

MPG No. 8.7.126 $m'mm$ (mm'm setting) [Type III, orthorhombic] [M tensor]

* Rank 0 tensor. * Rank 1 tensor. * Rank 2 tensor (s).

$$\begin{bmatrix} 0 & 0 & M_{xz} \\ 0 & 0 & 0 \\ M_{xz} & 0 & 0 \end{bmatrix}$$

$$M_{xz} = M_{dxz}^{(1)}$$

* Rank 2 tensor (a).

$$\begin{bmatrix} 0 & 0 & M_{xz} \\ 0 & 0 & 0 \\ -M_{xz} & 0 & 0 \end{bmatrix}$$

$$M_{xz} = -T_{py}^{(1)}$$

* Rank 3 tensor (s). * Rank 3 tensor (a). * Rank 4 tensor (sss).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & M_{xxzx} & 0 \\ 0 & 0 & 0 & 0 & M_{yyzx} & 0 \\ 0 & 0 & 0 & 0 & M_{zzzx} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzxy} \\ M_{xxzx} & M_{yyzx} & M_{zzzx} & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{yzxy} & 0 & 0 \end{bmatrix}$$

$$M_{xxzx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} - M_{gay}^{(1)} - M_{gby}^{(1)}$$

$$M_{yyzx} = M_{dxz}^{(1)} + 2M_{gby}^{(1)}$$

$$M_{zzzx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{gay}^{(1)} - M_{gby}^{(1)}$$

$$M_{yzxy} = M_{dxz}^{(2)} + 2M_{gby}^{(1)}$$

* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & M_{xxzx} & 0 \\ 0 & 0 & 0 & 0 & M_{yyzx} & 0 \\ 0 & 0 & 0 & 0 & M_{zzzx} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzxy} \\ -M_{xxzx} & -M_{yyzx} & -M_{zzzx} & 0 & 0 & 0 \\ 0 & 0 & 0 & -M_{yzxy} & 0 & 0 \end{bmatrix}$$

$$M_{xxzx} = M_{dxz}^{(3)} + 2T_{fay}^{(1)} + 2T_{fb}^{(1)} - 2T_{py}^{(1)}$$

$$M_{yyzx} = M_{dxz}^{(3)} - 4T_{fb}^{(1)}$$

$$M_{zzzx} = M_{dxz}^{(3)} - 2T_{fay}^{(1)} + 2T_{fb}^{(1)} + 2T_{py}^{(1)}$$

$$M_{yzxy} = 4T_{fay}^{(1)} + T_{py}^{(1)}$$

* Rank 4 tensor (aas).

$$\begin{bmatrix} 0 & 0 & M_{yzxy} \\ 0 & 0 & 0 \\ M_{yzxy} & 0 & 0 \end{bmatrix}$$

$$M_{yzxy} = 2M_{dxz}^{(4)}$$

* Rank 4 tensor (aaa).

$$\begin{bmatrix} 0 & 0 & M_{yzxy} \\ 0 & 0 & 0 \\ -M_{yzxy} & 0 & 0 \end{bmatrix}$$

$$M_{yzxy} = T_{py}^{(2)}$$

* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & M_{xxzx} & 0 \\ 0 & M_{yyzx} & 0 \\ 0 & M_{zzzx} & 0 \\ 0 & 0 & M_{yzxy} \\ 0 & 0 & 0 \\ M_{xxyz} & 0 & 0 \end{bmatrix}$$

$$M_{xxzx} = 2M_{dxz}^{(5)} - T_{fay}^{(2)} - T_{fb}^{(2)} + T_{py}^{(3)}$$

$$M_{yyzx} = 2T_{fay}^{(2)} + T_{py}^{(3)} + 2T_{py}^{(4)}$$

$$M_{zzzx} = -2M_{dxz}^{(5)} - T_{fay}^{(2)} + T_{fb}^{(2)} + T_{py}^{(3)}$$

$$M_{yzxy} = M_{dxz}^{(5)} - T_{fay}^{(2)} + T_{fb}^{(2)} + T_{py}^{(4)}$$

$$M_{xxyz} = -M_{dxz}^{(5)} - T_{fay}^{(2)} - T_{fb}^{(2)} + T_{py}^{(4)}$$

* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & M_{yzxy} \\ M_{zxxx} & M_{zxyy} & M_{zxzz} & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{xxyz} & 0 & 0 \end{bmatrix}$$

