Atomic Multipoles (spinless LM basis)

bra: $= |s, 0\rangle$
ket: $= |s, 0\rangle$

Table 1: (s,s) block.

No.	multipole	matrix
1	$\mathbb{Q}^{(a)}_{0,0}$	$\begin{bmatrix} 1 \end{bmatrix}$

bra: $= |s, 0\rangle$
ket: $= |p, 1\rangle, |p, 0\rangle, |p, -1\rangle$

Table 2: (s,p) block.

No.	multipole	matrix
2	$\mathbb{Q}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}}{3} \end{bmatrix}$
3	$\mathbb{Q}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{\sqrt{3}}{3} & 0 \end{bmatrix}$
4	$\mathbb{Q}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{\sqrt{3}}{3} & 0 & 0 \end{bmatrix}$
5	$\mathbb{T}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{9} \end{bmatrix}$
6	$\mathbb{T}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{\sqrt{3}i}{9} & 0 \end{bmatrix}$
7	$\mathbb{T}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{\sqrt{3}i}{9} & 0 & 0 \end{bmatrix}$

bra: $= |s, 0\rangle$
ket: $= |d, 2\rangle, |d, 1\rangle, |d, 0\rangle, |d, -1\rangle, |d, -2\rangle$

Table 3: (s,d) block.

No.	multipole	matrix
8	$\mathbb{Q}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{5} \end{bmatrix}$
9	$\mathbb{Q}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{5}}{5} & 0 \end{bmatrix}$
10	$\mathbb{Q}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{5}}{5} & 0 & 0 \end{bmatrix}$
11	$\mathbb{Q}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{5}}{5} & 0 & 0 & 0 \end{bmatrix}$
12	$\mathbb{Q}^{(a)}_{2,-2}$	$\begin{bmatrix} \frac{\sqrt{5}}{5} & 0 & 0 & 0 & 0 \end{bmatrix}$
13	$\mathbb{T}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} \end{bmatrix}$
14	$\mathbb{T}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$
15	$\mathbb{T}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 \end{bmatrix}$
16	$\mathbb{T}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 \end{bmatrix}$
17	$\mathbb{T}^{(a)}_{2,-2}$	$\begin{bmatrix} \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 \end{bmatrix}$

bra: $= |s,0\rangle$
ket: $= |f,3\rangle, |f,2\rangle, |f,1\rangle, |f,0\rangle, |f,-1\rangle, |f,-2\rangle, |f,-3\rangle$

Table 4: (s,f) block.

No.	multipole	matrix
18	$\mathbb{Q}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} \end{bmatrix}$
19	$\mathbb{Q}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 \end{bmatrix}$
20	$\mathbb{Q}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 \end{bmatrix}$
21	$\mathbb{Q}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 \end{bmatrix}$
22	$\mathbb{Q}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 4

No.	multipole	matrix
23	$\mathbb{Q}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
24	$\mathbb{Q}^{(a)}_{3,-3}$	$\begin{bmatrix} -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
25	$\mathbb{T}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{35} \end{bmatrix}$
26	$\mathbb{T}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}i}{35} & 0 \end{bmatrix}$
27	$\mathbb{T}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{35} & 0 & 0 \end{bmatrix}$
28	$\mathbb{T}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{3\sqrt{7}i}{35} & 0 & 0 & 0 \end{bmatrix}$
29	$\mathbb{T}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & 0 & -\frac{3\sqrt{7}i}{35} & 0 & 0 & 0 & 0 \end{bmatrix}$
30	$\mathbb{T}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & \frac{3\sqrt{7}i}{35} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
31	$\mathbb{T}^{(a)}_{3,-3}$	$\begin{bmatrix} -\frac{3\sqrt{7}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

bra: $= |p,1\rangle, |p,0\rangle, |p,-1\rangle$
ket: $= |p,1\rangle, |p,0\rangle, |p,-1\rangle$

Table 5: (p,p) block.

No.	multipole	matrix
32	$\mathbb{Q}^{(a)}_{0,0}$	$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
33	$\mathbb{Q}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{5} \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 5

No.	multipole	matrix
34	$\mathbb{Q}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & \frac{\sqrt{3}}{5} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{5} \\ 0 & 0 & 0 \end{bmatrix}$
35	$\mathbb{Q}^{(a)}_{2,0}$	$\begin{bmatrix} -\frac{1}{5} & 0 & 0 \\ 0 & \frac{2}{5} & 0 \\ 0 & 0 & -\frac{1}{5} \end{bmatrix}$
36	$\mathbb{Q}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & 0 & 0 \\ -\frac{\sqrt{3}}{5} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{5} & 0 \end{bmatrix}$
37	$\mathbb{Q}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ -\frac{\sqrt{6}}{5} & 0 & 0 \end{bmatrix}$
38	$\mathbb{M}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 0 & 0 & 0 \end{bmatrix}$
39	$\mathbb{M}^{(a)}_{1,0}$	$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
40	$\mathbb{M}^{(a)}_{1,-1}$	$\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

bra: $= |p,1\rangle, |p,0\rangle, |p,-1\rangle$
ket: $= |d,2\rangle, |d,1\rangle, |d,0\rangle, |d,-1\rangle, |d,-2\rangle$

Table 6: (p,d) block.

