

No. 15  $D_{4h}$   $4/mmm$  [ tetragonal ] (axial)

表 1 rank 0

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
1	$A_{1u}$	<b>A1u</b>	—	—	$\mathbb{G}_0^{(h,A_{1u})}$	<b>Gh(0, A1u, , )</b>	$C_0$

表 2 rank 1

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
2	$A_{2g}$	<b>A2g</b>	—	—	$\mathbb{G}_1^{(h,A_{2g})}$	<b>Gh(1, A2g, , )</b>	$C_0$
3	$E_g$	<b>Eg</b>	—	0	$\mathbb{G}_{1,0}^{(h,E_g)}$	<b>Gh(1, Eg, , 0)</b>	$C_1$
4	$E_g$	<b>Eg</b>	—	1	$\mathbb{G}_{1,1}^{(h,E_g)}$	<b>Gh(1, Eg, , 1)</b>	$S_1$

表 3 rank 2

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
5	$A_{1u}$	<b>A1u</b>	—	—	$\mathbb{G}_2^{(h,A_{1u})}$	<b>Gh(2, A1u, , )</b>	$C_0$
6	$B_{1u}$	<b>B1u</b>	—	—	$\mathbb{G}_2^{(h,B_{1u})}$	<b>Gh(2, B1u, , )</b>	$C_2$
7	$B_{2u}$	<b>B2u</b>	—	—	$\mathbb{G}_2^{(h,B_{2u})}$	<b>Gh(2, B2u, , )</b>	$S_2$
8	$E_u$	<b>Eu</b>	—	0	$\mathbb{G}_{2,0}^{(h,E_u)}$	<b>Gh(2, Eu, , 0)</b>	$S_1$
9	$E_u$	<b>Eu</b>	—	1	$\mathbb{G}_{2,1}^{(h,E_u)}$	<b>Gh(2, Eu, , 1)</b>	$C_1$

表 4 rank 3

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
10	$A_{2g}$	<b>A2g</b>	—	—	$\mathbb{G}_3^{(h,A_{2g})}$	<b>Gh(3, A2g, , )</b>	$C_0$
11	$B_{1g}$	<b>B1g</b>	—	—	$\mathbb{G}_3^{(h,B_{1g})}$	<b>Gh(3, B1g, , )</b>	$S_2$
12	$B_{2g}$	<b>B2g</b>	—	—	$\mathbb{G}_3^{(h,B_{2g})}$	<b>Gh(3, B2g, , )</b>	$C_2$
13	$E_g$	<b>Eg</b>	1	0	$\mathbb{G}_{3,0}^{(h,E_g,1)}$	<b>Gh(3, Eg, 1, 0)</b>	$-\frac{\sqrt{6}C_1}{4} + \frac{\sqrt{10}C_3}{4}$
14	$E_g$	<b>Eg</b>	1	1	$\mathbb{G}_{3,1}^{(h,E_g,1)}$	<b>Gh(3, Eg, 1, 1)</b>	$-\frac{\sqrt{6}S_1}{4} - \frac{\sqrt{10}S_3}{4}$
15	$E_g$	<b>Eg</b>	2	0	$\mathbb{G}_{3,0}^{(h,E_g,2)}$	<b>Gh(3, Eg, 2, 0)</b>	$-\frac{\sqrt{10}C_1}{4} - \frac{\sqrt{6}C_3}{4}$
16	$E_g$	<b>Eg</b>	2	1	$\mathbb{G}_{3,1}^{(h,E_g,2)}$	<b>Gh(3, Eg, 2, 1)</b>	$-\frac{\sqrt{10}S_1}{4} + \frac{\sqrt{6}S_3}{4}$

表 5 rank 4

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
17	$A_{1u}$	<b>A1u</b>	1	—	$\mathbb{G}_4^{(h,A_{1u},1)}$	<b>Gh(4, A1u, 1, )</b>	$\frac{\sqrt{21}C_0}{6} + \frac{\sqrt{15}C_4}{6}$
18	$A_{1u}$	<b>A1u</b>	2	—	$\mathbb{G}_4^{(h,A_{1u},2)}$	<b>Gh(4, A1u, 2, )</b>	$\frac{\sqrt{15}C_0}{6} - \frac{\sqrt{21}C_4}{6}$
19	$A_{2u}$	<b>A2u</b>	—	—	$\mathbb{G}_4^{(h,A_{2u})}$	<b>Gh(4, A2u, , )</b>	$S_4$
20	$B_{1u}$	<b>B1u</b>	—	—	$\mathbb{G}_4^{(h,B_{1u})}$	<b>Gh(4, B1u, , )</b>	$-C_2$
21	$B_{2u}$	<b>B2u</b>	—	—	$\mathbb{G}_4^{(h,B_{2u})}$	<b>Gh(4, B2u, , )</b>	$S_2$
22	$E_u$	<b>Eu</b>	1	0	$\mathbb{G}_{4,0}^{(h,E_u,1)}$	<b>Gh(4, Eu, 1, 0)</b>	$-\frac{\sqrt{14}S_1}{4} - \frac{\sqrt{2}S_3}{4}$
23	$E_u$	<b>Eu</b>	1	1	$\mathbb{G}_{4,1}^{(h,E_u,1)}$	<b>Gh(4, Eu, 1, 1)</b>	$-\frac{\sqrt{14}C_1}{4} + \frac{\sqrt{2}C_3}{4}$
24	$E_u$	<b>Eu</b>	2	0	$\mathbb{G}_{4,0}^{(h,E_u,2)}$	<b>Gh(4, Eu, 2, 0)</b>	$-\frac{\sqrt{2}S_1}{4} + \frac{\sqrt{14}S_3}{4}$
25	$E_u$	<b>Eu</b>	2	1	$\mathbb{G}_{4,1}^{(h,E_u,2)}$	<b>Gh(4, Eu, 2, 1)</b>	$-\frac{\sqrt{2}C_1}{4} - \frac{\sqrt{14}C_3}{4}$

