

MPG No. 6.4.123 2'2'2 (22'2' setting) [Type III, orthorhombic] [T tensor]

* Rank 0 tensor. * Rank 1 tensor.

$$[T_x \quad 0 \quad 0]$$

$$T_x = T_{px}^{(1)}$$

* Rank 2 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & T_{yz} \\ 0 & T_{yz} & 0 \end{bmatrix}$$

$$T_{yz} = T_{dyz}^{(1)}$$

* Rank 2 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & T_{yz} \\ 0 & -T_{yz} & 0 \end{bmatrix}$$

$$T_{yz} = M_{px}^{(1)}$$

* Rank 3 tensor (s).

$$\begin{bmatrix} T_{xxx} & 0 & 0 \\ T_{yyx} & 0 & 0 \\ T_{zzx} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & T_{zxx} \\ 0 & T_{xyy} & 0 \end{bmatrix}$$

$$T_{xxx} = 2T_{fax}^{(1)} + T_{px}^{(1)} + 2T_{px}^{(2)}$$

$$T_{yyx} = -2M_{dyz}^{(1)} - T_{fax}^{(1)} + T_{fbx}^{(1)} + T_{px}^{(1)}$$

$$T_{zzx} = 2M_{dyz}^{(1)} - T_{fax}^{(1)} - T_{fbx}^{(1)} + T_{px}^{(1)}$$

$$T_{zxx} = -M_{dyz}^{(1)} - T_{fax}^{(1)} - T_{fbx}^{(1)} + T_{px}^{(2)}$$

$$T_{xyy} = M_{dyz}^{(1)} - T_{fax}^{(1)} + T_{fbx}^{(1)} + T_{px}^{(2)}$$

* Rank 3 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & T_{zxx} \\ 0 & T_{xyy} & 0 \end{bmatrix}$$

$$T_{zxx} = M_{dyz}^{(2)} + T_{px}^{(3)}$$

$$T_{xyy} = M_{dyz}^{(2)} - T_{px}^{(3)}$$

* Rank 4 tensor (sss).

$$\begin{bmatrix} 0 & 0 & 0 & T_{xxyz} & 0 & 0 \\ 0 & 0 & 0 & T_{yyyz} & 0 & 0 \\ 0 & 0 & 0 & T_{zzyz} & 0 & 0 \\ T_{xxyz} & T_{yyyz} & T_{zzyz} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{zxxz} \\ 0 & 0 & 0 & 0 & T_{zxxy} & 0 \end{bmatrix}$$

$$\begin{aligned}
T_{xxyz} &= T_{dyz}^{(1)} + 2T_{gbx}^{(1)} \\
T_{yyyz} &= T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{gax}^{(1)} - T_{gbx}^{(1)} \\
T_{zzyz} &= T_{dyz}^{(1)} + 2T_{dyz}^{(2)} - T_{gax}^{(1)} - T_{gbx}^{(1)} \\
T_{zxxy} &= T_{dyz}^{(2)} + 2T_{gbx}^{(1)}
\end{aligned}$$

* Rank 4 tensor (ssa).

$$\begin{bmatrix}
0 & 0 & 0 & T_{xxyz} & 0 & 0 \\
0 & 0 & 0 & T_{yyyz} & 0 & 0 \\
0 & 0 & 0 & T_{zzyz} & 0 & 0 \\
-T_{xxyz} & -T_{yyyz} & -T_{zzyz} & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & T_{zxxy} \\
0 & 0 & 0 & 0 & -T_{zxxy} & 0
\end{bmatrix}$$

$$\begin{aligned}
T_{xxyz} &= -4M_{fbx}^{(1)} + T_{dyz}^{(3)} \\
T_{yyyz} &= -2M_{fax}^{(1)} + 2M_{fbx}^{(1)} + 2M_{px}^{(1)} + T_{dyz}^{(3)} \\
T_{zzyz} &= 2M_{fax}^{(1)} + 2M_{fbx}^{(1)} - 2M_{px}^{(1)} + T_{dyz}^{(3)} \\
T_{zxxy} &= -4M_{fax}^{(1)} - M_{px}^{(1)}
\end{aligned}$$

* Rank 4 tensor (aas).

$$\begin{bmatrix}
0 & 0 & 0 \\
0 & 0 & T_{zxxy} \\
0 & T_{zxxy} & 0
\end{bmatrix}$$

$$T_{zxxy} = 2T_{dyz}^{(4)}$$

* Rank 4 tensor (aaa).

$$\begin{bmatrix}
0 & 0 & 0 \\
0 & 0 & T_{zxxy} \\
0 & -T_{zxxy} & 0
\end{bmatrix}$$

$$T_{zxxy} = -M_{px}^{(2)}$$

* Rank 4 tensor (sa).

