |
| | $-\frac{\sqrt{1430}}{3432}$ | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $\frac{23\sqrt{858}}{3432}$ | 0 | $\frac{23\sqrt{858i}}{3432}$ | 0 | 0 | $-\frac{8\sqrt{143}}{429}$ |
| | 0 | $\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 |
| | $-\frac{\sqrt{1430i}}{3432}$ | 0 | $-\frac{\sqrt{1430}}{3432}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{858i}}{264}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 | 0 |
| | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | 0 | 0 | $\frac{23\sqrt{858}}{3432}$ | 0 | $-\frac{\sqrt{858i}}{264}$ | $\frac{2\sqrt{2145}}{429}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ |
| | 0 | $\frac{2\sqrt{143}}{429}$ | 0 | 0 | $\frac{23\sqrt{858}}{3432}$ | 0 | $\frac{\sqrt{858i}}{264}$ | 0 | 0 | $-\frac{2\sqrt{2145}}{429}$ | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | 0 |
| | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | 0 | $-\frac{23\sqrt{858i}}{3432}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 | $-\frac{2\sqrt{2145}}{429}$ | 0 | 0 | $-\frac{5\sqrt{1430i}}{1716}$ |
| | 0 | 0 | 0 | $\frac{2\sqrt{143}}{429}$ | $\frac{23\sqrt{858i}}{3432}$ | 0 | $-\frac{\sqrt{858}}{264}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{2145}}{429}$ | $\frac{5\sqrt{1430i}}{1716}$ | 0 |
| | 0 | $\frac{\sqrt{858}}{286}$ | 0 | $-\frac{\sqrt{858i}}{286}$ | $\frac{8\sqrt{143}}{429}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | 0 | $-\frac{5\sqrt{1430i}}{1716}$ | 0 | 0 |
| | $\frac{\sqrt{858}}{286}$ | 0 | $\frac{\sqrt{858i}}{286}$ | 0 | 0 | $-\frac{8\sqrt{143}}{429}$ | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | 0 | $\frac{5\sqrt{1430i}}{1716}$ | 0 | 0 | 0 |
| 1019 | symmetry | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | | |
|---------------------------|-----------|----------------------------------------------------------------------|---------------------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---|
| $M_{5,1}^{(1,1;a)}(E, 1)$ | | 0 | $\frac{113\sqrt{1001}i}{16016}$ | 0 | $\frac{3\sqrt{1001}}{416}$ | 0 | 0 | $\frac{7\sqrt{6006}}{6864}$ | 0 | 0 | $\frac{\sqrt{15015}i}{2288}$ | 0 | $\frac{7\sqrt{15015}}{13728}$ | 0 | 0 | |
| | | $-\frac{113\sqrt{1001}i}{16016}$ | 0 | $\frac{3\sqrt{1001}}{416}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{6006}}{6864}$ | $-\frac{\sqrt{15015}i}{2288}$ | 0 | $\frac{7\sqrt{15015}}{13728}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{3\sqrt{1001}}{416}$ | 0 | $-\frac{59\sqrt{1001}i}{8008}$ | $\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{15015}}{13728}$ | 0 | $-\frac{\sqrt{15015}i}{1144}$ | $\frac{3\sqrt{10010}}{4576}$ | 0 | |