No.	multipole	matrix
41	$\mathbb{Q}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{5} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{5} \end{bmatrix}$
42	$\mathbb{Q}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{\sqrt{5}}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{5} & 0 \end{bmatrix}$
43	$\mathbb{Q}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{\sqrt{10}}{5} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{5} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 \end{bmatrix}$
44	$\mathbb{Q}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{3}{7} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
45	$\mathbb{Q}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{6}}{7} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{7} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
46	$\mathbb{Q}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & \frac{3\sqrt{10}}{35} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{30}}{35} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{35} \end{bmatrix}$
47	$\mathbb{Q}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & -\frac{3\sqrt{5}}{35} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{15}}{35} & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{5}}{35} & 0 \end{bmatrix}$
48	$\mathbb{Q}^{(a)}_{3,-1}$	$\begin{bmatrix} \frac{\sqrt{15}}{35} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{30}}{35} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{10}}{35} & 0 & 0 \end{bmatrix}$

continued ...

Table 6

No.	multipole	matrix
49	$\mathbb{Q}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}}{7} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{7} & 0 & 0 & 0 \end{bmatrix}$
50	$\mathbb{Q}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ \frac{3}{7} & 0 & 0 & 0 & 0 \end{bmatrix}$
51	$\mathbb{G}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{2\sqrt{30}i}{45} & 0 \\ 0 & 0 & 0 & 0 & \frac{4\sqrt{15}i}{45} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
52	$\mathbb{G}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & -\frac{2\sqrt{5}i}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{15}i}{45} & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{30}i}{45} \end{bmatrix}$
53	$\mathbb{G}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & \frac{2\sqrt{5}i}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{5}i}{15} & 0 \end{bmatrix}$
54	$\mathbb{G}^{(a)}_{2,-1}$	$\begin{bmatrix} -\frac{2\sqrt{30}i}{45} & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{15}i}{45} & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{5}i}{15} & 0 & 0 \end{bmatrix}$
55	$\mathbb{G}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ -\frac{4\sqrt{15}i}{45} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{30}i}{45} & 0 & 0 & 0 \end{bmatrix}$
56	$\mathbb{T}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{2\sqrt{15}i}{45} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{5}i}{15} & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{10}i}{15} \end{bmatrix}$

continued ...

Table 6

No.	multipole	matrix
57	$\mathbb{T}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{2\sqrt{5}i}{15} & 0 & 0 & 0 \\ 0 & 0 & \frac{4\sqrt{15}i}{45} & 0 & 0 \\ 0 & 0 & 0 & \frac{2\sqrt{5}i}{15} & 0 \end{bmatrix}$
58	$\mathbb{T}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{2\sqrt{10}i}{15} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{5}i}{15} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{15}i}{45} & 0 & 0 \end{bmatrix}$
59	$\mathbb{T}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{3i}{35} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
60	$\mathbb{T}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{6}i}{35} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{35} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
61	$\mathbb{T}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & \frac{3\sqrt{10}i}{175} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{30}i}{175} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{175} \end{bmatrix}$
62	$\mathbb{T}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & -\frac{3\sqrt{5}i}{175} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{15}i}{175} & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{5}i}{175} & 0 \end{bmatrix}$
63	$\mathbb{T}^{(a)}_{3,-1}$	$\begin{bmatrix} \frac{\sqrt{15}i}{175} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{30}i}{175} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{10}i}{175} & 0 & 0 \end{bmatrix}$
64	$\mathbb{T}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}i}{35} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{35} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 6

No.	multipole	matrix
65	$\mathbb{T}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ \frac{3i}{35} & 0 & 0 & 0 & 0 \end{bmatrix}$
66	$\mathbb{M}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{2\sqrt{30}}{15} & 0 \\ 0 & 0 & 0 & 0 & \frac{4\sqrt{15}}{15} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
67	$\mathbb{M}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & -\frac{2\sqrt{5}}{5} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{15}}{15} & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{30}}{15} \end{bmatrix}$
68	$\mathbb{M}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & \frac{2\sqrt{5}}{5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{5}}{5} & 0 \end{bmatrix}$
69	$\mathbb{M}^{(a)}_{2,-1}$	$\begin{bmatrix} -\frac{2\sqrt{30}}{15} & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{15}}{15} & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{5}}{5} & 0 & 0 \end{bmatrix}$
70	$\mathbb{M}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ -\frac{4\sqrt{15}}{15} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{30}}{15} & 0 & 0 & 0 \end{bmatrix}$

bra: $= |p,1\rangle, |p,0\rangle, |p,-1\rangle$
ket: $= |f,3\rangle, |f,2\rangle, |f,1\rangle, |f,0\rangle, |f,-1\rangle, |f,-2\rangle, |f,-3\rangle$

Table 7: (p,f) block.