$$\begin{bmatrix}
T_{xxyz} & 0 & 0 \\
T_{yyyz} & 0 & 0 \\
T_{zzyz} & 0 & 0 \\
0 & 0 & 0 \\
0 & 0 & T_{zxxy} \\
0 & T_{xyzx} & 0
\end{bmatrix}$$

$$\begin{aligned}
T_{xxyz} &= 2M_{fax}^{(2)} + M_{px}^{(3)} + 2M_{px}^{(4)} \\
T_{yyyz} &= -M_{fax}^{(2)} + M_{fbx}^{(2)} + M_{px}^{(3)} - 2T_{dyz}^{(5)} \\
T_{zzyz} &= -M_{fax}^{(2)} - M_{fbx}^{(2)} + M_{px}^{(3)} + 2T_{dyz}^{(5)} \\
T_{zxxy} &= -M_{fax}^{(2)} - M_{fbx}^{(2)} + M_{px}^{(4)} - T_{dyz}^{(5)} \\
T_{xyzx} &= -M_{fax}^{(2)} + M_{fbx}^{(2)} + M_{px}^{(4)} + T_{dyz}^{(5)}
\end{aligned}$$

* Rank 4 tensor (as).

$$\begin{bmatrix}
T_{y zx x} & T_{y z y y} & T_{y z z z} & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & T_{zxxy} \\
0 & 0 & 0 & 0 & T_{xyzx} & 0
\end{bmatrix}$$

$$T_{yzxx} = 2M_{fax}^{(3)} + M_{px}^{(5)} + 2M_{px}^{(6)}$$

$$T_{yzyy} = -M_{fax}^{(3)} + M_{fbx}^{(3)} + M_{px}^{(5)} - 2T_{dyz}^{(6)}$$

$$T_{yzzz} = -M_{fax}^{(3)} - M_{fbx}^{(3)} + M_{px}^{(5)} + 2T_{dyz}^{(6)}$$

$$T_{zxxy} = -M_{fax}^{(3)} + M_{fbx}^{(3)} + M_{px}^{(6)} + T_{dyz}^{(6)}$$

$$T_{xyzx} = -M_{fax}^{(3)} - M_{fbx}^{(3)} + M_{px}^{(6)} - T_{dyz}^{(6)}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 & T_{xxyz} & 0 & 0 & T_{xxzy} & 0 & 0 \\ 0 & 0 & 0 & T_{yyyz} & 0 & 0 & T_{yyzy} & 0 & 0 \\ 0 & 0 & 0 & T_{zzzy} & 0 & 0 & T_{zzzy} & 0 & 0 \\ T_{yzxx} & T_{yzyy} & T_{yzzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{zxxy} & 0 & 0 & T_{zxyx} \\ 0 & 0 & 0 & 0 & T_{xyzx} & 0 & 0 & T_{xyxz} & 0 \end{bmatrix}$$

$$T_{xxyz} = 2M_{fax}^{(2)} - 4M_{fbx}^{(1)} + M_{px}^{(3)} + 2M_{px}^{(4)} + T_{dyz}^{(1)} + T_{dyz}^{(3)} + 2T_{gbx}^{(1)}$$

$$T_{xxzy} = -2M_{fax}^{(2)} - 4M_{fbx}^{(1)} - M_{px}^{(3)} - 2M_{px}^{(4)} + T_{dyz}^{(1)} + T_{dyz}^{(3)} + 2T_{gbx}^{(1)}$$

$$T_{yyyz} = -2M_{fax}^{(1)} - M_{fax}^{(2)} + 2M_{fbx}^{(1)} + M_{fbx}^{(2)} + 2M_{px}^{(1)} + M_{px}^{(3)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} - 2T_{dyz}^{(5)} + T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{yyzy} = -2M_{fax}^{(1)} + M_{fax}^{(2)} + 2M_{fbx}^{(1)} - M_{fbx}^{(2)} + 2M_{px}^{(1)} - M_{px}^{(3)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} + 2T_{dyz}^{(5)} + T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{zzzy} = 2M_{fax}^{(1)} - M_{fax}^{(2)} + 2M_{fbx}^{(1)} - M_{fbx}^{(2)} - 2M_{px}^{(1)} + M_{px}^{(3)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} + 2T_{dyz}^{(5)} - T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{zzzy} = 2M_{fax}^{(1)} + M_{fax}^{(2)} + 2M_{fbx}^{(1)} + M_{fbx}^{(2)} - 2M_{px}^{(1)} - M_{px}^{(3)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} - 2T_{dyz}^{(5)} - T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{yzxx} = 4M_{fbx}^{(1)} + T_{dyz}^{(1)} - T_{dyz}^{(3)} + 2T_{gbx}^{(1)}$$

