A short course on

Stress

This video:

Stress Transformations

Terje's Toolbox is freely available at terje.civil.ubc.ca

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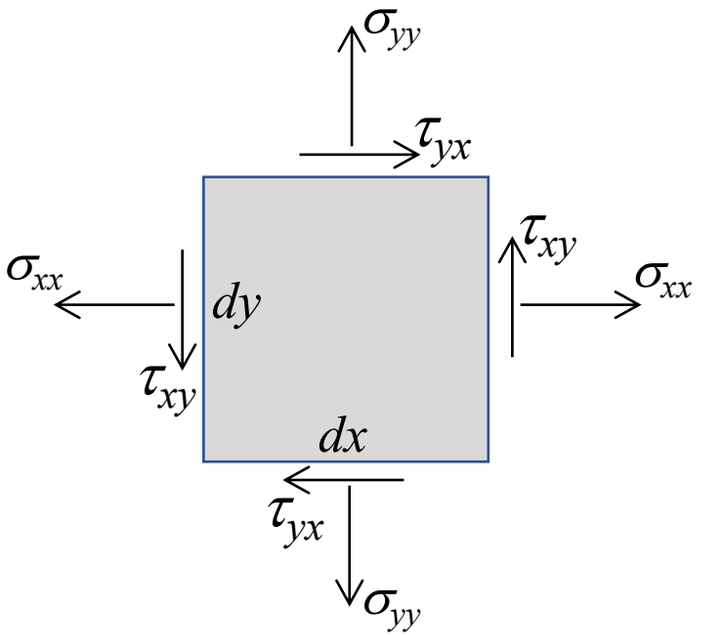
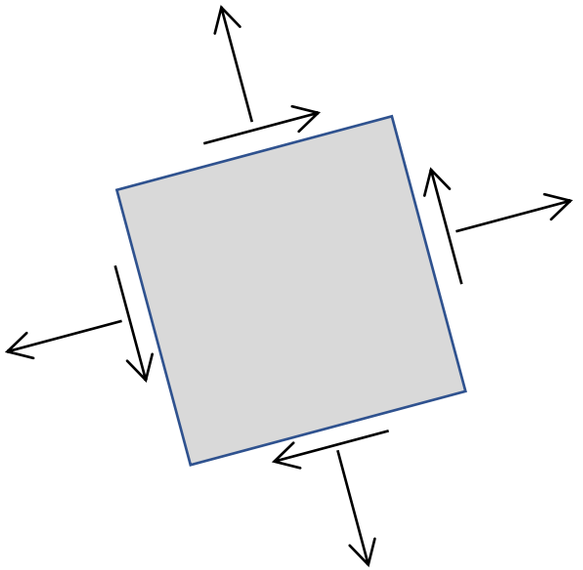
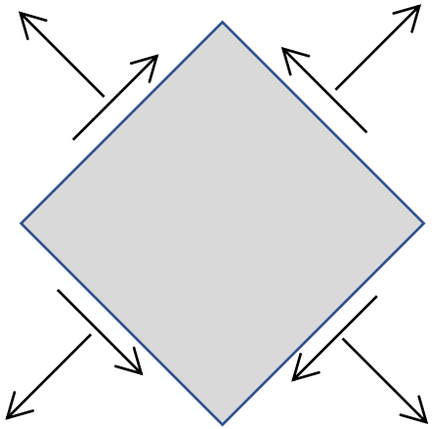
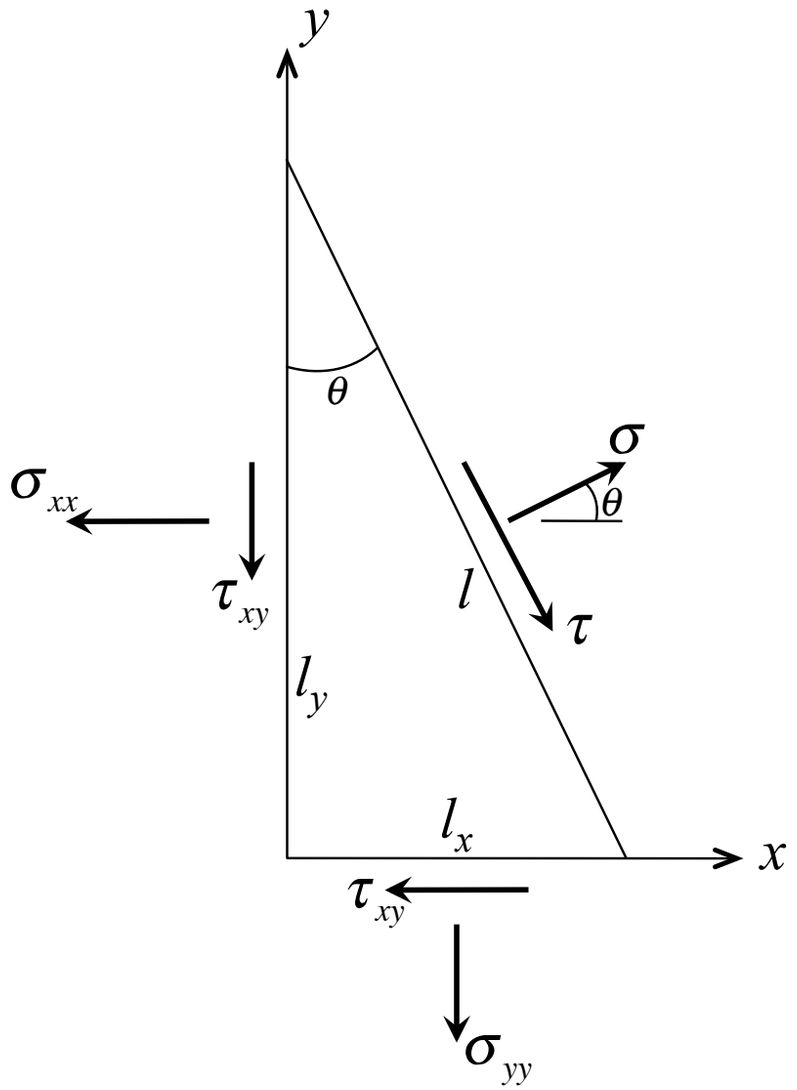
Rotating Coordinate System







