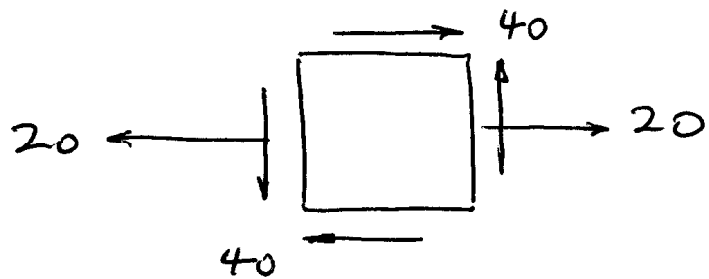


4. State of stress



principal planes

$$\tan 2\phi = \frac{2\tau_{xy}}{\sigma_x - \sigma_y} = \frac{80}{20} = 4$$

$$2\phi = 76^\circ \text{ and } 256^\circ$$

$$\phi = 38^\circ \text{ and } 128^\circ$$

$$\begin{aligned}\sigma_{38} &= \frac{1}{2}(20) + \frac{1}{2}(20)\cos 76 + 40\sin 76 \\ &= \underline{51.2 \text{ MN/m}^2}\end{aligned}$$

$$\begin{aligned}\sigma_{128} &= \frac{1}{2}(20) + \frac{1}{2}(20)\cos 256 + 40\sin 256 \\ &= \underline{-31.2 \text{ MN/m}^2}\end{aligned}$$