$$M_{yzxy} = -M_{dxz}^{(6)} - T_{fay}^{(3)} - T_{fb}^{(3)} + T_{py}^{(6)}$$

$$M_{zxxx} = 2M_{dxz}^{(6)} - T_{fay}^{(3)} - T_{fb}^{(3)} + T_{py}^{(5)}$$

$$M_{zxyy} = 2T_{fay}^{(3)} + T_{py}^{(5)} + 2T_{py}^{(6)}$$

$$M_{zxzz} = -2M_{dxz}^{(6)} - T_{fay}^{(3)} + T_{fb}^{(3)} + T_{py}^{(5)}$$

$$M_{xxyz} = M_{dxz}^{(6)} - T_{fay}^{(3)} + T_{fb}^{(3)} + T_{py}^{(6)}$$

* Rank 4 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & M_{xxzx} & 0 & 0 & M_{xxxz} & 0 \\ 0 & 0 & 0 & 0 & M_{yyzx} & 0 & 0 & M_{yyxz} & 0 \\ 0 & 0 & 0 & 0 & M_{zzzx} & 0 & 0 & M_{zzxz} & 0 \\ 0 & 0 & 0 & 0 & 0 & M_{yzxy} & 0 & 0 & M_{yzyx} \\ M_{zxxx} & M_{zxyy} & M_{zxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{xxyz} & 0 & 0 & M_{xyzx} & 0 & 0 \end{bmatrix}$$

$$M_{xxzx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} + 2M_{dxz}^{(5)} - M_{gay}^{(1)} - M_{gby}^{(1)} + 2T_{fay}^{(1)} - T_{fb}^{(2)} + 2T_{fay}^{(1)} - T_{fb}^{(2)} - 2T_{py}^{(1)} + T_{py}^{(3)}$$

$$M_{xxxz} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} - 2M_{dxz}^{(5)} - M_{gay}^{(1)} - M_{gby}^{(1)} + 2T_{fay}^{(1)} + T_{fb}^{(2)} + 2T_{fay}^{(1)} + T_{fb}^{(2)} - 2T_{py}^{(1)} - T_{py}^{(3)}$$

$$M_{yyzx} = M_{dxz}^{(1)} + M_{dxz}^{(3)} + 2M_{gby}^{(1)} + 2T_{fay}^{(2)} - 4T_{fb}^{(1)} + T_{py}^{(3)} + 2T_{py}^{(4)}$$

$$M_{yyxz} = M_{dxz}^{(1)} + M_{dxz}^{(3)} + 2M_{gby}^{(1)} - 2T_{fay}^{(2)} - 4T_{fb}^{(1)} - T_{py}^{(3)} - 2T_{py}^{(4)}$$

$$M_{zzzx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} - 2M_{dxz}^{(5)} + M_{gay}^{(1)} - M_{gby}^{(1)} - 2T_{fay}^{(1)} - T_{fb}^{(2)} + 2T_{fay}^{(1)} + T_{fb}^{(2)} + 2T_{py}^{(1)} + T_{py}^{(3)}$$

$$M_{zxzz} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} + 2M_{dxz}^{(5)} + M_{gay}^{(1)} - M_{gby}^{(1)} - 2T_{fay}^{(1)} + T_{fb}^{(2)} + 2T_{fay}^{(1)} - T_{fb}^{(2)} - T_{py}^{(1)} + 2T_{py}^{(1)} - T_{py}^{(3)}$$

$$M_{yzxy} = M_{dxz}^{(2)} + M_{dxz}^{(5)} + 2M_{gby}^{(1)} + 4T_{fay}^{(1)} - T_{fb}^{(2)} + T_{py}^{(2)} + T_{py}^{(1)} + T_{py}^{(4)}$$

$$M_{yzyx} = M_{dxz}^{(2)} - M_{dxz}^{(5)} + 2M_{gby}^{(1)} + 4T_{fay}^{(1)} + T_{fb}^{(2)} - T_{py}^{(2)} + T_{py}^{(1)} - T_{py}^{(4)}$$

