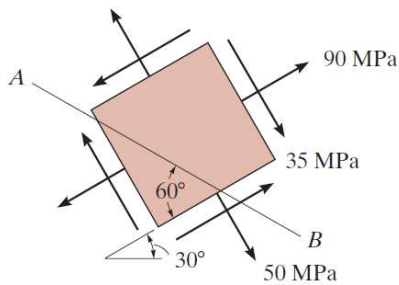


Plane Stress Transformation question solution using **STRESS TRANSFORMATION EQUATIONS**

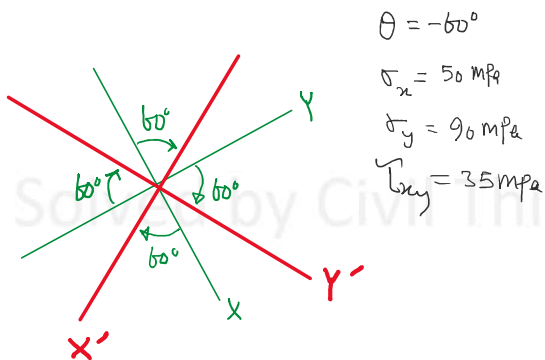
The state of stress at a point in a member is shown on the element. Determine the stress components acting on the inclined plane AB. Solve the problem using the **Stress Transformation** equations. Show the result on a sketch.



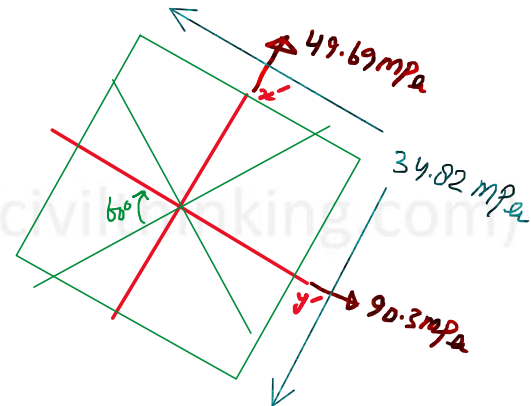
Probs. 9-4/5

Russell C. Hibbeler- Mechanics of Materials
10th Edition-Pearson (2016)

Solved by Civil Thinking (<https://civilthinking.com>)



$$\begin{aligned}\theta &= -60^\circ \\ \sigma_x &= 90 \text{ MPa} \\ \sigma_y &= 50 \text{ MPa} \\ \tau_{xy} &= 35 \text{ MPa}\end{aligned}$$



$$\sigma_{x'} = \frac{\sigma_x + \sigma_y}{2} + \frac{\sigma_x - \sigma_y}{2} \cos 2\theta + \tau_{xy} \sin 2\theta = 49.69 \text{ MPa}$$

$$\sigma_y \Rightarrow \theta \Rightarrow 90^\circ + \theta = 90.3 \text{ MPa} \quad [\theta = 60^\circ \Rightarrow 90 + (-60) = 30 \Rightarrow 2\theta = 60^\circ]$$

$$\tau_{x'y'} = \frac{\sigma_x - \sigma_y}{2} \sin 2\theta + \tau_{xy} \cos 2\theta = -34.82 \text{ MPa}$$

This problem was solved by Civil Thinking (<https://civilthinking.com>)

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