2D Equilibrium



$$\sigma = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \frac{\sigma_{xx} - \sigma_{yy}}{2} \cdot \cos(2\theta) + \tau_{xy} \cdot \sin(2\theta)$$

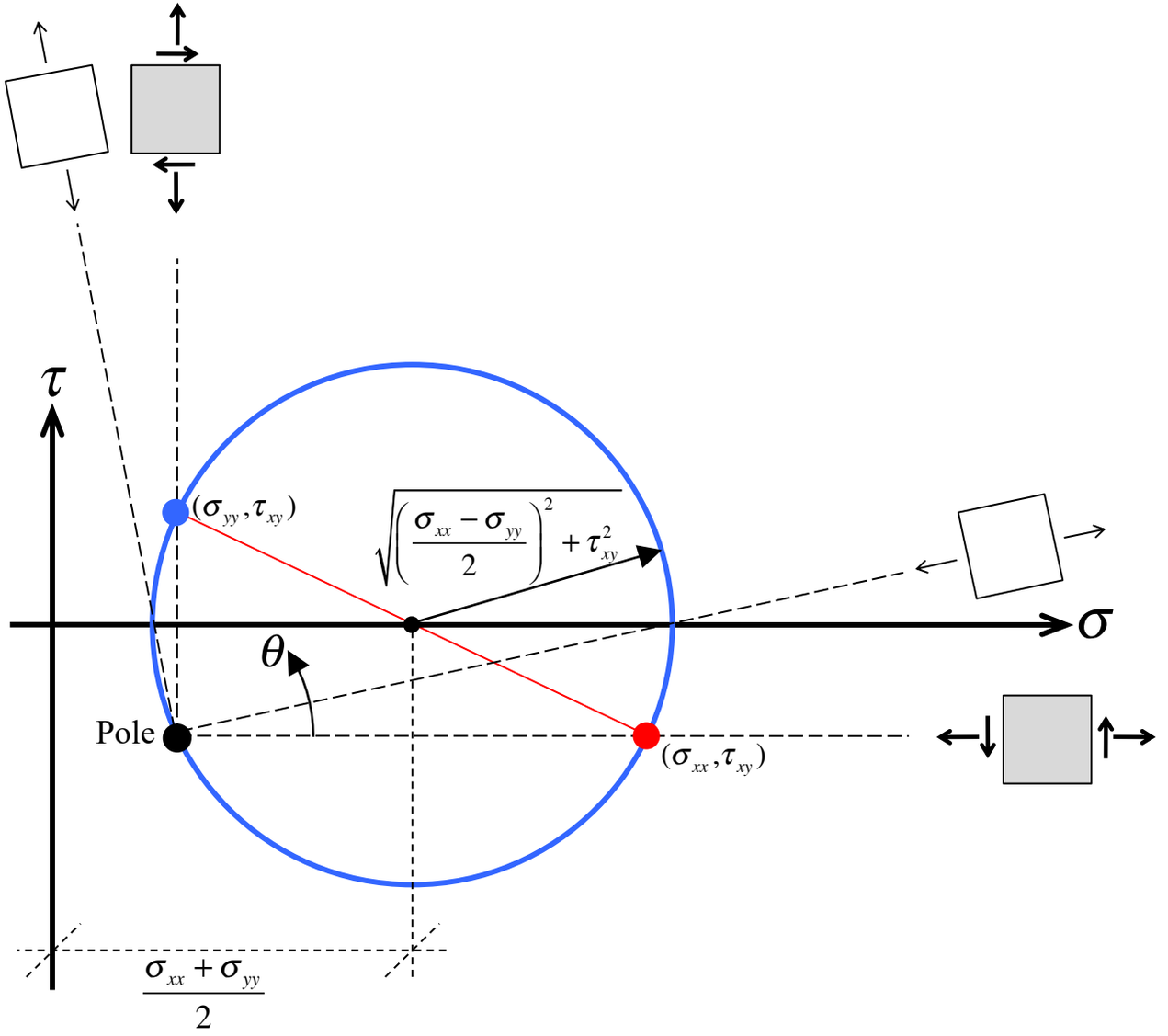
$$\tau = \frac{\sigma_{xx} - \sigma_{yy}}{2} \cdot \sin(2\theta) - \tau_{xy} \cdot \cos(2\theta)$$

Combine σ and τ

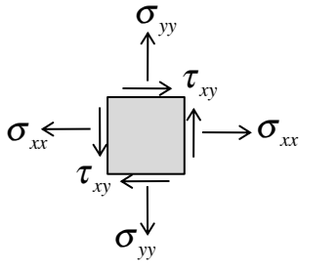
$$\left(\sigma - \underbrace{\frac{\sigma_{xx}+\sigma_{yy}}{2}}_{\text{Shift}}\right)^2 + \tau^2 = \underbrace{\left(\frac{\sigma_{xx}-\sigma_{yy}}{2}\right)^2 + \tau_{xy}^2}_{\text{Radius}^2}$$

$$x^2 + y^2 = r^2$$

Mohr's Circle



Positive direction of coordinate stresses:



More lectures:

Terje's Toobox:

terje.civil.ubc.ca