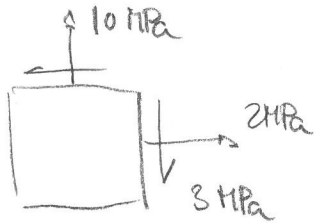


Najdete hlavní napětí a směry

4

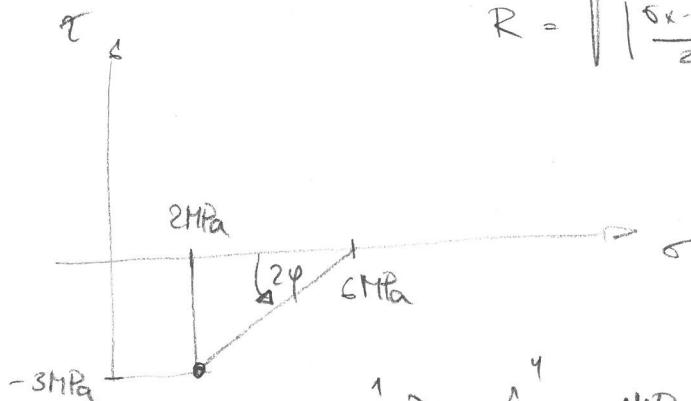


$$\tau_{xy} = \begin{bmatrix} 2 & -3 \\ -3 & 10 \end{bmatrix}$$

$$\frac{\sigma_x + \sigma_y}{2} = \frac{2 + 10}{2} = 6 \text{ MPa}$$

$$\left| \frac{\sigma_x - \sigma_y}{2} \right| = \left| \frac{2 - 10}{2} \right| = 4 \text{ MPa}$$

$$R = \sqrt{\left| \frac{\sigma_x - \sigma_y}{2} \right|^2 + \tau_{xy}^2} = \sqrt{4^2 + (-3)^2} = 5 \text{ MPa}$$

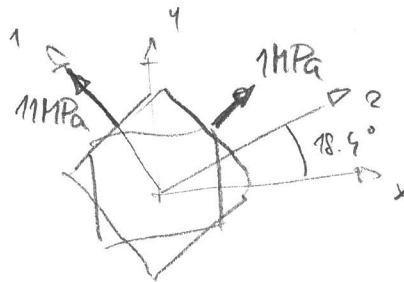


$$2\psi = \arctan \left| \frac{-3}{4} \right| = 36.9^\circ$$

$$\psi = 18.4^\circ$$

$$\sigma_{max} = 6 + 5 = 11 \text{ MPa}$$

$$\sigma_{min} = 6 - 5 = 1 \text{ MPa}$$



$$\det \begin{bmatrix} 2 - \sigma_i & -3 \\ -3 & 10 - \sigma_i \end{bmatrix} = 0$$

$$(2 - \sigma_i)(10 - \sigma_i) - (-3)^2 = 0$$

$$20 - 25\sigma_i - 10\sigma_i + \sigma_i^2 - 9 = 0$$

$$\sigma_i^2 - 12\sigma_i + 11 = 0 \Rightarrow \sigma_{1,2} =$$

$$\frac{12 + \sqrt{12^2 - 4 \cdot 11}}{2} = \frac{22}{2} = 11 \text{ MPa}$$

$$\frac{12 - \sqrt{12^2 - 4 \cdot 11}}{2} = \frac{2}{2} = 1 \text{ MPa}$$

$$\underline{n_1}: \begin{bmatrix} 2 - 11 & -3 \\ -3 & 10 - 11 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$$

$$\begin{bmatrix} -9 & -3 \\ -3 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0 \Rightarrow \begin{matrix} y = 1 \\ -3x - 1 = 0 \Rightarrow x = -\frac{1}{3} \end{matrix} \Rightarrow \underline{n_1} = \begin{bmatrix} -\frac{1}{3} \\ \frac{1}{\sqrt{(\frac{1}{3})^2 + 1^2}} \end{bmatrix} e$$

$$= \begin{bmatrix} -0.32 \\ 0.94 \end{bmatrix} = \begin{bmatrix} -\sin 18.4^\circ \\ \cos 18.4^\circ \end{bmatrix}$$

$$\underline{n_2}: \underline{n_2} = \begin{bmatrix} \cos 18.4^\circ \\ \sin 18.4^\circ \end{bmatrix} = \begin{bmatrix} 0.94 \\ +0.32 \end{bmatrix}$$