$$T_{yzyy} = 2M_{fax}^{(1)} - 2M_{fbx}^{(1)} - 2M_{px}^{(1)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} - T_{dyz}^{(3)} + T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{yzzz} = -2M_{fax}^{(1)} - 2M_{fbx}^{(1)} + 2M_{px}^{(1)} + T_{dyz}^{(1)} + 2T_{dyz}^{(2)} - T_{dyz}^{(3)} - T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{zxxy} = -4M_{fax}^{(1)} - M_{fax}^{(2)} - M_{fbx}^{(2)} - M_{px}^{(1)} + M_{px}^{(4)} + T_{dyz}^{(2)} - T_{dyz}^{(5)} + 2T_{gbx}^{(1)}$$

$$T_{zxyx} = -4M_{fax}^{(1)} + M_{fax}^{(2)} + M_{fbx}^{(2)} - M_{px}^{(1)} - M_{px}^{(4)} + T_{dyz}^{(2)} + T_{dyz}^{(5)} + 2T_{gbx}^{(1)}$$

$$T_{xyzx} = 4M_{fax}^{(1)} - M_{fax}^{(2)} + M_{fbx}^{(2)} + M_{px}^{(1)} + M_{px}^{(4)} + T_{dyz}^{(2)} + T_{dyz}^{(5)} + 2T_{gbx}^{(1)}$$

$$T_{xyxz} = 4M_{fax}^{(1)} + M_{fax}^{(2)} - M_{fbx}^{(2)} + M_{px}^{(1)} - M_{px}^{(4)} + T_{dyz}^{(2)} - T_{dyz}^{(5)} + 2T_{gbx}^{(1)}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} T_{yzxx} & T_{yzyy} & T_{yzzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & T_{zxxy} & 0 & 0 & T_{zxyx} \\ 0 & 0 & 0 & 0 & T_{xyzx} & 0 & 0 & T_{xyxz} & 0 \end{bmatrix}$$

$$T_{yzxx} = 2M_{fax}^{(3)} + M_{px}^{(5)} + 2M_{px}^{(6)}$$

$$T_{yzyy} = -M_{fax}^{(3)} + M_{fbx}^{(3)} + M_{px}^{(5)} - 2T_{dyz}^{(6)}$$

$$T_{yzzz} = -M_{fax}^{(3)} - M_{fbx}^{(3)} + M_{px}^{(5)} + 2T_{dyz}^{(6)}$$

$$T_{zxxy} = -M_{fax}^{(3)} + M_{fbx}^{(3)} - M_{px}^{(2)} + M_{px}^{(6)} + 2T_{dyz}^{(4)} + T_{dyz}^{(6)}$$

$$T_{zxyx} = -M_{fax}^{(3)} + M_{fbx}^{(3)} + M_{px}^{(2)} + M_{px}^{(6)} - 2T_{dyz}^{(4)} + T_{dyz}^{(6)}$$

$$T_{xyzx} = -M_{fax}^{(3)} - M_{fbx}^{(3)} + M_{px}^{(2)} + M_{px}^{(6)} + 2T_{dyz}^{(4)} - T_{dyz}^{(6)}$$

$$T_{xyxz} = -M_{fax}^{(3)} - M_{fbx}^{(3)} - M_{px}^{(2)} + M_{px}^{(6)} - 2T_{dyz}^{(4)} - T_{dyz}^{(6)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & T_{yyyz} \\ 0 & T_{zzzy} & 0 \\ 0 & T_{yyzy} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & T_{xxyz} \\ 0 & 0 & T_{yzzz} \\ 0 & T_{zxxy} & 0 \\ 0 & 0 & 0 \\ -\frac{T_{yyuz}}{2} + \frac{T_{uyzu}}{2} + T_{zxxy} & 0 & 0 \end{bmatrix}$$

$$T_{yyyz} = T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} - 2T_{dyz}^{(5)} + T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{zzzy} = T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} - 2T_{dyz}^{(5)} - T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{yyzy} = T_{dyz}^{(1)} + 2T_{dyz}^{(2)} + T_{dyz}^{(3)} + 2T_{dyz}^{(5)} + T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{xxyz} = T_{dyz}^{(1)} + T_{dyz}^{(3)} + 2T_{gbx}^{(1)}$$

$$T_{yzzz} = T_{dyz}^{(1)} + 2T_{dyz}^{(2)} - T_{dyz}^{(3)} - T_{gax}^{(1)} - T_{gbx}^{(1)}$$

$$T_{zxxy} = T_{dyz}^{(2)} - T_{dyz}^{(5)} + 2T_{gbx}^{(1)}$$