No.	multipole	matrix
71	$\mathbb{Q}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{35} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{35}}{35} \end{bmatrix}$
72	$\mathbb{Q}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{3\sqrt{7}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{42}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{35} & 0 \end{bmatrix}$
73	$\mathbb{Q}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & 0 & \frac{3\sqrt{14}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{21}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{14}}{35} & 0 & 0 \end{bmatrix}$
74	$\mathbb{Q}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{210}}{35} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{42}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{7}}{35} & 0 & 0 & 0 \end{bmatrix}$
75	$\mathbb{Q}^{(a)}_{2,-2}$	$\begin{bmatrix} \frac{3\sqrt{35}}{35} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{105}}{35} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}}{35} & 0 & 0 & 0 & 0 \end{bmatrix}$
76	$\mathbb{Q}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{3}}{9} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
77	$\mathbb{Q}^{(a)}_{4,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{1}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{9} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
78	$\mathbb{Q}^{(a)}_{4,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{63} \end{bmatrix}$

continued ...

Table 7

No.	multipole	matrix
79	$\mathbb{Q}^{(a)}_{4,1}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{210}}{63} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{21} & 0 \end{bmatrix}$
80	$\mathbb{Q}^{(a)}_{4,0}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{14}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{21}}{63} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{21} & 0 & 0 \end{bmatrix}$
81	$\mathbb{Q}^{(a)}_{4,-1}$	$\begin{bmatrix} 0 & \frac{\sqrt{7}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{210}}{63} & 0 & 0 & 0 \end{bmatrix}$
82	$\mathbb{Q}^{(a)}_{4,-2}$	$\begin{bmatrix} -\frac{\sqrt{21}}{63} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{7}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 \end{bmatrix}$
83	$\mathbb{Q}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{9} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{3} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
84	$\mathbb{Q}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{3}}{9} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
85	$\mathbb{G}^{(a)}_{\mathrm{T}3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}i}{28} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
86	$\mathbb{G}^{(a)}_{\mathrm{T}3,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{28} \end{bmatrix}$

continued ...

Table 7

No.	multipole	matrix
87	$\mathbb{G}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{3\sqrt{14}i}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{28} & 0 \end{bmatrix}$
88	$\mathbb{G}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & 0 & \frac{3\sqrt{14}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}i}{28} & 0 & 0 \end{bmatrix}$
89	$\mathbb{G}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{105}i}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{14}i}{28} & 0 & 0 & 0 \end{bmatrix}$
90	$\mathbb{G}^{(a)}_{3,-2}$	$\begin{bmatrix} \frac{3\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{105}i}{28} & 0 & 0 & 0 & 0 \end{bmatrix}$
91	$\mathbb{G}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{21}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
92	$\mathbb{T}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{42} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{42} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{14} \end{bmatrix}$
93	$\mathbb{T}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{42} & 0 \end{bmatrix}$
94	$\mathbb{T}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{14} & 0 & 0 \end{bmatrix}$

continued ...

Table 7

No.	multipole	matrix
95	$\mathbb{T}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{210}i}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{42}i}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 \end{bmatrix}$
96	$\mathbb{T}^{(a)}_{2,-2}$	$\begin{bmatrix} \frac{\sqrt{35}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{105}i}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}i}{42} & 0 & 0 & 0 & 0 \end{bmatrix}$
97	$\mathbb{T}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{3}i}{27} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
98	$\mathbb{T}^{(a)}_{4,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{i}{9} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{27} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
99	$\mathbb{T}^{(a)}_{4,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{63} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}i}{63} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{189} \end{bmatrix}$
100	$\mathbb{T}^{(a)}_{4,1}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{210}i}{189} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{63} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{63} & 0 \end{bmatrix}$
101	$\mathbb{T}^{(a)}_{4,0}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{14}i}{63} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{21}i}{189} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{63} & 0 & 0 \end{bmatrix}$
102	$\mathbb{T}^{(a)}_{4,-1}$	$\begin{bmatrix} 0 & \frac{\sqrt{7}i}{63} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}i}{63} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{210}i}{189} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 7

No.	multipole	matrix
103	$\mathbb{T}^{(a)}_{4,-2}$	$\begin{bmatrix} -\frac{\sqrt{21}i}{189} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{7}i}{63} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}i}{63} & 0 & 0 & 0 & 0 \end{bmatrix}$
104	$\mathbb{T}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{27} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{9} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
105	$\mathbb{T}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{3}i}{27} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
106	$\mathbb{M}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{14} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{21}}{14} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
107	$\mathbb{M}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{14} \end{bmatrix}$
108	$\mathbb{M}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{3\sqrt{14}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{14} & 0 \end{bmatrix}$
109	$\mathbb{M}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & 0 & \frac{3\sqrt{14}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}}{14} & 0 & 0 \end{bmatrix}$
110	$\mathbb{M}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{105}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{14}}{14} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 7

No.	multipole	matrix
111	$\mathbb{M}^{(a)}_{3,-2}$	$\begin{bmatrix} \frac{3\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{105}}{14} & 0 & 0 & 0 & 0 \end{bmatrix}$
112	$\mathbb{M}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

bra: $= |d,2\rangle, |d,1\rangle, |d,0\rangle, |d,-1\rangle, |d,-2\rangle$
ket: $= |d,2\rangle, |d,1\rangle, |d,0\rangle, |d,-1\rangle, |d,-2\rangle$

Table 8: (d,d) block.