| | | $\frac{3\sqrt{1001}}{416}$ | 0 | $\frac{59\sqrt{1001}i}{8008}$ | 0 | 0 | $-\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | $\frac{5\sqrt{15015}}{13728}$ | 0 | $\frac{\sqrt{15015}i}{1144}$ | 0 | 0 | $-\frac{3\sqrt{10010}}{4576}$ | |
| | | 0 | 0 | $\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | $\frac{3\sqrt{1001}i}{616}$ | 0 | $\frac{3\sqrt{1001}}{1144}$ | 0 | 0 | $\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{\sqrt{15015}i}{1144}$ | |
| | | 0 | 0 | 0 | $-\frac{19\sqrt{6006}}{13728}$ | $-\frac{3\sqrt{1001}i}{616}$ | 0 | $\frac{3\sqrt{1001}}{1144}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{10010}}{4576}$ | $-\frac{\sqrt{15015}i}{1144}$ | 0 | |
| | | $\frac{7\sqrt{6006}}{6864}$ | 0 | 0 | 0 | 0 | $\frac{3\sqrt{1001}}{1144}$ | 0 | $-\frac{3\sqrt{1001}i}{1001}$ | $\frac{\sqrt{10010}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15015}}{3432}$ | |
| | | 0 | $-\frac{7\sqrt{6006}}{6864}$ | 0 | 0 | $\frac{3\sqrt{1001}}{1144}$ | 0 | $\frac{3\sqrt{1001}i}{1001}$ | 0 | 0 | $-\frac{\sqrt{10010}}{2288}$ | 0 | 0 | $\frac{\sqrt{15015}}{3432}$ | 0 | |
| | | 0 | $\frac{\sqrt{15015}i}{2288}$ | 0 | $\frac{5\sqrt{15015}}{13728}$ | 0 | 0 | 0 | $\frac{\sqrt{10010}}{2288}$ | 0 | 0 | $\frac{15\sqrt{1001}i}{16016}$ | 0 | $\frac{5\sqrt{1001}}{4576}$ | 0 | 0 |
| | | $-\frac{\sqrt{15015}i}{2288}$ | 0 | $\frac{5\sqrt{15015}}{13728}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{2288}$ | $-\frac{15\sqrt{1001}i}{16016}$ | 0 | $\frac{5\sqrt{1001}}{4576}$ | 0 | 0 | 0 | |
| | | 0 | $\frac{7\sqrt{15015}}{13728}$ | 0 | $-\frac{\sqrt{15015}i}{1144}$ | $\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{1001}}{4576}$ | 0 | $-\frac{45\sqrt{1001}i}{8008}$ | $\frac{25\sqrt{6006}}{13728}$ | 0 | |
| | | $\frac{7\sqrt{15015}}{13728}$ | 0 | $\frac{\sqrt{15015}i}{1144}$ | 0 | 0 | $-\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{5\sqrt{1001}}{4576}$ | 0 | $\frac{45\sqrt{1001}i}{8008}$ | 0 | 0 | $-\frac{25\sqrt{6006}}{13728}$ | |
| | | 0 | 0 | $\frac{3\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{\sqrt{15015}i}{1144}$ | 0 | $\frac{\sqrt{15015}}{3432}$ | 0 | 0 | $\frac{25\sqrt{6006}}{13728}$ | 0 | 0 | $\frac{25\sqrt{1001}i}{8008}$ | |
| | | 0 | 0 | 0 | $-\frac{3\sqrt{10010}}{4576}$ | $-\frac{\sqrt{15015}i}{1144}$ | 0 | $\frac{\sqrt{15015}}{3432}$ | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{6006}}{13728}$ | $-\frac{25\sqrt{1001}i}{8008}$ | 0 | |