表 6 rank 5

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
26	$A_{1g}$	A1g	—	—	$\mathbb{G}_5^{(h,A_{1g})}$	Gh(5, A1g, , )	$S_4$
27	$A_{2g}$	A2g	1	—	$\mathbb{G}_5^{(h,A_{2g},1)}$	Gh(5, A2g, 1, )	$C_0$
28	$A_{2g}$	A2g	2	—	$\mathbb{G}_5^{(h,A_{2g},2)}$	Gh(5, A2g, 2, )	$C_4$
29	$B_{1g}$	B1g	—	—	$\mathbb{G}_5^{(h,B_{1g})}$	Gh(5, B1g, , )	$-S_2$
30	$B_{2g}$	B2g	—	—	$\mathbb{G}_5^{(h,B_{2g})}$	Gh(5, B2g, , )	$C_2$
31	$E_g$	Eg	1	0	$\mathbb{G}_{5,0}^{(h,E_g,1)}$	Gh(5, Eg, 1, 0)	$\frac{\sqrt{15}C_1}{8} - \frac{\sqrt{70}C_3}{16} + \frac{3\sqrt{14}C_5}{16}$
32	$E_g$	Eg	1	1	$\mathbb{G}_{5,1}^{(h,E_g,1)}$	Gh(5, Eg, 1, 1)	$\frac{\sqrt{15}S_1}{8} + \frac{\sqrt{70}S_3}{16} + \frac{3\sqrt{14}S_5}{16}$
33	$E_g$	Eg	2	0	$\mathbb{G}_{5,0}^{(h,E_g,2)}$	Gh(5, Eg, 2, 0)	$\frac{\sqrt{21}C_1}{8} + \frac{9\sqrt{2}C_3}{16} + \frac{\sqrt{10}C_5}{16}$
34	$E_g$	Eg	2	1	$\mathbb{G}_{5,1}^{(h,E_g,2)}$	Gh(5, Eg, 2, 1)	$\frac{\sqrt{21}S_1}{8} - \frac{9\sqrt{2}S_3}{16} + \frac{\sqrt{10}S_5}{16}$
35	$E_g$	Eg	3	0	$\mathbb{G}_{5,0}^{(h,E_g,3)}$	Gh(5, Eg, 3, 0)	$\frac{\sqrt{7}C_1}{4} - \frac{\sqrt{6}C_3}{8} - \frac{\sqrt{30}C_5}{8}$
36	$E_g$	Eg	3	1	$\mathbb{G}_{5,1}^{(h,E_g,3)}$	Gh(5, Eg, 3, 1)	$\frac{\sqrt{7}S_1}{4} + \frac{\sqrt{6}S_3}{8} - \frac{\sqrt{30}S_5}{8}$

表 7 rank 6

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
37	$A_{1u}$	A1u	1	—	$\mathbb{G}_6^{(h,A_{1u},1)}$	Gh(6, A1u, 1, )	$\frac{\sqrt{2}C_0}{4} - \frac{\sqrt{14}C_4}{4}$
38	$A_{1u}$	A1u	2	—	$\mathbb{G}_6^{(h,A_{1u},2)}$	Gh(6, A1u, 2, )	$\frac{\sqrt{14}C_0}{4} + \frac{\sqrt{2}C_4}{4}$
39	$A_{2u}$	A2u	—	—	$\mathbb{G}_6^{(h,A_{2u})}$	Gh(6, A2u, , )	$S_4$
40	$B_{1u}$	B1u	1	—	$\mathbb{G}_6^{(h,B_{1u},1)}$	Gh(6, B1u, 1, )	$\frac{\sqrt{11}C_2}{4} - \frac{\sqrt{5}C_6}{4}$
41	$B_{1u}$	B1u	2	—	$\mathbb{G}_6^{(h,B_{1u},2)}$	Gh(6, B1u, 2, )	$\frac{\sqrt{5}C_2}{4} + \frac{\sqrt{11}C_6}{4}$
42	$B_{2u}$	B2u	1	—	$\mathbb{G}_6^{(h,B_{2u},1)}$	Gh(6, B2u, 1, )	$S_6$
43	$B_{2u}$	B2u	2	—	$\mathbb{G}_6^{(h,B_{2u},2)}$	Gh(6, B2u, 2, )	$S_2$
44	$E_u$	Eu	1	0	$\mathbb{G}_{6,0}^{(h,E_u,1)}$	Gh(6, Eu, 1, 0)	$\frac{\sqrt{3}S_1}{4} - \frac{\sqrt{30}S_3}{8} - \frac{\sqrt{22}S_5}{8}$
45	$E_u$	Eu	1	1	$\mathbb{G}_{6,1}^{(h,E_u,1)}$	Gh(6, Eu, 1, 1)	$\frac{\sqrt{3}C_1}{4} + \frac{\sqrt{30}C_3}{8} - \frac{\sqrt{22}C_5}{8}$
46	$E_u$	Eu	2	0	$\mathbb{G}_{6,0}^{(h,E_u,2)}$	Gh(6, Eu, 2, 0)	$\frac{3\sqrt{22}S_1}{16} + \frac{\sqrt{55}S_3}{16} + \frac{\sqrt{3}S_5}{16}$
47	$E_u$	Eu	2	1	$\mathbb{G}_{6,1}^{(h,E_u,2)}$	Gh(6, Eu, 2, 1)	$\frac{3\sqrt{22}C_1}{16} - \frac{\sqrt{55}C_3}{16} + \frac{\sqrt{3}C_5}{16}$
48	$E_u$	Eu	3	0	$\mathbb{G}_{6,0}^{(h,E_u,3)}$	Gh(6, Eu, 3, 0)	$\frac{\sqrt{10}S_1}{16} - \frac{9S_3}{16} + \frac{\sqrt{165}S_5}{16}$
49	$E_u$	Eu	3	1	$\mathbb{G}_{6,1}^{(h,E_u,3)}$	Gh(6, Eu, 3, 1)	$\frac{\sqrt{10}C_1}{16} + \frac{9C_3}{16} + \frac{\sqrt{165}C_5}{16}$

