

Exercise 1

The components of a symmetric tensor $\boldsymbol{\tau}$ are

$$\begin{aligned}\tau_{xx} &= 3 & \tau_{xy} &= 2 & \tau_{xz} &= -1 \\ \tau_{yx} &= 2 & \tau_{yy} &= 2 & \tau_{yz} &= 1 \\ \tau_{zx} &= -1 & \tau_{zy} &= 1 & \tau_{zz} &= 4\end{aligned}$$

The components of a vector \mathbf{v} are

$$v_x = 5 \quad v_y = 3 \quad v_z = -2$$

Evaluate

$$\begin{array}{lll} \text{(a)} \quad [\boldsymbol{\tau} \cdot \mathbf{v}] & \text{(b)} \quad [\mathbf{v} \cdot \boldsymbol{\tau}] & \text{(c)} \quad (\boldsymbol{\tau} : \boldsymbol{\tau}) \\ \text{(d)} \quad (\mathbf{v} \cdot [\boldsymbol{\tau} \cdot \mathbf{v}]) & \text{(e)} \quad \mathbf{v}\mathbf{v} & \text{(f)} \quad [\boldsymbol{\tau} \cdot \boldsymbol{\delta}_x] \end{array}$$