| 1020 | symmetry | $\frac{x(8x^4 - 40x^2y^2 - 40x^2z^2 + 15y^4 + 30y^2z^2 + 15z^4)}{8}$ | | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|---------------------------|---------------------------------------------------|--------------------------------|---------------------------------|---------------------------------|-------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|---------------------------------|--------------------------------|-------------------------------|--------------------------------|
| | $M_{5,2}^{(1,1;a)}(E, 1)$ | 0 | $\frac{59\sqrt{1001}}{8008}$ | 0 | $-\frac{3\sqrt{1001}i}{416}$ | $\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{15015}}{1144}$ | 0 | $\frac{5\sqrt{15015}i}{13728}$ | $-\frac{3\sqrt{10010}}{4576}$ | 0 |
| | | $\frac{59\sqrt{1001}}{8008}$ | 0 | $\frac{3\sqrt{1001}i}{416}$ | 0 | 0 | $-\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | $-\frac{\sqrt{15015}}{1144}$ | 0 | $-\frac{5\sqrt{15015}i}{13728}$ | 0 | 0 | $\frac{3\sqrt{10010}}{4576}$ |
| | | 0 | $-\frac{3\sqrt{1001}i}{416}$ | 0 | $-\frac{113\sqrt{1001}}{16016}$ | 0 | 0 | $-\frac{7\sqrt{6006}}{6864}$ | 0 | 0 | $\frac{7\sqrt{15015}i}{13728}$ | 0 | $\frac{\sqrt{15015}}{2288}$ | 0 | 0 |
| | | $\frac{3\sqrt{1001}i}{416}$ | 0 | $-\frac{113\sqrt{1001}}{16016}$ | 0 | 0 | 0 | $\frac{7\sqrt{6006}}{6864}$ | $-\frac{7\sqrt{15015}i}{13728}$ | 0 | $\frac{\sqrt{15015}}{2288}$ | 0 | 0 | 0 | 0 |
| | | $\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{1001}}{616}$ | 0 | $\frac{3\sqrt{1001}i}{1144}$ | $-\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15015}}{1144}$ |
| | | 0 | $-\frac{19\sqrt{6006}}{13728}$ | 0 | 0 | $-\frac{3\sqrt{1001}}{616}$ | 0 | $-\frac{3\sqrt{1001}i}{1144}$ | 0 | 0 | $\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{\sqrt{15015}}{1144}$ | 0 |
| | | 0 | 0 | $-\frac{7\sqrt{6006}}{6864}$ | 0 | 0 | $\frac{3\sqrt{1001}i}{1144}$ | 0 | $\frac{3\sqrt{1001}}{1001}$ | 0 | 0 | $\frac{\sqrt{10010}}{2288}$ | 0 | 0 | $-\frac{\sqrt{15015}i}{3432}$ |
| | | 0 | 0 | 0 | $\frac{7\sqrt{6006}}{6864}$ | $-\frac{3\sqrt{1001}i}{1144}$ | 0 | $\frac{3\sqrt{1001}}{1001}$ | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{2288}$ | $\frac{\sqrt{15015}i}{3432}$ | 0 | 0 |
| | | 0 | $-\frac{\sqrt{15015}}{1144}$ | 0 | $\frac{7\sqrt{15015}i}{13728}$ | $-\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{45\sqrt{1001}}{8008}$ | 0 | $-\frac{5\sqrt{1001}i}{4576}$ | $\frac{25\sqrt{6006}}{13728}$ | 0 |
| | | $-\frac{\sqrt{15015}}{1144}$ | 0 | $-\frac{7\sqrt{15015}i}{13728}$ | 0 | 0 | $\frac{7\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{45\sqrt{1001}}{8008}$ | 0 | $\frac{5\sqrt{1001}i}{4576}$ | 0 | 0 | $-\frac{25\sqrt{6006}}{13728}$ |