表 8 rank 7

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
50	$A_{1g}$	A1g	—	—	$\mathbb{G}_7^{(h,A_{1g})}$	Gh(7, A1g, , )	$S_4$
51	$A_{2g}$	A2g	1	—	$\mathbb{G}_7^{(h,A_{2g},1)}$	Gh(7, A2g, 1, )	$C_0$
52	$A_{2g}$	A2g	2	—	$\mathbb{G}_7^{(h,A_{2g},2)}$	Gh(7, A2g, 2, )	$C_4$
53	$B_{1g}$	B1g	1	—	$\mathbb{G}_7^{(h,B_{1g},1)}$	Gh(7, B1g, 1, )	$\frac{\sqrt{78}S_2}{12} + \frac{\sqrt{66}S_6}{12}$
54	$B_{1g}$	B1g	2	—	$\mathbb{G}_7^{(h,B_{1g},2)}$	Gh(7, B1g, 2, )	$\frac{\sqrt{66}S_2}{12} - \frac{\sqrt{78}S_6}{12}$
55	$B_{2g}$	B2g	1	—	$\mathbb{G}_7^{(h,B_{2g},1)}$	Gh(7, B2g, 1, )	$C_6$
56	$B_{2g}$	B2g	2	—	$\mathbb{G}_7^{(h,B_{2g},2)}$	Gh(7, B2g, 2, )	$C_2$
57	$E_g$	Eg	1	0	$\mathbb{G}_{7,0}^{(h,E_g,1)}$	Gh(7, Eg, 1, 0)	$-\frac{5\sqrt{7}C_1}{32} + \frac{3\sqrt{21}C_3}{32} - \frac{\sqrt{231}C_5}{32} + \frac{\sqrt{429}C_7}{32}$
58	$E_g$	Eg	1	1	$\mathbb{G}_{7,1}^{(h,E_g,1)}$	Gh(7, Eg, 1, 1)	$-\frac{5\sqrt{7}S_1}{32} - \frac{3\sqrt{21}S_3}{32} - \frac{\sqrt{231}S_5}{32} - \frac{\sqrt{429}S_7}{32}$
59	$E_g$	Eg	2	0	$\mathbb{G}_{7,0}^{(h,E_g,2)}$	Gh(7, Eg, 2, 0)	$-\frac{3\sqrt{33}C_1}{32} - \frac{\sqrt{11}C_3}{32} + \frac{25C_5}{32} + \frac{\sqrt{91}C_7}{32}$
60	$E_g$	Eg	2	1	$\mathbb{G}_{7,1}^{(h,E_g,2)}$	Gh(7, Eg, 2, 1)	$-\frac{3\sqrt{33}S_1}{32} + \frac{\sqrt{11}S_3}{32} + \frac{25S_5}{32} - \frac{\sqrt{91}S_7}{32}$
61	$E_g$	Eg	3	0	$\mathbb{G}_{7,0}^{(h,E_g,3)}$	Gh(7, Eg, 3, 0)	$-\frac{\sqrt{858}C_1}{64} - \frac{3\sqrt{286}C_3}{64} - \frac{5\sqrt{26}C_5}{64} - \frac{\sqrt{14}C_7}{64}$
62	$E_g$	Eg	3	1	$\mathbb{G}_{7,1}^{(h,E_g,3)}$	Gh(7, Eg, 3, 1)	$-\frac{\sqrt{858}S_1}{64} + \frac{3\sqrt{286}S_3}{64} - \frac{5\sqrt{26}S_5}{64} + \frac{\sqrt{14}S_7}{64}$
63	$E_g$	Eg	4	0	$\mathbb{G}_{7,0}^{(h,E_g,4)}$	Gh(7, Eg, 4, 0)	$-\frac{15\sqrt{6}C_1}{64} + \frac{19\sqrt{2}C_3}{64} - \frac{\sqrt{22}C_5}{64} - \frac{\sqrt{2002}C_7}{64}$
64	$E_g$	Eg	4	1	$\mathbb{G}_{7,1}^{(h,E_g,4)}$	Gh(7, Eg, 4, 1)	$-\frac{15\sqrt{6}S_1}{64} - \frac{19\sqrt{2}S_3}{64} - \frac{\sqrt{22}S_5}{64} + \frac{\sqrt{2002}S_7}{64}$