No.	multipole	matrix
113	$\mathbb{Q}^{(a)}_{0,0}$	$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$
114	$\mathbb{Q}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & -\frac{2}{7} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{7} & 0 \\ 0 & 0 & 0 & 0 & -\frac{2}{7} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
115	$\mathbb{Q}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & \frac{\sqrt{6}}{7} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{7} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{7} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{7} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
116	$\mathbb{Q}^{(a)}_{2,0}$	$\begin{bmatrix} -\frac{2}{7} & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{7} & 0 & 0 & 0 \\ 0 & 0 & \frac{2}{7} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{7} & 0 \\ 0 & 0 & 0 & 0 & -\frac{2}{7} \end{bmatrix}$
117	$\mathbb{Q}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}}{7} & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{7} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{7} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{7} & 0 \end{bmatrix}$
118	$\mathbb{Q}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ -\frac{2}{7} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{7} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2}{7} & 0 & 0 \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
119	$\mathbb{Q}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{21} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
120	$\mathbb{Q}^{(a)}_{4,3}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{35}}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{21} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
121	$\mathbb{Q}^{(a)}_{4,2}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{15}}{21} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{10}}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{21} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
122	$\mathbb{Q}^{(a)}_{4,1}$	$\begin{bmatrix} 0 & -\frac{\sqrt{5}}{21} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{21} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{21} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
123	$\mathbb{Q}^{(a)}_{4,0}$	$\begin{bmatrix} \frac{1}{21} & 0 & 0 & 0 & 0 \\ 0 & -\frac{4}{21} & 0 & 0 & 0 \\ 0 & 0 & \frac{2}{7} & 0 & 0 \\ 0 & 0 & 0 & -\frac{4}{21} & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{21} \end{bmatrix}$
124	$\mathbb{Q}^{(a)}_{4,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{21} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{21} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{21} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{21} & 0 \end{bmatrix}$
125	$\mathbb{Q}^{(a)}_{4,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}}{21} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{10}}{21} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}}{21} & 0 & 0 \end{bmatrix}$
126	$\mathbb{Q}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{35}}{21} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
127	$\mathbb{Q}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{70}}{21} & 0 & 0 & 0 & 0 \end{bmatrix}$
128	$\mathbb{M}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & -\sqrt{2} & 0 & 0 & 0 \\ 0 & 0 & -\sqrt{3} & 0 & 0 \\ 0 & 0 & 0 & -\sqrt{3} & 0 \\ 0 & 0 & 0 & 0 & -\sqrt{2} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
129	$\mathbb{M}^{(a)}_{1,0}$	$\begin{bmatrix} 2 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & -2 \end{bmatrix}$
130	$\mathbb{M}^{(a)}_{1,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ \sqrt{2} & 0 & 0 & 0 & 0 \\ 0 & \sqrt{3} & 0 & 0 & 0 \\ 0 & 0 & \sqrt{3} & 0 & 0 \\ 0 & 0 & 0 & \sqrt{2} & 0 \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
131	$\mathbb{M}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{3\sqrt{5}}{7} & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{7} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
132	$\mathbb{M}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & -\frac{3\sqrt{5}}{7} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{7} \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
133	$\mathbb{M}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & \frac{3\sqrt{3}}{7} & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{2}}{7} & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{2}}{7} & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{3}}{7} \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
134	$\mathbb{M}^{(a)}_{3,0}$	$\begin{bmatrix} -\frac{3}{7} & 0 & 0 & 0 & 0 \\ 0 & \frac{6}{7} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{6}{7} & 0 \\ 0 & 0 & 0 & 0 & \frac{3}{7} \end{bmatrix}$

continued ...

Table 8

No.	multipole	matrix
135	$\mathbb{M}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{3}}{7} & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{2}}{7} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{2}}{7} & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{3}}{7} & 0 \end{bmatrix}$
136	$\mathbb{M}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{5}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{5}}{7} & 0 & 0 \end{bmatrix}$
137	$\mathbb{M}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{5}}{7} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{5}}{7} & 0 & 0 & 0 \end{bmatrix}$

bra: $= |d,2\rangle, |d,1\rangle, |d,0\rangle, |d,-1\rangle, |d,-2\rangle$
ket: $= |f,3\rangle, |f,2\rangle, |f,1\rangle, |f,0\rangle, |f,-1\rangle, |f,-2\rangle, |f,-3\rangle$

Table 9: (d,f) block.