| | | 0 | $\frac{5\sqrt{15015}i}{13728}$ | 0 | $\frac{\sqrt{15015}}{2288}$ | 0 | 0 | $\frac{\sqrt{10010}}{2288}$ | 0 | 0 | $-\frac{5\sqrt{1001}i}{4576}$ | 0 | $-\frac{15\sqrt{1001}}{16016}$ | 0 | 0 |
| | | $-\frac{5\sqrt{15015}i}{13728}$ | 0 | $\frac{\sqrt{15015}}{2288}$ | 0 | 0 | 0 | $-\frac{\sqrt{10010}}{2288}$ | $\frac{5\sqrt{1001}i}{4576}$ | 0 | $-\frac{15\sqrt{1001}}{16016}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{10010}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{15015}}{1144}$ | 0 | $-\frac{\sqrt{15015}i}{3432}$ | $\frac{25\sqrt{6006}}{13728}$ | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{1001}}{8008}$ |
| | | 0 | $\frac{3\sqrt{10010}}{4576}$ | 0 | 0 | $\frac{\sqrt{15015}}{1144}$ | 0 | $\frac{\sqrt{15015}i}{3432}$ | 0 | 0 | $-\frac{25\sqrt{6006}}{13728}$ | 0 | 0 | $-\frac{25\sqrt{1001}}{8008}$ | 0 |
| 1021 | symmetry | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | |
|---------------------------|-------------------------------|---------------------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|
| $M_{5,1}^{(1,1;a)}(E, 2)$ | 0 | $\frac{5\sqrt{715}i}{2288}$ | 0 | $\frac{\sqrt{715}}{416}$ | 0 | 0 | $\frac{\sqrt{4290}}{6864}$ | 0 | 0 | $-\frac{35\sqrt{429}i}{6864}$ | 0 | $-\frac{47\sqrt{429}}{13728}$ | 0 | 0 |
| | $-\frac{5\sqrt{715}i}{2288}$ | 0 | $\frac{\sqrt{715}}{416}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{4290}}{6864}$ | $\frac{35\sqrt{429}i}{6864}$ | 0 | $-\frac{47\sqrt{429}}{13728}$ | 0 | 0 | 0 |
| | 0 | $\frac{\sqrt{715}}{416}$ | 0 | $-\frac{3\sqrt{715}i}{1144}$ | $\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | 0 | 0 | $-\frac{31\sqrt{429}}{4576}$ | 0 | $\frac{5\sqrt{429}i}{1144}$ | $-\frac{27\sqrt{286}}{4576}$ | 0 |
| | $\frac{\sqrt{715}}{416}$ | 0 | $\frac{3\sqrt{715}i}{1144}$ | 0 | 0 | $-\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | $-\frac{31\sqrt{429}}{4576}$ | 0 | $-\frac{5\sqrt{429}i}{1144}$ | 0 | 0 | $\frac{27\sqrt{286}}{4576}$ |
| | 0 | 0 | $\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | $-\frac{5\sqrt{715}i}{1144}$ | 0 | $-\frac{7\sqrt{715}}{1144}$ | 0 | 0 | $-\frac{23\sqrt{286}}{4576}$ | 0 | 0 | $\frac{5\sqrt{429}i}{3432}$ |
| | 0 | 0 | 0 | $-\frac{3\sqrt{4290}}{4576}$ | $\frac{5\sqrt{715}i}{1144}$ | 0 | $-\frac{7\sqrt{715}}{1144}$ | 0 | 0 | 0 | 0 | $\frac{23\sqrt{286}}{4576}$ | $-\frac{5\sqrt{429}i}{3432}$ | 0 |
| | $\frac{\sqrt{4290}}{6864}$ | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{715}}{1144}$ | 0 | $\frac{\sqrt{715}i}{143}$ | $-\frac{29\sqrt{286}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{23\sqrt{429}}{3432}$ |