表 9 rank 8

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
65	$A_{1u}$	A1u	1	—	$\mathbb{G}_8^{(h,A_{1u},1)}$	Gh(8, A1u, 1, )	$\frac{\sqrt{33}C_0}{8} + \frac{\sqrt{21}C_4}{12} + \frac{\sqrt{195}C_8}{24}$
66	$A_{1u}$	A1u	2	—	$\mathbb{G}_8^{(h,A_{1u},2)}$	Gh(8, A1u, 2, )	$-\frac{\sqrt{286}C_0}{32} + \frac{\sqrt{182}C_4}{16} + \frac{\sqrt{10}C_8}{32}$
67	$A_{1u}$	A1u	3	—	$\mathbb{G}_8^{(h,A_{1u},3)}$	Gh(8, A1u, 3, )	$-\frac{\sqrt{210}C_0}{32} - \frac{\sqrt{330}C_4}{48} + \frac{\sqrt{6006}C_8}{96}$
68	$A_{2u}$	A2u	1	—	$\mathbb{G}_8^{(h,A_{2u},1)}$	Gh(8, A2u, 1, )	$S_8$
69	$A_{2u}$	A2u	2	—	$\mathbb{G}_8^{(h,A_{2u},2)}$	Gh(8, A2u, 2, )	$S_4$
70	$B_{1u}$	B1u	1	—	$\mathbb{G}_8^{(h,B_{1u},1)}$	Gh(8, B1u, 1, )	$C_6$
71	$B_{1u}$	B1u	2	—	$\mathbb{G}_8^{(h,B_{1u},2)}$	Gh(8, B1u, 2, )	$C_2$
72	$B_{2u}$	B2u	1	—	$\mathbb{G}_8^{(h,B_{2u},1)}$	Gh(8, B2u, 1, )	$S_6$
73	$B_{2u}$	B2u	2	—	$\mathbb{G}_8^{(h,B_{2u},2)}$	Gh(8, B2u, 2, )	$S_2$
74	$E_u$	Eu	1	0	$\mathbb{G}_{8,0}^{(h,E_u,1)}$	Gh(8, Eu, 1, 0)	$-\frac{\sqrt{715}S_1}{32} - \frac{\sqrt{273}S_3}{32} - \frac{\sqrt{35}S_5}{32} - \frac{S_7}{32}$
75	$E_u$	Eu	1	1	$\mathbb{G}_{8,1}^{(h,E_u,1)}$	Gh(8, Eu, 1, 1)	$-\frac{\sqrt{715}C_1}{32} + \frac{\sqrt{273}C_3}{32} - \frac{\sqrt{35}C_5}{32} + \frac{C_7}{32}$
76	$E_u$	Eu	2	0	$\mathbb{G}_{8,0}^{(h,E_u,2)}$	Gh(8, Eu, 2, 0)	$-\frac{\sqrt{77}S_1}{32} + \frac{5\sqrt{15}S_3}{32} - \frac{3\sqrt{13}S_5}{32} - \frac{\sqrt{455}S_7}{32}$
77	$E_u$	Eu	2	1	$\mathbb{G}_{8,1}^{(h,E_u,2)}$	Gh(8, Eu, 2, 1)	$-\frac{\sqrt{77}C_1}{32} - \frac{5\sqrt{15}C_3}{32} - \frac{3\sqrt{13}C_5}{32} + \frac{\sqrt{455}C_7}{32}$
78	$E_u$	Eu	3	0	$\mathbb{G}_{8,0}^{(h,E_u,3)}$	Gh(8, Eu, 3, 0)	$-\frac{\sqrt{858}S_1}{64} + \frac{\sqrt{910}S_3}{64} + \frac{7\sqrt{42}S_5}{64} + \frac{3\sqrt{30}S_7}{64}$
79	$E_u$	Eu	3	1	$\mathbb{G}_{8,1}^{(h,E_u,3)}$	Gh(8, Eu, 3, 1)	$-\frac{\sqrt{858}C_1}{64} - \frac{\sqrt{910}C_3}{64} + \frac{7\sqrt{42}C_5}{64} - \frac{3\sqrt{30}C_7}{64}$
80	$E_u$	Eu	4	0	$\mathbb{G}_{8,0}^{(h,E_u,4)}$	Gh(8, Eu, 4, 0)	$-\frac{\sqrt{70}S_1}{64} + \frac{3\sqrt{66}S_3}{64} - \frac{\sqrt{1430}S_5}{64} + \frac{\sqrt{2002}S_7}{64}$
81	$E_u$	Eu	4	1	$\mathbb{G}_{8,1}^{(h,E_u,4)}$	Gh(8, Eu, 4, 1)	$-\frac{\sqrt{70}C_1}{64} - \frac{3\sqrt{66}C_3}{64} - \frac{\sqrt{1430}C_5}{64} - \frac{\sqrt{2002}C_7}{64}$

