Cercle de Mohr

Transformation de contraintes

$$\sigma_{x'} + \sigma_{y'} = \sigma_x + \sigma_y$$

$$\sigma_{ave} = \frac{\sigma_x + \sigma_y}{2}$$

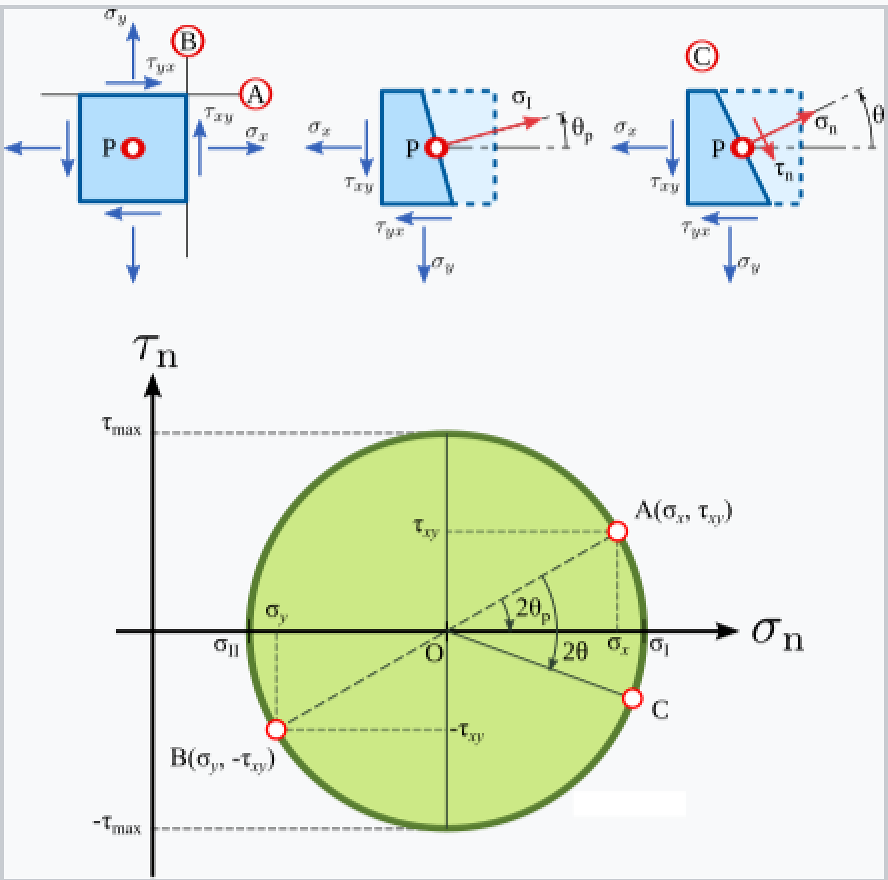
$$R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2} = \pm\, \tau_{\substack{Max \\ min}}$$

$$\sigma_{max} = \sigma_{ave} + R = \frac{\sigma_x + \sigma_y}{2} + \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$\sigma_{min} = \sigma_{ave} - R = \frac{\sigma_x + \sigma_y}{2} - \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

Cercle de Mohr

Représentation des contraintes



Cercle de Mohr en état de contraintes planes.

$$\sigma_{ave} = \frac{\sigma_x+\sigma_y}{2} \Rightarrow \text{Origine O}$$

$$R = \sqrt{\left(\frac{\sigma_x-\sigma_y}{2}\right)^2 + \tau_{xy}^2} \Rightarrow \text{Rayon constant}$$

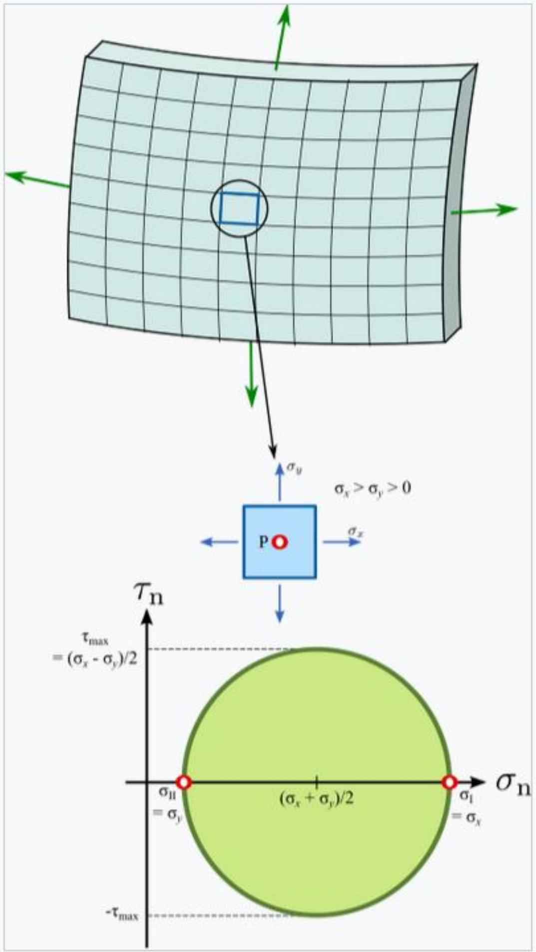
$$\sigma_{max} = \sigma_{ave} + R = \frac{\sigma_x + \sigma_y}{2} + \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$\sigma_{min} = \sigma_{ave} - R = \frac{\sigma_x + \sigma_y}{2} - \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