| | 0 | $-\frac{\sqrt{4290}}{6864}$ | 0 | 0 | $-\frac{7\sqrt{715}}{1144}$ | 0 | $-\frac{\sqrt{715}i}{143}$ | 0 | 0 | $\frac{29\sqrt{286}}{2288}$ | 0 | 0 | $\frac{23\sqrt{429}}{3432}$ | 0 |
| | 0 | $-\frac{35\sqrt{429}i}{6864}$ | 0 | $-\frac{31\sqrt{429}}{4576}$ | 0 | 0 | $-\frac{29\sqrt{286}}{2288}$ | 0 | 0 | $-\frac{5\sqrt{715}i}{2288}$ | 0 | $\frac{23\sqrt{715}}{4576}$ | 0 | 0 |
| | $\frac{35\sqrt{429}i}{6864}$ | 0 | $-\frac{31\sqrt{429}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{29\sqrt{286}}{2288}$ | $\frac{5\sqrt{715}i}{2288}$ | 0 | $\frac{23\sqrt{715}}{4576}$ | 0 | 0 | 0 |
| | 0 | $-\frac{47\sqrt{429}}{13728}$ | 0 | $\frac{5\sqrt{429}i}{1144}$ | $-\frac{23\sqrt{286}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{23\sqrt{715}}{4576}$ | 0 | $-\frac{5\sqrt{715}i}{1144}$ | $\frac{35\sqrt{4290}}{13728}$ | 0 |
| | $-\frac{47\sqrt{429}}{13728}$ | 0 | $-\frac{5\sqrt{429}i}{1144}$ | 0 | 0 | $\frac{23\sqrt{286}}{4576}$ | 0 | 0 | $\frac{23\sqrt{715}}{4576}$ | 0 | $\frac{5\sqrt{715}i}{1144}$ | 0 | 0 | $-\frac{35\sqrt{4290}}{13728}$ |
| | 0 | 0 | $-\frac{27\sqrt{286}}{4576}$ | 0 | 0 | $\frac{5\sqrt{429}i}{3432}$ | 0 | $\frac{23\sqrt{429}}{3432}$ | 0 | 0 | $\frac{35\sqrt{4290}}{13728}$ | 0 | 0 | $\frac{5\sqrt{715}i}{1144}$ |
| | 0 | 0 | 0 | $\frac{27\sqrt{286}}{4576}$ | $-\frac{5\sqrt{429}i}{3432}$ | 0 | $\frac{23\sqrt{429}}{3432}$ | 0 | 0 | 0 | 0 | $-\frac{35\sqrt{4290}}{13728}$ | $-\frac{5\sqrt{715}i}{1144}$ | 0 |
| 1022 | symmetry | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|------------------------------|-------------------------------|-------------------------------------------------|--------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|--------------------------------|
| $M_{5,2}^{(1,1;a)}(E, 2)$ | 0 | $\frac{3\sqrt{715}}{1144}$ | 0 | $-\frac{\sqrt{715}i}{416}$ | $\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{429}}{1144}$ | 0 | $-\frac{31\sqrt{429}i}{4576}$ | $\frac{27\sqrt{286}}{4576}$ | 0 | |
| | $\frac{3\sqrt{715}}{1144}$ | 0 | $\frac{\sqrt{715}i}{416}$ | 0 | 0 | $-\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | $\frac{5\sqrt{429}}{1144}$ | 0 | $\frac{31\sqrt{429}i}{4576}$ | 0 | 0 | $-\frac{27\sqrt{286}}{4576}$ | |
| | 0 | $-\frac{\sqrt{715}i}{416}$ | 0 | $-\frac{5\sqrt{715}}{2288}$ | 0 | 0 | $-\frac{\sqrt{4290}}{6864}$ | 0 | 0 | $-\frac{47\sqrt{429}i}{13728}$ | 0 | $-\frac{35\sqrt{429}}{6864}$ | 0 | 0 | |
| | $\frac{\sqrt{715}i}{416}$ | 0 | $-\frac{5\sqrt{715}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{4290}}{6864}$ | $\frac{47\sqrt{429}i}{13728}$ | 0 | $-\frac{35\sqrt{429}}{6864}$ | 0 | 0 | 0 | |