表 10 rank 9

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
82	$A_{1g}$	A1g	1	—	$\mathbb{G}_9^{(h,A_{1g},1)}$	Gh(9, A1g, 1, )	$\frac{\sqrt{102}S_4}{12} - \frac{\sqrt{42}S_8}{12}$
83	$A_{1g}$	A1g	2	—	$\mathbb{G}_9^{(h,A_{1g},2)}$	Gh(9, A1g, 2, )	$\frac{\sqrt{42}S_4}{12} + \frac{\sqrt{102}S_8}{12}$
84	$A_{2g}$	A2g	1	—	$\mathbb{G}_9^{(h,A_{2g},1)}$	Gh(9, A2g, 1, )	$C_0$
85	$A_{2g}$	A2g	2	—	$\mathbb{G}_9^{(h,A_{2g},2)}$	Gh(9, A2g, 2, )	$C_8$
86	$A_{2g}$	A2g	3	—	$\mathbb{G}_9^{(h,A_{2g},3)}$	Gh(9, A2g, 3, )	$C_4$
87	$B_{1g}$	B1g	1	—	$\mathbb{G}_9^{(h,B_{1g},1)}$	Gh(9, B1g, 1, )	$\frac{\sqrt{3}S_2}{4} - \frac{\sqrt{13}S_6}{4}$
88	$B_{1g}$	B1g	2	—	$\mathbb{G}_9^{(h,B_{1g},2)}$	Gh(9, B1g, 2, )	$-\frac{\sqrt{13}S_2}{4} - \frac{\sqrt{3}S_6}{4}$
89	$B_{2g}$	B2g	1	—	$\mathbb{G}_9^{(h,B_{2g},1)}$	Gh(9, B2g, 1, )	$C_6$
90	$B_{2g}$	B2g	2	—	$\mathbb{G}_9^{(h,B_{2g},2)}$	Gh(9, B2g, 2, )	$C_2$
91	$E_g$	Eg	1	0	$\mathbb{G}_{9,0}^{(h,E_g,1)}$	Gh(9, Eg, 1, 0)	$\frac{21\sqrt{5}C_1}{128} - \frac{\sqrt{2310}C_3}{128} + \frac{3\sqrt{286}C_5}{128} - \frac{3\sqrt{1430}C_7}{256} + \frac{\sqrt{24310}C_9}{256}$
92	$E_g$	Eg	1	1	$\mathbb{G}_{9,1}^{(h,E_g,1)}$	Gh(9, Eg, 1, 1)	$\frac{21\sqrt{5}S_1}{128} + \frac{\sqrt{2310}S_3}{128} + \frac{3\sqrt{286}S_5}{128} + \frac{3\sqrt{1430}S_7}{256} + \frac{\sqrt{24310}S_9}{256}$
93	$E_g$	Eg	2	0	$\mathbb{G}_{9,0}^{(h,E_g,2)}$	Gh(9, Eg, 2, 0)	$\frac{\sqrt{2431}C_1}{128} + \frac{\sqrt{9282}C_3}{128} + \frac{5\sqrt{170}C_5}{128} + \frac{7\sqrt{34}C_7}{256} + \frac{3\sqrt{2}C_9}{256}$
94	$E_g$	Eg	2	1	$\mathbb{G}_{9,1}^{(h,E_g,2)}$	Gh(9, Eg, 2, 1)	$\frac{\sqrt{2431}S_1}{128} - \frac{\sqrt{9282}S_3}{128} + \frac{5\sqrt{170}S_5}{128} - \frac{7\sqrt{34}S_7}{256} + \frac{3\sqrt{2}S_9}{256}$
95	$E_g$	Eg	3	0	$\mathbb{G}_{9,0}^{(h,E_g,3)}$	Gh(9, Eg, 3, 0)	$\frac{\sqrt{1001}C_1}{64} - \frac{\sqrt{78}C_3}{64} - \frac{3\sqrt{70}C_5}{64} + \frac{23\sqrt{14}C_7}{128} + \frac{3\sqrt{238}C_9}{128}$
96	$E_g$	Eg	3	1	$\mathbb{G}_{9,1}^{(h,E_g,3)}$	Gh(9, Eg, 3, 1)	$\frac{\sqrt{1001}S_1}{64} + \frac{\sqrt{78}S_3}{64} - \frac{3\sqrt{70}S_5}{64} - \frac{23\sqrt{14}S_7}{128} + \frac{3\sqrt{238}S_9}{128}$
97	$E_g$	Eg	4	0	$\mathbb{G}_{9,0}^{(h,E_g,4)}$	Gh(9, Eg, 4, 0)	$\frac{\sqrt{858}C_1}{64} + \frac{\sqrt{91}C_3}{32} - \frac{5\sqrt{15}C_5}{32} - \frac{21\sqrt{3}C_7}{64} - \frac{\sqrt{51}C_9}{64}$
98	$E_g$	Eg	4	1	$\mathbb{G}_{9,1}^{(h,E_g,4)}$	Gh(9, Eg, 4, 1)	$\frac{\sqrt{858}S_1}{64} - \frac{\sqrt{91}S_3}{32} - \frac{5\sqrt{15}S_5}{32} + \frac{21\sqrt{3}S_7}{64} - \frac{\sqrt{51}S_9}{64}$
99	$E_g$	Eg	5	0	$\mathbb{G}_{9,0}^{(h,E_g,5)}$	Gh(9, Eg, 5, 0)	$\frac{7\sqrt{22}C_1}{64} - \frac{3\sqrt{21}C_3}{32} + \frac{\sqrt{65}C_5}{32} + \frac{\sqrt{13}C_7}{64} - \frac{3\sqrt{221}C_9}{64}$
100	$E_g$	Eg	5	1	$\mathbb{G}_{9,1}^{(h,E_g,5)}$	Gh(9, Eg, 5, 1)	$\frac{7\sqrt{22}S_1}{64} + \frac{3\sqrt{21}S_3}{32} + \frac{\sqrt{65}S_5}{32} - \frac{\sqrt{13}S_7}{64} - \frac{3\sqrt{221}S_9}{64}$