No.	multipole	matrix
138	$\mathbb{Q}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{105}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{7} \end{bmatrix}$
139	$\mathbb{Q}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{35}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{70}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 \end{bmatrix}$
140	$\mathbb{Q}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{\sqrt{21}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{14}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{210}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{105}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 \end{bmatrix}$
141	$\mathbb{Q}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{21} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
142	$\mathbb{Q}^{(a)}_{3,2}$	$\begin{pmatrix} 0 & 0 & 0 & -\frac{2\sqrt{7}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{21} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
143	$\mathbb{Q}^{(a)}_{3,1}$	$\begin{pmatrix} 0 & 0 & \frac{2\sqrt{210}}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{21} \end{pmatrix}$
144	$\mathbb{Q}^{(a)}_{3,0}$	$\begin{pmatrix} 0 & -\frac{2\sqrt{7}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{70}}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{35}}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{105} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{7}}{21} & 0 \end{pmatrix}$
145	$\mathbb{Q}^{(a)}_{3,-1}$	$\begin{pmatrix} \frac{\sqrt{14}}{21} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{210}}{105} & 0 & 0 \end{pmatrix}$

continued ...

Table 9

No.	multipole	matrix
146	$\mathbb{Q}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{7}}{21} & 0 & 0 & 0 \end{bmatrix}$
147	$\mathbb{Q}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{14}}{21} & 0 & 0 & 0 & 0 \end{bmatrix}$
148	$\mathbb{Q}^{(a)}_{5,5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{6}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
149	$\mathbb{Q}^{(a)}_{5,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{11} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
150	$\mathbb{Q}^{(a)}_{5,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{5\sqrt{2}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{5}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
151	$\mathbb{Q}^{(a)}_{5,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{5}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{3}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{11} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
152	$\mathbb{Q}^{(a)}_{5,1}$	$\begin{bmatrix} 0 & 0 & -\frac{5\sqrt{21}}{231} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{7}}{231} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{77} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{210}}{231} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{231} \end{bmatrix}$
153	$\mathbb{Q}^{(a)}_{5,0}$	$\begin{bmatrix} 0 & \frac{5\sqrt{7}}{231} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{70}}{231} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{10\sqrt{35}}{231} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{70}}{231} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}}{231} & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
154	$\mathbb{Q}^{(a)}_{5,-1}$	$\begin{bmatrix} -\frac{\sqrt{35}}{231} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{210}}{231} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{14}}{77} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{7}}{231} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{21}}{231} & 0 & 0 \end{bmatrix}$
155	$\mathbb{Q}^{(a)}_{5,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{3}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{5}{33} & 0 & 0 & 0 \end{bmatrix}$
156	$\mathbb{Q}^{(a)}_{5,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{5}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{4\sqrt{5}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{2}}{33} & 0 & 0 & 0 & 0 \end{bmatrix}$
157	$\mathbb{Q}^{(a)}_{5,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{15}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{11} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
158	$\mathbb{Q}^{(a)}_{5,-5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{6}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
159	$\mathbb{G}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{2\sqrt{35}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{105}i}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}i}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}i}{7} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
160	$\mathbb{G}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & -\frac{2\sqrt{105}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{4\sqrt{35}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{70}i}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}i}{7} \end{bmatrix}$
161	$\mathbb{G}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & \frac{2\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{70}i}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{7}i}{7} & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
162	$\mathbb{G}^{(a)}_{2,-1}$	$\begin{bmatrix} -\frac{2\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{35}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{105}i}{35} & 0 & 0 \end{bmatrix}$
163	$\mathbb{G}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{105}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{35}i}{35} & 0 & 0 & 0 \end{bmatrix}$
164	$\mathbb{G}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{10}i}{75} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{15}i}{75} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
165	$\mathbb{G}^{(a)}_{4,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{2\sqrt{2}i}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{5}i}{75} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}i}{25} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
166	$\mathbb{G}^{(a)}_{4,2}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{4\sqrt{21}i}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{7}i}{105} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{8\sqrt{105}i}{525} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{105}i}{175} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
167	$\mathbb{G}^{(a)}_{4,1}$	$\begin{bmatrix} 0 & 0 & \frac{4\sqrt{14}i}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{42}i}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{21}i}{105} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{35}i}{75} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{210}i}{525} \end{bmatrix}$
168	$\mathbb{G}^{(a)}_{4,0}$	$\begin{bmatrix} 0 & -\frac{4\sqrt{7}i}{105} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}i}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{70}i}{105} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}i}{105} & 0 \end{bmatrix}$
169	$\mathbb{G}^{(a)}_{4,-1}$	$\begin{bmatrix} \frac{2\sqrt{210}i}{525} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{35}i}{75} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{21}i}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2\sqrt{42}i}{105} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{4\sqrt{14}i}{105} & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
170	$\mathbb{G}^{(a)}_{4,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2\sqrt{105}i}{175} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{8\sqrt{105}i}{525} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{7}i}{105} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{21}i}{105} & 0 & 0 & 0 \end{bmatrix}$
171	$\mathbb{G}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2\sqrt{5}i}{25} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{5}i}{75} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{2}i}{15} & 0 & 0 & 0 & 0 \end{bmatrix}$
172	$\mathbb{G}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{4\sqrt{15}i}{75} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{4\sqrt{10}i}{75} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
173	$\mathbb{T}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{35}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{105}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{7} \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
174	$\mathbb{T}^{(a)}_{1,0}$	$\begin{bmatrix} 0 & \frac{\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{35}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{70}i}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{7} & 0 \end{bmatrix}$
