

$$\tan 2\phi = \frac{2 \times 21.2}{28.8 - 57.6} = -1.4722$$

$$\text{giving } 2\phi = -55.8^\circ \text{ and } 124.2^\circ$$

$$\text{or } \phi = -27.9^\circ \text{ and } 62.1^\circ$$

principal stresses given by stress transformation eqn<sup>1</sup>:

with  $\phi = -27.9^\circ$  and  $62.1^\circ$  i.e.:

$$\begin{aligned} \sigma_{-27.9^\circ} &= \frac{1}{2}(28.8 + 57.6) + \frac{1}{2}(28.8 - 57.6) \cos(-55.8^\circ) \\ &\quad + 21.2 \sin(-55.8^\circ) = \underline{17.6 \text{ MPa}} \end{aligned}$$

$$\begin{aligned} \sigma_{62.1^\circ} &= \frac{1}{2}(28.8 + 57.6) + \frac{1}{2}(28.8 - 57.6) \cos(124.2^\circ) \\ &\quad + 21.2 \sin(124.2^\circ) = \underline{68.8 \text{ MPa}} \end{aligned}$$

Principal Stresses