| | $\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{715}}{1144}$ | 0 | $-\frac{7\sqrt{715}i}{1144}$ | $\frac{23\sqrt{286}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{429}}{3432}$ | |
| | 0 | $-\frac{3\sqrt{4290}}{4576}$ | 0 | 0 | $\frac{5\sqrt{715}}{1144}$ | 0 | $\frac{7\sqrt{715}i}{1144}$ | 0 | 0 | $-\frac{23\sqrt{286}}{4576}$ | 0 | 0 | 0 | $\frac{5\sqrt{429}}{3432}$ | 0 |
| | 0 | 0 | $-\frac{\sqrt{4290}}{6864}$ | 0 | 0 | $-\frac{7\sqrt{715}i}{1144}$ | 0 | $-\frac{\sqrt{715}}{143}$ | 0 | 0 | $-\frac{29\sqrt{286}}{2288}$ | 0 | 0 | 0 | $-\frac{23\sqrt{429}i}{3432}$ |
| | 0 | 0 | 0 | $\frac{\sqrt{4290}}{6864}$ | $\frac{7\sqrt{715}i}{1144}$ | 0 | $-\frac{\sqrt{715}}{143}$ | 0 | 0 | 0 | 0 | $\frac{29\sqrt{286}}{2288}$ | $\frac{23\sqrt{429}i}{3432}$ | 0 | 0 |
| | 0 | $\frac{5\sqrt{429}}{1144}$ | 0 | $-\frac{47\sqrt{429}i}{13728}$ | $\frac{23\sqrt{286}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{715}}{1144}$ | 0 | $-\frac{23\sqrt{715}i}{4576}$ | $\frac{35\sqrt{4290}}{13728}$ | 0 | 0 |
| | $\frac{5\sqrt{429}}{1144}$ | 0 | $\frac{47\sqrt{429}i}{13728}$ | 0 | 0 | $-\frac{23\sqrt{286}}{4576}$ | 0 | 0 | $\frac{5\sqrt{715}}{1144}$ | 0 | $\frac{23\sqrt{715}i}{4576}$ | 0 | 0 | 0 | $-\frac{35\sqrt{4290}}{13728}$ |
| | 0 | $-\frac{31\sqrt{429}i}{4576}$ | 0 | $-\frac{35\sqrt{429}}{6864}$ | 0 | 0 | $-\frac{29\sqrt{286}}{2288}$ | 0 | 0 | $-\frac{23\sqrt{715}i}{4576}$ | 0 | $\frac{5\sqrt{715}}{2288}$ | 0 | 0 | 0 |
| | $\frac{31\sqrt{429}i}{4576}$ | 0 | $-\frac{35\sqrt{429}}{6864}$ | 0 | 0 | 0 | 0 | $\frac{29\sqrt{286}}{2288}$ | $\frac{23\sqrt{715}i}{4576}$ | 0 | $\frac{5\sqrt{715}}{2288}$ | 0 | 0 | 0 | 0 |
| | $\frac{27\sqrt{286}}{4576}$ | 0 | 0 | 0 | 0 | $\frac{5\sqrt{429}}{3432}$ | 0 | $-\frac{23\sqrt{429}i}{3432}$ | $\frac{35\sqrt{4290}}{13728}$ | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{715}}{1144}$ |
| | 0 | $-\frac{27\sqrt{286}}{4576}$ | 0 | 0 | $\frac{5\sqrt{429}}{3432}$ | 0 | $\frac{23\sqrt{429}i}{3432}$ | 0 | 0 | $-\frac{35\sqrt{4290}}{13728}$ | 0 | 0 | 0 | $-\frac{5\sqrt{715}}{1144}$ | 0 |
| | 1023 | symmetry | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|------|---------------------------|-------------------------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|
| | $M_{5,1}^{(1,1;a)}(E, 3)$ | 0 | $-\frac{2\sqrt{2145}}{429}$ | 0 | $\frac{\sqrt{2145}i}{208}$ | $-\frac{\sqrt{1430}}{528}$ | 0 | 0 | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | $\frac{19\sqrt{143}i}{6864}$ | $-\frac{3\sqrt{858}}{2288}$ | 0 |
| | | $-\frac{2\sqrt{2145}i}{429}$ | 0 | $-\frac{\sqrt{2145}i}{208}$ | 0 | 0 | $\frac{\sqrt{1430}}{528}$ | 0 | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | $-\frac{19\sqrt{143}i}{6864}$ | 0 | 0 | $\frac{3\sqrt{858}}{2288}$ |