175	$\mathbb{T}^{(a)}_{1,-1}$	$\begin{bmatrix} -\frac{\sqrt{21}i}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{14}i}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{210}i}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{105}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{35} & 0 & 0 \end{bmatrix}$
176	$\mathbb{T}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{70} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{70} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
177	$\mathbb{T}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{7}i}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{70} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{70} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
178	$\mathbb{T}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{210}i}{175} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}i}{350} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{35}i}{350} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{70} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{70} \end{bmatrix}$
179	$\mathbb{T}^{(a)}_{3,0}$	$\begin{bmatrix} 0 & -\frac{\sqrt{7}i}{35} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{70}i}{350} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2\sqrt{35}i}{175} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{350} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{35} & 0 \end{bmatrix}$
180	$\mathbb{T}^{(a)}_{3,-1}$	$\begin{bmatrix} \frac{\sqrt{14}i}{70} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}i}{70} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{35}i}{350} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{70}i}{350} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{175} & 0 & 0 \end{bmatrix}$
181	$\mathbb{T}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}i}{70} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{21}i}{70} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}i}{35} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
182	$\mathbb{T}^{(a)}_{3,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{35}i}{70} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}i}{70} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{14}i}{70} & 0 & 0 & 0 & 0 \end{bmatrix}$
183	$\mathbb{T}^{(a)}_{5,5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{6}i}{231} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
184	$\mathbb{T}^{(a)}_{5,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{77} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}i}{231} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
185	$\mathbb{T}^{(a)}_{5,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{5\sqrt{2}i}{231} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{5}i}{231} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}i}{231} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
186	$\mathbb{T}^{(a)}_{5,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{5i}{231} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{3}i}{231} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{77} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{231} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
187	$\mathbb{T}^{(a)}_{5,1}$	$\begin{bmatrix} 0 & 0 & -\frac{5\sqrt{21}i}{1617} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{7}i}{1617} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}i}{539} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{210}i}{1617} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{1617} \end{bmatrix}$
188	$\mathbb{T}^{(a)}_{5,0}$	$\begin{bmatrix} 0 & \frac{5\sqrt{7}i}{1617} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{70}i}{1617} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{10\sqrt{35}i}{1617} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{70}i}{1617} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}i}{1617} & 0 \end{bmatrix}$
189	$\mathbb{T}^{(a)}_{5,-1}$	$\begin{bmatrix} -\frac{\sqrt{35}i}{1617} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{210}i}{1617} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{14}i}{539} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{7}i}{1617} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{21}i}{1617} & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
190	$\mathbb{T}^{(a)}_{5,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{231} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}i}{77} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{3}i}{231} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{5i}{231} & 0 & 0 & 0 \end{bmatrix}$
191	$\mathbb{T}^{(a)}_{5,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{5}i}{231} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{4\sqrt{5}i}{231} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{2}i}{231} & 0 & 0 & 0 & 0 \end{bmatrix}$
192	$\mathbb{T}^{(a)}_{5,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{15}i}{231} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{77} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
193	$\mathbb{T}^{(a)}_{5,-5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{6}i}{231} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
194	$\mathbb{M}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{4\sqrt{35}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{4\sqrt{105}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{7} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{7} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
195	$\mathbb{M}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & 0 & -\frac{4\sqrt{105}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{8\sqrt{35}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{4\sqrt{70}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{7} \end{bmatrix}$
196	$\mathbb{M}^{(a)}_{2,0}$	$\begin{bmatrix} 0 & \frac{4\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{4\sqrt{70}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{4\sqrt{70}}{35} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{7}}{7} & 0 \end{bmatrix}$
197	$\mathbb{M}^{(a)}_{2,-1}$	$\begin{bmatrix} -\frac{4\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{4\sqrt{70}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{8\sqrt{35}}{35} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{4\sqrt{105}}{35} & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
198	$\mathbb{M}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{4\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{4\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{4\sqrt{105}}{35} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{4\sqrt{35}}{35} & 0 & 0 & 0 \end{bmatrix}$
199	$\mathbb{M}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{10}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{15}}{15} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
200	$\mathbb{M}^{(a)}_{4,3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{2\sqrt{2}}{3} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{5}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}}{5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
201	$\mathbb{M}^{(a)}_{4,2}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{4\sqrt{21}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{7}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{8\sqrt{105}}{105} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{105}}{35} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
202	$\mathbb{M}^{(a)}_{4,1}$	$\begin{bmatrix} 0 & 0 & \frac{4\sqrt{14}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{42}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{21}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2\sqrt{35}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{210}}{105} \end{bmatrix}$
203	$\mathbb{M}^{(a)}_{4,0}$	$\begin{bmatrix} 0 & -\frac{4\sqrt{7}}{21} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{70}}{21} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{21} & 0 \end{bmatrix}$
204	$\mathbb{M}^{(a)}_{4,-1}$	$\begin{bmatrix} \frac{2\sqrt{210}}{105} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{35}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{21}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2\sqrt{42}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{4\sqrt{14}}{21} & 0 & 0 \end{bmatrix}$
205	$\mathbb{M}^{(a)}_{4,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2\sqrt{105}}{35} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{8\sqrt{105}}{105} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{7}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{21}}{21} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 9

