

MPG No. 22.1.79 6 [ Type I, hexagonal ] [T tensor]

\* Rank 0 tensor.

$$[T]$$

$$T = T_s^{(1)}$$

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

$$\begin{bmatrix} T_{xx} & 0 & 0 \\ 0 & T_{xx} & 0 \\ 0 & 0 & T_{zz} \end{bmatrix}$$

$$T_{xx} = -T_{du}^{(1)} + T_s^{(1)}$$

$$T_{zz} = 2T_{du}^{(1)} + T_s^{(1)}$$

\* Rank 2 tensor (a).

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

$$T_{xy} = M_{pz}^{(1)}$$

\* Rank 3 tensor (s).

$$\begin{bmatrix} T_{xxx} & T_{xxy} & 0 \\ -T_{xxx} & -T_{xxy} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ T_{xxy} & -T_{xxx} & 0 \end{bmatrix}$$

$$T_{xxx} = T_{f2}^{(1)}$$

$$T_{xxy} = T_{f1}^{(1)}$$

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

$$\begin{bmatrix} T_{xxxx} & T_{xxyy} & T_{xxzz} & 0 & 0 & 0 \\ T_{xxyy} & T_{xxxx} & T_{xxzz} & 0 & 0 & 0 \\ T_{xxzz} & T_{xxzz} & T_{zzzz} & 0 & 0 & 0 \\ 0 & 0 & 0 & T_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{T_{xxxx}}{2} - \frac{T_{xxyy}}{2} \end{bmatrix}$$

$$T_{xxxx} = -2T_{du}^{(1)} - 4T_{du}^{(2)} + 3T_{g0}^{(1)} + T_s^{(1)} + 2T_s^{(2)}$$

$$T_{xxyy} = -2T_{du}^{(1)} + T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{xxzz} = T_{du}^{(1)} - 4T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{zzzz} = 4T_{du}^{(1)} + 8T_{du}^{(2)} + 8T_{g0}^{(1)} + T_s^{(1)} + 2T_s^{(2)}$$

$$T_{yzyz} = T_{du}^{(2)} - 4T_{g0}^{(1)} + T_s^{(2)}$$

\* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & 0 & T_{xxzz} & 0 & 0 & T_{xxyy} \\ 0 & 0 & T_{xxzz} & 0 & 0 & -T_{xxyy} \\ -T_{xxzz} & -T_{xxzz} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & T_{yzzx} & 0 \\ 0 & 0 & 0 & -T_{yzzx} & 0 & 0 \\ -T_{xxyy} & T_{xxyy} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxzz} &= 3T_{du}^{(3)} \\ T_{xxxy} &= -2M_{faz}^{(1)} + 2M_{pz}^{(1)} \\ T_{yzzx} &= -4M_{faz}^{(1)} - M_{pz}^{(1)} \end{aligned}$$

\* Rank 4 tensor (aas).

$$\begin{bmatrix} T_{yzyz} & 0 & 0 \\ 0 & T_{yzyz} & 0 \\ 0 & 0 & T_{xyxy} \end{bmatrix}$$

$$\begin{aligned} T_{yzyz} &= -2T_{du}^{(4)} + T_s^{(3)} \\ T_{xyxy} &= 4T_{du}^{(4)} + T_s^{(3)} \end{aligned}$$

\* Rank 4 tensor (aaa).

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

$$T_{yzzx} = -M_{pz}^{(2)}$$

\* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & T_{xxxy} \\ 0 & 0 & T_{xxxy} \\ 0 & 0 & T_{zzxy} \\ T_{yzyz} & T_{yzzx} & 0 \\ T_{yzzx} & -T_{yzyz} & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{xxxy} &= -M_{faz}^{(2)} + M_{pz}^{(3)} \\ T_{zzxy} &= 2M_{faz}^{(2)} + M_{pz}^{(3)} + 2M_{pz}^{(4)} \\ T_{yzyz} &= -3T_{du}^{(5)} \\ T_{yzzx} &= -M_{faz}^{(2)} + M_{pz}^{(4)} \end{aligned}$$

\* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & T_{yzzx} & 0 \\ 0 & 0 & 0 & T_{yzzx} & -T_{yzyz} & 0 \\ T_{xyxx} & T_{xyxx} & T_{xyzz} & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{aligned} T_{yzyz} &= -3T_{du}^{(6)} \\ T_{yzzx} &= -M_{faz}^{(3)} + M_{pz}^{(6)} \\ T_{xyxx} &= -M_{faz}^{(3)} + M_{pz}^{(5)} \\ T_{xyzz} &= 2M_{faz}^{(3)} + M_{pz}^{(5)} + 2M_{pz}^{(6)} \end{aligned}$$

\* Rank 4 tensor (s).