$$M_{zxxx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} - M_{dxz}^{(3)} - M_{gay}^{(1)} - M_{gby}^{(1)} - 2T_{fay}^{(1)} - 2T_{fb}^{(1)} + 2T_{py}^{(1)}$$

$$M_{zxyy} = M_{dxz}^{(1)} - M_{dxz}^{(3)} + 2M_{gby}^{(1)} + 4T_{fb}^{(1)}$$

$$M_{zxzz} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} - M_{dxz}^{(3)} + M_{gay}^{(1)} - M_{gby}^{(1)} + 2T_{fay}^{(1)} - 2T_{fb}^{(1)} - 2T_{py}^{(1)}$$

$$M_{xxyz} = M_{dxz}^{(2)} - M_{dxz}^{(5)} + 2M_{gby}^{(1)} - 4T_{fay}^{(1)} - T_{fb}^{(2)} - T_{py}^{(2)} - T_{py}^{(1)} + T_{py}^{(4)}$$

$$M_{xyzy} = M_{dxz}^{(2)} + M_{dxz}^{(5)} + 2M_{gby}^{(1)} - 4T_{fay}^{(1)} + T_{fb}^{(2)} + T_{py}^{(2)} - T_{py}^{(1)} - T_{py}^{(4)}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & M_{yzxy} & 0 & 0 & M_{yzyx} \\ M_{zxxx} & M_{zxyy} & M_{zxzz} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & M_{xyyz} & 0 & 0 & M_{xyzy} & 0 & 0 \end{bmatrix}$$

$$M_{yzxy} = 2M_{dxz}^{(4)} - M_{dxz}^{(6)} - T_{fay}^{(3)} - T_{fbg}^{(3)} + T_{py}^{(2)} + T_{py}^{(6)}$$

$$M_{yzyx} = -2M_{dxz}^{(4)} - M_{dxz}^{(6)} - T_{fay}^{(3)} - T_{fbg}^{(3)} - T_{py}^{(2)} + T_{py}^{(6)}$$

$$M_{zxxx} = 2M_{dxz}^{(6)} - T_{fay}^{(3)} - T_{fbg}^{(3)} + T_{py}^{(5)}$$

$$M_{zxyy} = 2T_{fay}^{(3)} + T_{py}^{(5)} + 2T_{py}^{(6)}$$

$$M_{zxzz} = -2M_{dxz}^{(6)} - T_{fay}^{(3)} + T_{fbg}^{(3)} + T_{py}^{(5)}$$

$$M_{xyyz} = 2M_{dxz}^{(4)} + M_{dxz}^{(6)} - T_{fay}^{(3)} + T_{fbg}^{(3)} - T_{py}^{(2)} + T_{py}^{(6)}$$

$$M_{xyzy} = -2M_{dxz}^{(4)} + M_{dxz}^{(6)} - T_{fay}^{(3)} + T_{fbg}^{(3)} + T_{py}^{(2)} + T_{py}^{(6)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} 0 & 0 & M_{xxxx} \\ 0 & 0 & 0 \\ M_{zzzx} & 0 & 0 \\ M_{yyzx} & 0 & 0 \\ 0 & 0 & M_{zxxz} \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ M_{zxxx} & 0 & 0 \\ 0 & 0 & M_{xyyz} \\ 0 & M_{xyyz} + \frac{M_{zzzx}}{2} - \frac{M_{zxxz}}{2} & 0 \end{bmatrix}$$

$$M_{xxxx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} - 2M_{dxz}^{(5)} - M_{gay}^{(1)} - M_{gbg}^{(1)}$$

$$M_{zzzx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} - 2M_{dxz}^{(5)} + M_{gay}^{(1)} - M_{gbg}^{(1)}$$

$$M_{yyzx} = M_{dxz}^{(1)} + M_{dxz}^{(3)} + 2M_{gbg}^{(1)}$$

$$M_{zxxz} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} + M_{dxz}^{(3)} + 2M_{dxz}^{(5)} + M_{gay}^{(1)} - M_{gbg}^{(1)}$$

$$M_{zxxx} = M_{dxz}^{(1)} + 2M_{dxz}^{(2)} - M_{dxz}^{(3)} - M_{gay}^{(1)} - M_{gbg}^{(1)}$$

$$M_{xyyz} = M_{dxz}^{(2)} - M_{dxz}^{(5)} + 2M_{gbg}^{(1)}$$