表 11 rank 10

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
101	$A_{1u}$	A1u	1	—	$\mathbb{G}_{10}^{(h,A_{1u},1)}$	Gh(10, A1u, 1, )	$\frac{\sqrt{390}C_0}{48} - \frac{\sqrt{22}C_4}{8} - \frac{\sqrt{1122}C_8}{48}$
102	$A_{1u}$	A1u	2	—	$\mathbb{G}_{10}^{(h,A_{1u},2)}$	Gh(10, A1u, 2, )	$\frac{11\sqrt{420189}C_0}{8988} + \frac{\sqrt{827645}C_4}{1498} - \frac{\sqrt{146055}C_8}{8988}$
103	$A_{1u}$	A1u	3	—	$\mathbb{G}_{10}^{(h,A_{1u},3)}$	Gh(10, A1u, 3, )	$\frac{3\sqrt{3213210}C_0}{11984} - \frac{83\sqrt{1498}C_4}{5992} + \frac{31\sqrt{76398}C_8}{11984}$
104	$A_{2u}$	A2u	1	—	$\mathbb{G}_{10}^{(h,A_{2u},1)}$	Gh(10, A2u, 1, )	$S_8$
105	$A_{2u}$	A2u	2	—	$\mathbb{G}_{10}^{(h,A_{2u},2)}$	Gh(10, A2u, 2, )	$S_4$
106	$B_{1u}$	B1u	1	—	$\mathbb{G}_{10}^{(h,B_{1u},1)}$	Gh(10, B1u, 1, )	$-\frac{\sqrt{85}C_{10}}{16} + \frac{\sqrt{1482}C_2}{48} + \frac{\sqrt{57}C_6}{48}$
107	$B_{1u}$	B1u	2	—	$\mathbb{G}_{10}^{(h,B_{1u},2)}$	Gh(10, B1u, 2, )	$\frac{\sqrt{370006}C_{10}}{749} + \frac{\sqrt{190995}C_2}{749}$
108	$B_{1u}$	B1u	3	—	$\mathbb{G}_{10}^{(h,B_{1u},3)}$	Gh(10, B1u, 3, )	$\frac{\sqrt{1209635}C_{10}}{11984} - \frac{19\sqrt{58422}C_2}{35952} + \frac{\sqrt{2247}C_6}{48}$
109	$B_{2u}$	B2u	1	—	$\mathbb{G}_{10}^{(h,B_{2u},1)}$	Gh(10, B2u, 1, )	$S_{10}$
110	$B_{2u}$	B2u	2	—	$\mathbb{G}_{10}^{(h,B_{2u},2)}$	Gh(10, B2u, 2, )	$S_6$
111	$B_{2u}$	B2u	3	—	$\mathbb{G}_{10}^{(h,B_{2u},3)}$	Gh(10, B2u, 3, )	$S_2$
112	$E_u$	Eu	1	0	$\mathbb{G}_{10,0}^{(h,E_u,1)}$	Gh(10, Eu, 1, 0)	$\frac{\sqrt{221}S_1}{32} - \frac{\sqrt{102}S_3}{32} - \frac{\sqrt{510}S_5}{32} - \frac{11\sqrt{6}S_7}{64} - \frac{\sqrt{38}S_9}{64}$
113	$E_u$	Eu	1	1	$\mathbb{G}_{10,1}^{(h,E_u,1)}$	Gh(10, Eu, 1, 1)	$\frac{\sqrt{221}C_1}{32} + \frac{\sqrt{102}C_3}{32} - \frac{\sqrt{510}C_5}{32} + \frac{11\sqrt{6}C_7}{64} - \frac{\sqrt{38}C_9}{64}$
114	$E_u$	Eu	2	0	$\mathbb{G}_{10,0}^{(h,E_u,2)}$	Gh(10, Eu, 2, 0)	$\frac{\sqrt{39}S_1}{32} - \frac{11\sqrt{2}S_3}{32} + \frac{5\sqrt{10}S_5}{32} - \frac{\sqrt{34}S_7}{64} - \frac{\sqrt{1938}S_9}{64}$
115	$E_u$	Eu	2	1	$\mathbb{G}_{10,1}^{(h,E_u,2)}$	Gh(10, Eu, 2, 1)	$\frac{\sqrt{39}C_1}{32} + \frac{11\sqrt{2}C_3}{32} + \frac{5\sqrt{10}C_5}{32} + \frac{\sqrt{34}C_7}{64} - \frac{\sqrt{1938}C_9}{64}$
116	$E_u$	Eu	3	0	$\mathbb{G}_{10,0}^{(h,E_u,3)}$	Gh(10, Eu, 3, 0)	$\frac{\sqrt{41990}S_1}{256} + \frac{\sqrt{4845}S_3}{128} + \frac{\sqrt{969}S_5}{128} + \frac{\sqrt{285}S_7}{256} + \frac{\sqrt{5}S_9}{256}$
117	$E_u$	Eu	3	1	$\mathbb{G}_{10,1}^{(h,E_u,3)}$	Gh(10, Eu, 3, 1)	$\frac{\sqrt{41990}C_1}{256} - \frac{\sqrt{4845}C_3}{128} + \frac{\sqrt{969}C_5}{128} - \frac{\sqrt{285}C_7}{256} + \frac{\sqrt{5}C_9}{256}$
118	$E_u$	Eu	4	0	$\mathbb{G}_{10,0}^{(h,E_u,4)}$	Gh(10, Eu, 4, 0)	$\frac{9\sqrt{78}S_1}{256} - \frac{69S_3}{128} - \frac{\sqrt{5}S_5}{128} + \frac{43\sqrt{17}S_7}{256} + \frac{3\sqrt{969}S_9}{256}$
119	$E_u$	Eu	4	1	$\mathbb{G}_{10,1}^{(h,E_u,4)}$	Gh(10, Eu, 4, 1)	$\frac{9\sqrt{78}C_1}{256} + \frac{69C_3}{128} - \frac{\sqrt{5}C_5}{128} - \frac{43\sqrt{17}C_7}{256} + \frac{3\sqrt{969}C_9}{256}$
120	$E_u$	Eu	5	0	$\mathbb{G}_{10,0}^{(h,E_u,5)}$	Gh(10, Eu, 5, 0)	$\frac{7\sqrt{3}S_1}{128} - \frac{7\sqrt{26}S_3}{128} + \frac{5\sqrt{130}S_5}{128} - \frac{7\sqrt{442}S_7}{256} + \frac{\sqrt{25194}S_9}{256}$
121	$E_u$	Eu	5	1	$\mathbb{G}_{10,1}^{(h,E_u,5)}$	Gh(10, Eu, 5, 1)	$\frac{7\sqrt{3}C_1}{128} + \frac{7\sqrt{26}C_3}{128} + \frac{5\sqrt{130}C_5}{128} + \frac{7\sqrt{442}C_7}{256} + \frac{\sqrt{25194}C_9}{256}$