$$\begin{bmatrix} T_{xxxx} & T_{xxyy} & T_{xxxz} & 0 & 0 & T_{xxxy} & 0 & 0 & T_{xxyx} \\ T_{xxyy} & T_{xxxx} & T_{xxxx} & 0 & 0 & -T_{xxxy} & 0 & 0 & -T_{xxxy} \\ T_{zzzx} & T_{zzxx} & T_{zzzz} & 0 & 0 & T_{zzxy} & 0 & 0 & -T_{zzxy} \\ 0 & 0 & 0 & T_{yzyz} & T_{yzzx} & 0 & T_{yzyy} & T_{yzzx} & 0 \\ 0 & 0 & 0 & -T_{yzzx} & T_{yzyz} & 0 & -T_{yzzx} & T_{yzyz} & 0 \\ -\frac{T_{xxxx}}{2} - \frac{T_{xxyx}}{2} & \frac{T_{xxxx}}{2} + \frac{T_{xxyx}}{2} & 0 & 0 & 0 & \frac{T_{xxxx}}{2} - \frac{T_{xxyx}}{2} & 0 & 0 & \frac{T_{xxxx}}{2} - \frac{T_{xxyx}}{2} \end{bmatrix}$$

$$T_{xxxx} = -2T_{du}^{(1)} - 4T_{du}^{(2)} + 3T_{g0}^{(1)} + T_s^{(1)} + 2T_s^{(2)}$$

$$T_{xxyy} = -2T_{du}^{(1)} + T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{xxzz} = T_{du}^{(1)} + 3T_{du}^{(3)} - 4T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{xxxz} = -2M_{faz}^{(1)} - M_{faz}^{(2)} + 2M_{pz}^{(1)} + M_{pz}^{(3)}$$

$$T_{xxyx} = -2M_{faz}^{(1)} + M_{faz}^{(2)} + 2M_{pz}^{(1)} - M_{pz}^{(3)}$$

$$T_{zzxx} = T_{du}^{(1)} - 3T_{du}^{(3)} - 4T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{zzzz} = 4T_{du}^{(1)} + 8T_{du}^{(2)} + 8T_{g0}^{(1)} + T_s^{(1)} + 2T_s^{(2)}$$

$$T_{zzxy} = 2M_{faz}^{(2)} + M_{pz}^{(3)} + 2M_{pz}^{(4)}$$

$$T_{yzyz} = T_{du}^{(2)} - 3T_{du}^{(5)} - 4T_{g0}^{(1)} + T_s^{(2)}$$

$$T_{yzzx} = -4M_{faz}^{(1)} - M_{faz}^{(2)} - M_{pz}^{(1)} + M_{pz}^{(4)}$$

$$T_{yzzy} = T_{du}^{(2)} + 3T_{du}^{(5)} - 4T_{g0}^{(1)} + T_s^{(2)}$$

$$T_{yzxz} = -4M_{faz}^{(1)} + M_{faz}^{(2)} - M_{pz}^{(1)} - M_{pz}^{(4)}$$

\* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & T_{yzyz} & T_{yzzx} & 0 & T_{yzyy} & T_{yzzz} & 0 \\ 0 & 0 & 0 & T_{yzzx} & -T_{yzyy} & 0 & T_{yzzz} & -T_{yzyz} & 0 \\ T_{xyxx} & T_{xyxx} & T_{xyzz} & 0 & 0 & T_{xyxy} & 0 & 0 & -T_{xyxy} \end{bmatrix}$$

$$T_{yzyz} = -2T_{du}^{(4)} - 3T_{du}^{(6)} + T_s^{(3)}$$

$$T_{yzzx} = -M_{faz}^{(3)} - M_{pz}^{(2)} + M_{pz}^{(6)}$$

$$T_{yzzy} = 2T_{du}^{(4)} - 3T_{du}^{(6)} - T_s^{(3)}$$

$$T_{yzxz} = -M_{faz}^{(3)} + M_{pz}^{(2)} + M_{pz}^{(6)}$$

$$T_{xyxx} = -M_{faz}^{(3)} + M_{pz}^{(5)}$$

$$T_{xyzz} = 2M_{faz}^{(3)} + M_{pz}^{(5)} + 2M_{pz}^{(6)}$$

$$T_{xyxy} = 4T_{du}^{(4)} + T_s^{(3)}$$

\* Rank 4 tensor (t).

$$\begin{bmatrix} T_{xxxx} & 0 & 0 & \\ 0 & T_{xxxx} & 0 & \\ 0 & 0 & T_{zzzz} & \\ 0 & 0 & T_{yyzz} & \\ T_{zzxx} & 0 & 0 & \\ 0 & T_{xxyy} & 0 & \\ 0 & T_{yzyy} & 0 & \\ 0 & 0 & -\frac{T_{xxxx}}{2} + \frac{3T_{xxuy}}{2} + T_{yyzz} - T_{yzyy} + T_{zzxx} & \\ \frac{T_{xxxx}}{2} - \frac{T_{xxuy}}{2} & 0 & 0 & \\ 0 & 0 & 0 & \end{bmatrix}$$

$$T_{xxxx} = -2T_{du}^{(1)} - 4T_{du}^{(2)} + 3T_{g0}^{(1)} + 3T_s^{(1)}$$

$$T_{zzzz} = 4T_{du}^{(1)} + 8T_{du}^{(2)} + 8T_{g0}^{(1)} + 3T_s^{(1)}$$

$$T_{yyzz} = T_{du}^{(1)} + 3T_{du}^{(3)} - 4T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{zzxx} = T_{du}^{(1)} - 3T_{du}^{(3)} - 4T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{xxyy} = -2T_{du}^{(1)} + T_{g0}^{(1)} + T_s^{(1)}$$

$$T_{yzyy} = T_{du}^{(2)} + 3T_{du}^{(5)} - 4T_{g0}^{(1)} + T_s^{(1)}$$