No.	multipole	matrix
206	$\mathbb{M}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2\sqrt{5}}{5} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{5}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{2}}{3} & 0 & 0 & 0 & 0 \end{bmatrix}$
207	$\mathbb{M}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{4\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{4\sqrt{10}}{15} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

bra: $= |f,3\rangle, |f,2\rangle, |f,1\rangle, |f,0\rangle, |f,-1\rangle, |f,-2\rangle, |f,-3\rangle$
ket: $= |f,3\rangle, |f,2\rangle, |f,1\rangle, |f,0\rangle, |f,-1\rangle, |f,-2\rangle, |f,-3\rangle$

Table 10: (f,f) block.

No.	multipole	matrix
208	$\mathbb{Q}^{(a)}_{0,0}$	$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
209	$\mathbb{Q}^{(a)}_{2,2}$	$\begin{bmatrix} 0 & 0 & -\frac{\sqrt{10}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{5}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{6}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{15} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
210	$\mathbb{Q}^{(a)}_{2,1}$	$\begin{bmatrix} 0 & \frac{1}{3} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
211	$\mathbb{Q}^{(a)}_{2,0}$	$\begin{bmatrix} -\frac{1}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{5} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{4}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{3} \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
212	$\mathbb{Q}^{(a)}_{2,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{3} & 0 \end{bmatrix}$
213	$\mathbb{Q}^{(a)}_{2,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{10}}{15} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{5}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{6}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{5}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{15} & 0 & 0 \end{bmatrix}$
214	$\mathbb{Q}^{(a)}_{4,4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
215	$\mathbb{Q}_{4,3}^{(a)}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{7}}{11} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
216	$\mathbb{Q}_{4,2}^{(a)}$	$\begin{bmatrix} 0 & 0 & \frac{\sqrt{6}}{11} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{2\sqrt{10}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{11} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
217	$\mathbb{Q}_{4,1}^{(a)}$	$\begin{bmatrix} 0 & -\frac{\sqrt{30}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{4\sqrt{2}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{4\sqrt{2}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
218	$\mathbb{Q}^{(a)}_{4,0}$	$\begin{bmatrix} \frac{1}{11} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{7}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2}{11} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{7}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{11} \end{bmatrix}$
219	$\mathbb{Q}^{(a)}_{4,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{30}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{4\sqrt{2}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{4\sqrt{2}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{33} & 0 \end{bmatrix}$
220	$\mathbb{Q}^{(a)}_{4,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{11} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{10}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{11} & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
221	$\mathbb{Q}^{(a)}_{4,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{7}}{11} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{14}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{14}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{11} & 0 & 0 & 0 \end{bmatrix}$
222	$\mathbb{Q}^{(a)}_{4,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{42}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{70}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42}}{33} & 0 & 0 & 0 & 0 \end{bmatrix}$
223	$\mathbb{Q}^{(a)}_{6,6}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{10\sqrt{231}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
224	$\mathbb{Q}_{6,5}^{(a)}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{462}}{429} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{462}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
225	$\mathbb{Q}_{6,4}^{(a)}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{5\sqrt{210}}{429} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{10\sqrt{14}}{143} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{210}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
226	$\mathbb{Q}_{6,3}^{(a)}$	$\begin{bmatrix} 0 & 0 & 0 & \frac{10\sqrt{21}}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{143} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{143} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{10\sqrt{21}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
227	$\mathbb{Q}_{6,2}^{(a)}$	$\begin{bmatrix} 0 & 0 & -\frac{10\sqrt{7}}{429} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{14}}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{10\sqrt{105}}{429} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{20\sqrt{14}}{429} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{10\sqrt{7}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
228	$\mathbb{Q}_{6,1}^{(a)}$	$\begin{bmatrix} 0 & \frac{5\sqrt{7}}{429} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{105}}{429} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{25\sqrt{14}}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{25\sqrt{14}}{429} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{105}}{429} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}}{429} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
229	$\mathbb{Q}_{6,0}^{(a)}$	$\begin{bmatrix} -\frac{5}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{10}{143} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{25}{143} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{100}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{25}{143} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{10}{143} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5}{429} \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
230	$\mathbb{Q}^{(a)}_{6,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{7}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{105}}{429} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{25\sqrt{14}}{429} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{25\sqrt{14}}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{105}}{429} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}}{429} & 0 \end{bmatrix}$
231	$\mathbb{Q}^{(a)}_{6,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{10\sqrt{7}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{20\sqrt{14}}{429} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{10\sqrt{105}}{429} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{20\sqrt{14}}{429} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{10\sqrt{7}}{429} & 0 & 0 \end{bmatrix}$
232	$\mathbb{Q}^{(a)}_{6,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{10\sqrt{21}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{42}}{143} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{42}}{143} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{10\sqrt{21}}{429} & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
233	$\mathbb{Q}^{(a)}_{6,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{210}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{10\sqrt{14}}{143} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{210}}{429} & 0 & 0 & 0 & 0 \end{bmatrix}$
234	$\mathbb{Q}^{(a)}_{6,-5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{5\sqrt{462}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{462}}{429} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
235	$\mathbb{Q}^{(a)}_{6,-6}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{10\sqrt{231}}{429} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
236	$\mathbb{M}^{(a)}_{1,1}$	$\begin{bmatrix} 0 & -\sqrt{3} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\sqrt{5} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\sqrt{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\sqrt{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\sqrt{5} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\sqrt{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
237	$\mathbb{M}^{(a)}_{1,0}$	$\begin{bmatrix} 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -3 \end{bmatrix}$
238	$\mathbb{M}^{(a)}_{1,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \sqrt{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \sqrt{5} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \sqrt{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \sqrt{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sqrt{5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \sqrt{3} & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
239	$\mathbb{M}^{(a)}_{3,3}$	$\begin{bmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sqrt{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \sqrt{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
240	$\mathbb{M}^{(a)}_{3,2}$	$\begin{bmatrix} 0 & 0 & -\sqrt{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \sqrt{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
241	$\mathbb{M}^{(a)}_{3,1}$	$\begin{bmatrix} 0 & \sqrt{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \sqrt{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
242	$\mathbb{M}^{(a)}_{3,0}$	$\begin{bmatrix} -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$
243	$\mathbb{M}^{(a)}_{3,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\sqrt{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\sqrt{2} & 0 \end{bmatrix}$
244	$\mathbb{M}^{(a)}_{3,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\sqrt{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sqrt{2} & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
245	$\mathbb{M}^{(a)}_{3,-3}$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\sqrt{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\sqrt{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & 0 \end{pmatrix}$
246	$\mathbb{M}^{(a)}_{5,5}$	$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$
247	$\mathbb{M}^{(a)}_{5,4}$	$\begin{pmatrix} 0 & 0 & 0 & 0 & \frac{5\sqrt{42}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{42}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