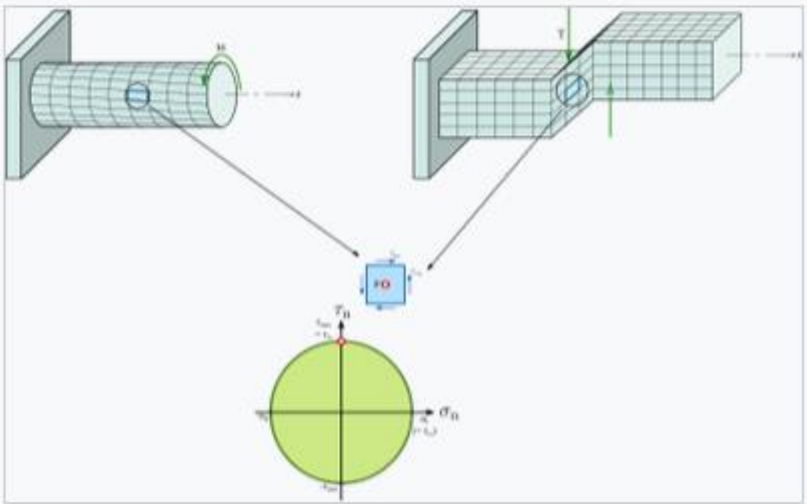
Attention: Rotation de 2θ sur le cercle de Mohr

Cercle de Mohr

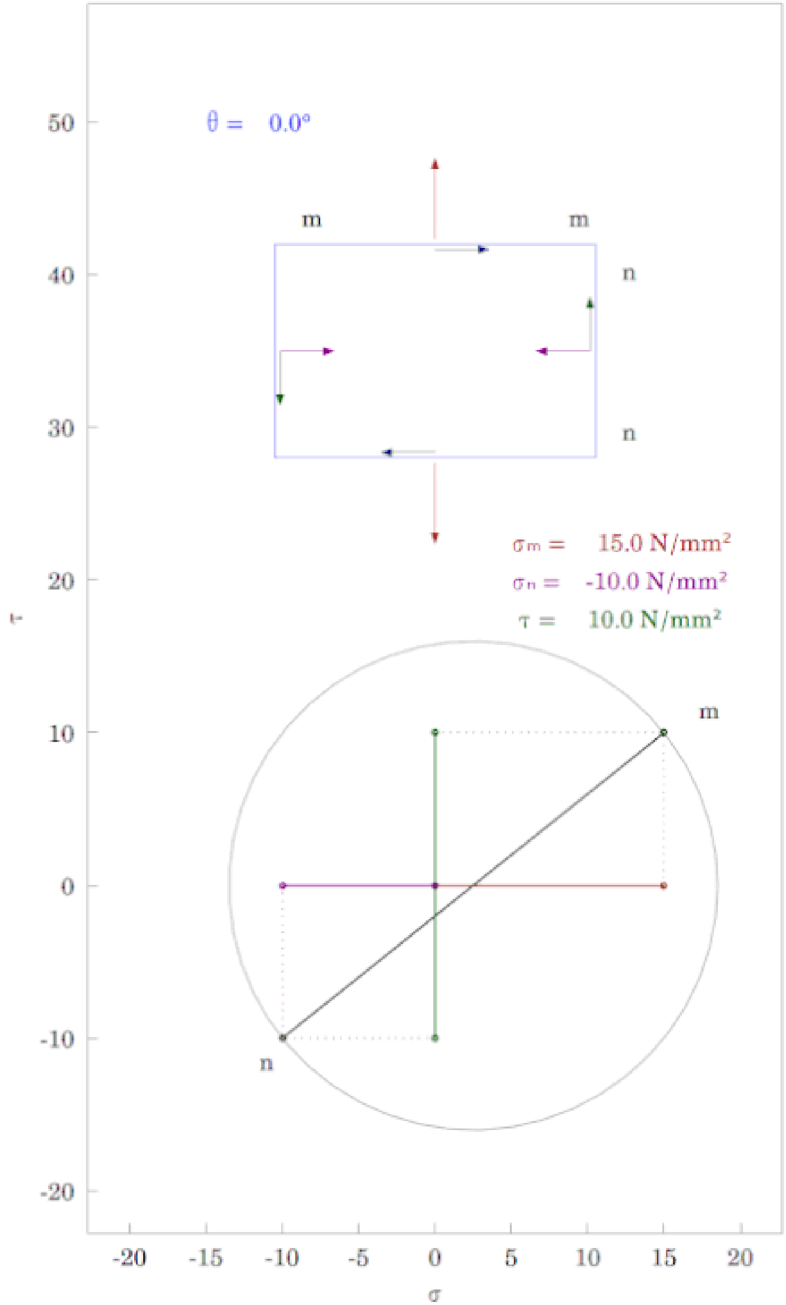
Représentation des contraintes



Cercle de Mohr pour un état de contraintes biaxiales.



Cercle de Mohr pour du cisaillement pur.



Source: Wikipedia