

1.1. INTRODUCTION TO THE PROPERTIES OF TENSORS

1.1.4.9.4.2. Groups $\bar{3}m$, 32 , $3m$, with the twofold axis parallel to Ox_1

| kl | 11 | 22 | 33 | 23 | 31 | 12 | 32 | 13 | 21 |
|------|------|-------|------|-------|------|------|-------|------|------|
| ij | | | | | | | | | |
| 11 | 1111 | 1122 | 1133 | 1123 | | | 1132 | | |
| 22 | 1122 | 1111 | 1133 | -1123 | | | -1132 | | |
| 33 | 3311 | 3311 | 3333 | | | | | | |
| 23 | 2311 | -2311 | | 2323 | | | 2332 | | |
| 31 | | | | | 3131 | 3211 | | 3113 | 3211 |
| 12 | | | | | 1132 | 1212 | | 1123 | 1221 |
| 32 | 3211 | -3211 | | 3113 | | | 3131 | | |
| 13 | | | | | 2332 | 2311 | | 2323 | 2311 |
| 21 | | | | | 1132 | 1221 | | 1123 | 1212 |

with

$$t_{1111} - t_{1122} = t_{1212} + t_{1221}.$$

There are 14 independent components.

1.1.4.9.5. Tetragonal system

1.1.4.9.5.1. Groups $4/m$, 4 , $\bar{4}$

| kl | 11 | 22 | 33 | 23 | 31 | 12 | 32 | 13 | 21 |
|------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| ij | | | | | | | | | |
| 11 | 1111 | 1122 | 1133 | | | 1112 | | | -2212 |
| 22 | 1122 | 1111 | 1133 | | | 2212 | | | -1112 |
| 33 | 3311 | 3311 | 3333 | | | 3312 | | | -3312 |
| 23 | | | | 2323 | 2331 | | 2332 | 2313 | |
| 31 | | | | 3123 | 3131 | | 3132 | 3113 | |
| 12 | 1211 | 1222 | 1233 | | | 1212 | | | 1221 |
| 32 | | | | 3113 | -3132 | | 3131 | -3123 | |
| 13 | | | | -2313 | 2332 | | -2331 | 2323 | |
| 21 | -1222 | -1211 | -1233 | | | | | | 1212 |

There are 21 independent components.

1.1.4.9.5.2. Groups $4/m\bar{m}2$, 422 , $4mm$, $\bar{4}2m$

| kl | 11 | 22 | 33 | 23 | 31 | 12 | 32 | 13 | 21 |
|------|------|------|------|------|------|------|------|------|------|
| ij | | | | | | | | | |
| 11 | 1111 | 1122 | 1133 | | | | | | |
| 22 | 1122 | 1111 | 1133 | | | | | | |
| 33 | 3311 | 3311 | 3333 | | | | | | |
| 23 | | | | 2323 | | | 2332 | | |
| 31 | | | | | 3131 | | | 3113 | |
| 12 | | | | | | 1212 | | | 1221 |
| 32 | | | | 3113 | | | 3131 | | |
| 13 | | | | | 2332 | | | 2323 | |
| 21 | | | | | | 1221 | | | 1212 |

There are 11 independent components.

1.1.4.9.6. Hexagonal and cylindrical systems

1.1.4.9.6.1. Groups $6/m$, $\bar{6}$, 6 ; $(A_\infty/M)C$, A_∞

| kl | 11 | 22 | 33 | 23 | 31 | 12 | 32 | 13 | 21 |
|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| ij | | | | | | | | | |
| 11 | 1111 | 1122 | 1133 | | | 1112 | | | 1121 |
| 22 | 1122 | 1111 | 1133 | | | -1121 | | | -1112 |
| 33 | 3311 | 3311 | 3333 | | | 3312 | | | -3312 |
| 23 | | | | 2323 | 2331 | | 2332 | 2313 | |
| 31 | | | | 3123 | 3131 | | 3132 | 3113 | |
| 12 | 1211 | -2111 | 1233 | | | 1212 | | | 1221 |
| 32 | | | | 3113 | -3132 | | 3131 | -3123 | |
| 13 | | | | -2313 | 2332 | | -2331 | 2323 | |
| 21 | 2111 | -1211 | -1233 | | | 1132 | 1221 | | 1123 |

with

$$\left. \begin{aligned} t_{1111} - t_{1122} &= t_{1212} + t_{1221} \\ t_{1112} + t_{1121} &= -(t_{1211} + t_{2111}). \end{aligned} \right\}$$

There are 19 independent components.

1.1.4.9.6.2. Groups $6/m\bar{m}2$, 622 , $6mm$, $\bar{6}2m$; $(A_\infty/M)\infty$; $(A_2/M)C$, $A_\infty\infty A_2$

| kl | 11 | 22 | 33 | 23 | 31 | 12 | 32 | 13 | 21 |
|------|------|------|------|------|------|------|------|------|------|
| ij | | | | | | | | | |
| 11 | 1111 | 1122 | 1133 | | | | | | |
| 22 | 1122 | 1111 | 1133 | | | | | | |
| 33 | 3311 | 3311 | 3333 | | | | | | |
| 23 | | | | 2323 | | | 2332 | | |
| 31 | | | | | 3131 | | | 3113 | |
| 12 | | | | | | 1212 | | | 1221 |
| 32 | | | | 3113 | | | 3131 | | |
| 13 | | | | | 2332 | | | 2323 | |
| 21 | | | | | | 1221 | | | 1212 |

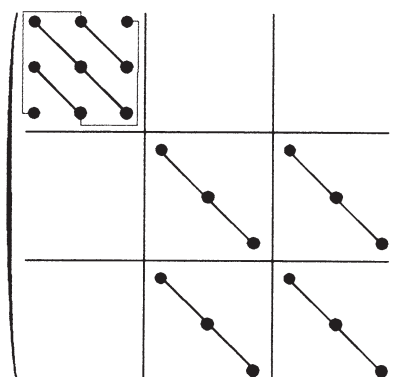
with

$$t_{1111} - t_{1122} = t_{1212} + t_{1221}.$$

There are 11 independent components.

1.1.4.9.7. Cubic system

1.1.4.9.7.1. Groups 23 , $\bar{3}m$



There are 7 independent components.