| | | 0 | $\frac{\sqrt{2145}i}{208}$ | 0 | $\frac{17\sqrt{2145}}{3432}$ | 0 | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | $\frac{41\sqrt{143}i}{6864}$ | 0 | $-\frac{\sqrt{143}}{3432}$ | 0 | 0 |
| | | $-\frac{\sqrt{2145}i}{208}$ | 0 | $\frac{17\sqrt{2145}}{3432}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | $-\frac{41\sqrt{143}i}{6864}$ | 0 | $-\frac{\sqrt{143}}{3432}$ | 0 | 0 | 0 |
| | | $-\frac{\sqrt{1430}}{528}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | $\frac{\sqrt{2145}i}{572}$ | $-\frac{31\sqrt{858}}{6864}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{143}}{1716}$ |
| | | 0 | $\frac{\sqrt{1430}}{528}$ | 0 | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | $-\frac{\sqrt{2145}i}{572}$ | 0 | 0 | $\frac{31\sqrt{858}}{6864}$ | 0 | 0 | $\frac{17\sqrt{143}}{1716}$ | 0 |
| | | 0 | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | $\frac{\sqrt{2145}i}{572}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | 0 | 0 | $-\frac{\sqrt{143}i}{156}$ |
| | | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | $-\frac{\sqrt{2145}i}{572}$ | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{858}}{1716}$ | $\frac{\sqrt{143}i}{156}$ | 0 | 0 |
| | | 0 | $-\frac{2\sqrt{143}}{429}$ | 0 | $\frac{41\sqrt{143}i}{6864}$ | $-\frac{31\sqrt{858}}{6864}$ | 0 | 0 | 0 | 0 | $\frac{2\sqrt{2145}}{429}$ | 0 | $-\frac{\sqrt{2145}i}{624}$ | $\frac{35\sqrt{1430}}{6864}$ | 0 |
| | | $-\frac{2\sqrt{143}}{429}$ | 0 | $-\frac{41\sqrt{143}i}{6864}$ | 0 | 0 | $\frac{31\sqrt{858}}{6864}$ | 0 | 0 | $\frac{2\sqrt{2145}}{429}$ | 0 | $\frac{\sqrt{2145}i}{624}$ | 0 | 0 | $-\frac{35\sqrt{1430}}{6864}$ |
| | | 0 | $\frac{19\sqrt{143}i}{6864}$ | 0 | $-\frac{\sqrt{143}}{3432}$ | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | 0 | 0 | $-\frac{\sqrt{2145}i}{624}$ | 0 | $-\frac{\sqrt{2145}}{3432}$ | 0 | 0 |
| | | $-\frac{19\sqrt{143}i}{6864}$ | 0 | $-\frac{\sqrt{143}}{3432}$ | 0 | 0 | 0 | $\frac{\sqrt{858}}{1716}$ | $\frac{\sqrt{2145}i}{624}$ | 0 | $-\frac{\sqrt{2145}}{3432}$ | 0 | 0 | 0 | 0 |
| | | $-\frac{3\sqrt{858}}{2288}$ | 0 | 0 | 0 | 0 | $\frac{17\sqrt{143}}{1716}$ | 0 | $-\frac{\sqrt{143}i}{156}$ | $\frac{35\sqrt{1430}}{6864}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{2145}}{1716}$ |
| | | 0 | $\frac{3\sqrt{858}}{2288}$ | 0 | 0 | $\frac{17\sqrt{143}}{1716}$ | 0 | $\frac{\sqrt{143}i}{156}$ | 0 | $-\frac{35\sqrt{1430}}{6864}$ | 0 | 0 | $-\frac{5\sqrt{2145}}{1716}$ | 0 | 0 |
| 1024 | symmetry | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ | | | | | | | | | | | | | |

continued ...