表 12 rank 11

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
122	$A_{1g}$	A1g	1	—	$\mathbb{G}_{11}^{(h,A_{1g},1)}$	Gh(11, A1g, 1, )	$S_8$
123	$A_{1g}$	A1g	2	—	$\mathbb{G}_{11}^{(h,A_{1g},2)}$	Gh(11, A1g, 2, )	$S_4$
124	$A_{2g}$	A2g	1	—	$\mathbb{G}_{11}^{(h,A_{2g},1)}$	Gh(11, A2g, 1, )	$C_0$
125	$A_{2g}$	A2g	2	—	$\mathbb{G}_{11}^{(h,A_{2g},2)}$	Gh(11, A2g, 2, )	$C_8$
126	$A_{2g}$	A2g	3	—	$\mathbb{G}_{11}^{(h,A_{2g},3)}$	Gh(11, A2g, 3, )	$C_4$
127	$B_{1g}$	B1g	1	—	$\mathbb{G}_{11}^{(h,B_{1g},1)}$	Gh(11, B1g, 1, )	$\frac{\sqrt{798}S_{10}}{48} + \frac{\sqrt{255}S_2}{24} + \frac{3\sqrt{6}S_6}{16}$
128	$B_{1g}$	B1g	2	—	$\mathbb{G}_{11}^{(h,B_{1g},2)}$	Gh(11, B1g, 2, )	$-\frac{\sqrt{210}S_{10}}{96} + \frac{\sqrt{969}S_2}{48} - \frac{\sqrt{570}S_6}{32}$
129	$B_{1g}$	B1g	3	—	$\mathbb{G}_{11}^{(h,B_{1g},3)}$	Gh(11, B1g, 3, )	$-\frac{\sqrt{646}S_{10}}{32} + \frac{\sqrt{35}S_2}{16} + \frac{\sqrt{238}S_6}{32}$
130	$B_{2g}$	B2g	1	—	$\mathbb{G}_{11}^{(h,B_{2g},1)}$	Gh(11, B2g, 1, )	$C_{10}$
131	$B_{2g}$	B2g	2	—	$\mathbb{G}_{11}^{(h,B_{2g},2)}$	Gh(11, B2g, 2, )	$C_6$
132	$B_{2g}$	B2g	3	—	$\mathbb{G}_{11}^{(h,B_{2g},3)}$	Gh(11, B2g, 3, )	$C_2$
133	$E_g$	Eg	1	0	$\mathbb{G}_{11,0}^{(h,E_g,1)}$	Gh(11, Eg, 1, 0)	$-\frac{21\sqrt{66}C_1}{512} + \frac{\sqrt{88179}C_{11}}{512} + \frac{\sqrt{30030}C_3}{512} - \frac{15\sqrt{143}C_5}{512} + \frac{\sqrt{36465}C_7}{512} - \frac{\sqrt{46189}C_9}{512}$
134	$E_g$	Eg	1	1	$\mathbb{G}_{11,1}^{(h,E_g,1)}$	Gh(11, Eg, 1, 1)	$-\frac{21\sqrt{66}S_1}{512} - \frac{\sqrt{88179}S_{11}}{512} - \frac{\sqrt{30030}S_3}{512} - \frac{15\sqrt{143}S_5}{512} - \frac{\sqrt{36465}S_7}{512} - \frac{\sqrt{46189}S_9}{512}$
135	$E_g$	Eg	2	0	$\mathbb{G}_{11,0}^{(h,E_g,2)}$	Gh(11, Eg, 2, 0)	$-\frac{\sqrt{41990}C_1}{512} + \frac{\sqrt{385}C_{11}}{512} - \frac{3\sqrt{4522}C_3}{512} + \frac{3\sqrt{4845}C_5}{512} + \frac{77\sqrt{19}C_7}{512} + \frac{39\sqrt{15}C_9}{512}$
136	$E_g$	Eg	2	1	$\mathbb{G}_{11,1}^{(h,E_g,2)}$	Gh(11, Eg, 2, 1)	$-\frac{\sqrt{41990}S_1}{512} - \frac{\sqrt{385}S_{11}}{512} + \frac{3\sqrt{4522}S_3}{512} + \frac{3\sqrt{4845}S_5}{512} - \frac{77\sqrt{19}S_7}{512} + \frac{39\sqrt{15}S_9}{512}$