continued ...

Table 10

No.	multipole	matrix
248	$\mathbb{M}^{(a)}_{5,3}$	$\begin{bmatrix} 0 & 0 & 0 & -\frac{10\sqrt{7}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{5\sqrt{14}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{14}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{10\sqrt{7}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
249	$\mathbb{M}^{(a)}_{5,2}$	$\begin{bmatrix} 0 & 0 & \frac{5\sqrt{14}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{10\sqrt{7}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{10\sqrt{7}}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
250	$\mathbb{M}^{(a)}_{5,1}$	$\begin{bmatrix} 0 & -\frac{5\sqrt{5}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{5\sqrt{3}}{11} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{5\sqrt{10}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{10}}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{3}}{11} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{5}}{33} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
251	$\mathbb{M}^{(a)}_{5,0}$	$\begin{bmatrix} \frac{5}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{20}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{25}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{25}{33} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{20}{33} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5}{33} \end{bmatrix}$
252	$\mathbb{M}^{(a)}_{5,-1}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{5\sqrt{5}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{5\sqrt{3}}{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{5\sqrt{10}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{5\sqrt{10}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{3}}{11} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{5}}{33} & 0 \end{bmatrix}$
253	$\mathbb{M}^{(a)}_{5,-2}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{5\sqrt{14}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{10\sqrt{7}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{10\sqrt{7}}{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{14}}{33} & 0 & 0 \end{bmatrix}$

continued ...

Table 10

No.	multipole	matrix
254	$\mathbb{M}^{(a)}_{5,-3}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{10\sqrt{7}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{5\sqrt{14}}{33} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{14}}{33} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{10\sqrt{7}}{33} & 0 & 0 & 0 \end{bmatrix}$
255	$\mathbb{M}^{(a)}_{5,-4}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{5\sqrt{42}}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{42}}{33} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
256	$\mathbb{M}^{(a)}_{5,-5}$	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{5\sqrt{42}}{33} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{42}}{33} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$