Table 10

| No. | multipole | matrix | | | | | | | | | | | | | |
|---------------------------|--------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|---|
| $M_{5,2}^{(1,1;a)}(E, 3)$ | 0 | $\frac{17\sqrt{2145}i}{3432}$ | 0 | $\frac{\sqrt{2145}}{208}$ | 0 | 0 | $\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | $\frac{\sqrt{143}i}{3432}$ | 0 | $-\frac{41\sqrt{143}}{6864}$ | 0 | 0 | |
| | $-\frac{17\sqrt{2145}i}{3432}$ | 0 | $\frac{\sqrt{2145}}{208}$ | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{1430}}{1716}$ | $-\frac{\sqrt{143}i}{3432}$ | 0 | $-\frac{41\sqrt{143}}{6864}$ | 0 | 0 | 0 | |
| | 0 | $\frac{\sqrt{2145}}{208}$ | 0 | $-\frac{2\sqrt{2145}i}{429}$ | $\frac{\sqrt{1430}}{528}$ | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{143}}{6864}$ | 0 | $\frac{2\sqrt{143}i}{429}$ | $-\frac{3\sqrt{858}}{2288}$ | 0 | 0 |
| | $\frac{\sqrt{2145}}{208}$ | 0 | $\frac{2\sqrt{2145}i}{429}$ | 0 | 0 | $-\frac{\sqrt{1430}}{528}$ | 0 | 0 | $-\frac{19\sqrt{143}}{6864}$ | 0 | $-\frac{2\sqrt{143}i}{429}$ | 0 | 0 | $\frac{3\sqrt{858}}{2288}$ | |
| | 0 | 0 | $\frac{\sqrt{1430}}{528}$ | 0 | 0 | $-\frac{\sqrt{2145}i}{572}$ | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | 0 | $-\frac{31\sqrt{858}}{6864}$ | 0 | 0 | $-\frac{17\sqrt{143}i}{1716}$ | |
| | 0 | 0 | 0 | $-\frac{\sqrt{1430}}{528}$ | $\frac{\sqrt{2145}i}{572}$ | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | 0 | 0 | 0 | $\frac{31\sqrt{858}}{6864}$ | $\frac{17\sqrt{143}i}{1716}$ | 0 | 0 |
| | $\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | 0 | $\frac{\sqrt{858}}{1716}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{143}}{156}$ | |
| | 0 | $-\frac{5\sqrt{1430}}{1716}$ | 0 | 0 | $-\frac{\sqrt{2145}}{572}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | 0 | 0 | $-\frac{\sqrt{143}}{156}$ | 0 | 0 |
| | 0 | $\frac{\sqrt{143}i}{3432}$ | 0 | $-\frac{19\sqrt{143}}{6864}$ | 0 | 0 | $\frac{\sqrt{858}}{1716}$ | 0 | 0 | $-\frac{\sqrt{2145}i}{3432}$ | 0 | $-\frac{\sqrt{2145}}{624}$ | 0 | 0 | 0 |
| | $-\frac{\sqrt{143}i}{3432}$ | 0 | $-\frac{19\sqrt{143}}{6864}$ | 0 | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | $\frac{\sqrt{2145}i}{3432}$ | 0 | $-\frac{\sqrt{2145}}{624}$ | 0 | 0 | 0 | 0 | 0 |
| | 0 | $-\frac{41\sqrt{143}}{6864}$ | 0 | $\frac{2\sqrt{143}i}{429}$ | $-\frac{31\sqrt{858}}{6864}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2145}}{624}$ | 0 | $\frac{2\sqrt{2145}i}{429}$ | $-\frac{35\sqrt{1430}}{6864}$ | 0 | 0 |
| | $-\frac{41\sqrt{143}}{6864}$ | 0 | $-\frac{2\sqrt{143}i}{429}$ | 0 | 0 | $\frac{31\sqrt{858}}{6864}$ | 0 | 0 | $-\frac{\sqrt{2145}}{624}$ | 0 | $-\frac{2\sqrt{2145}i}{429}$ | 0 | 0 | $\frac{35\sqrt{1430}}{6864}$ | |
| | 0 | 0 | $-\frac{3\sqrt{858}}{2288}$ | 0 | 0 | $-\frac{17\sqrt{143}i}{1716}$ | 0 | $-\frac{\sqrt{143}}{156}$ | 0 | 0 | $-\frac{35\sqrt{1430}}{6864}$ | 0 | 0 | $-\frac{5\sqrt{2145}i}{1716}$ | |
| | 0 | 0 | 0 | $\frac{3\sqrt{858}}{2288}$ | $\frac{17\sqrt{143}i}{1716}$ | 0 | $-\frac{\sqrt{143}}{156}$ | 0 | 0 | 0 | 0 | $\frac{35\sqrt{1430}}{6864}$ | $\frac{5\sqrt{2145}i}{1716}$ | 0 | |