137	$E_g$	Eg	3	0	$\mathbb{G}_{11,0}^{(h,E_g,3)}$	Gh(11, Eg, 3, 0)	$-\frac{5\sqrt{546}C_1}{256} + \frac{\sqrt{10659}C_{11}}{256} + \frac{11\sqrt{30}C_3}{256} + \frac{13\sqrt{7}C_5}{256} - \frac{3\sqrt{1785}C_7}{256} + \frac{3\sqrt{2261}C_9}{256}$
138	$E_g$	Eg	3	1	$\mathbb{G}_{11,1}^{(h,E_g,3)}$	Gh(11, Eg, 3, 1)	$-\frac{5\sqrt{546}S_1}{256} - \frac{\sqrt{10659}S_{11}}{256} - \frac{11\sqrt{30}S_3}{256} + \frac{13\sqrt{7}S_5}{256} + \frac{3\sqrt{1785}S_7}{256} + \frac{3\sqrt{2261}S_9}{256}$
139	$E_g$	Eg	4	0	$\mathbb{G}_{11,0}^{(h,E_g,4)}$	Gh(11, Eg, 4, 0)	$-\frac{\sqrt{29393}C_1}{512} - \frac{\sqrt{22}C_{11}}{1024} - \frac{9\sqrt{1615}C_3}{512} - \frac{5\sqrt{13566}C_5}{1024} - \frac{7\sqrt{1330}C_7}{1024} - \frac{9\sqrt{42}C_9}{1024}$
140	$E_g$	Eg	4	1	$\mathbb{G}_{11,1}^{(h,E_g,4)}$	Gh(11, Eg, 4, 1)	$-\frac{\sqrt{29393}S_1}{512} + \frac{\sqrt{22}S_{11}}{1024} + \frac{9\sqrt{1615}S_3}{512} - \frac{5\sqrt{13566}S_5}{1024} + \frac{7\sqrt{1330}S_7}{1024} - \frac{9\sqrt{42}S_9}{1024}$
141	$E_g$	Eg	5	0	$\mathbb{G}_{11,0}^{(h,E_g,5)}$	Gh(11, Eg, 5, 0)	$-\frac{15\sqrt{221}C_1}{512} - \frac{3\sqrt{2926}C_{11}}{1024} - \frac{\sqrt{595}C_3}{512} + \frac{53\sqrt{102}C_5}{1024} - \frac{105\sqrt{10}C_7}{1024} - \frac{61\sqrt{114}C_9}{1024}$
142	$E_g$	Eg	5	1	$\mathbb{G}_{11,1}^{(h,E_g,5)}$	Gh(11, Eg, 5, 1)	$-\frac{15\sqrt{221}S_1}{512} + \frac{3\sqrt{2926}S_{11}}{1024} + \frac{\sqrt{595}S_3}{512} + \frac{53\sqrt{102}S_5}{1024} + \frac{105\sqrt{10}S_7}{1024} - \frac{61\sqrt{114}S_9}{1024}$
143	$E_g$	Eg	6	0	$\mathbb{G}_{11,0}^{(h,E_g,6)}$	Gh(11, Eg, 6, 0)	$-\frac{21\sqrt{130}C_1}{512} - \frac{\sqrt{124355}C_{11}}{512} + \frac{57\sqrt{14}C_3}{512} - \frac{41\sqrt{15}C_5}{512} + \frac{17\sqrt{17}C_7}{512} + \frac{\sqrt{4845}C_9}{512}$
144	$E_g$	Eg	6	1	$\mathbb{G}_{11,1}^{(h,E_g,6)}$	Gh(11, Eg, 6, 1)	$-\frac{21\sqrt{130}S_1}{512} + \frac{\sqrt{124355}S_{11}}{512} - \frac{57\sqrt{14}S_3}{512} - \frac{41\sqrt{15}S_5}{512} - \frac{17\sqrt{17}S_7}{512} + \frac{\sqrt{4845}S_9}{512}$