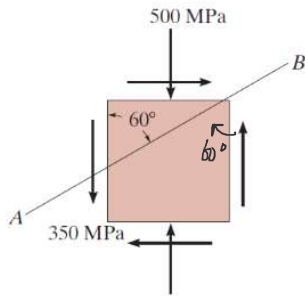


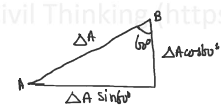
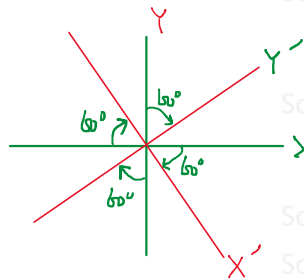
Plane Stress Transformation question solution using Method of Equilibrium

9-6. 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 method of equilibrium described in Sec. 9.1.



Prob. 9-6

Mechanics of Materials, R.C. Hibbeler 10th Ed. Pearson



$$\sum F_x = 0$$

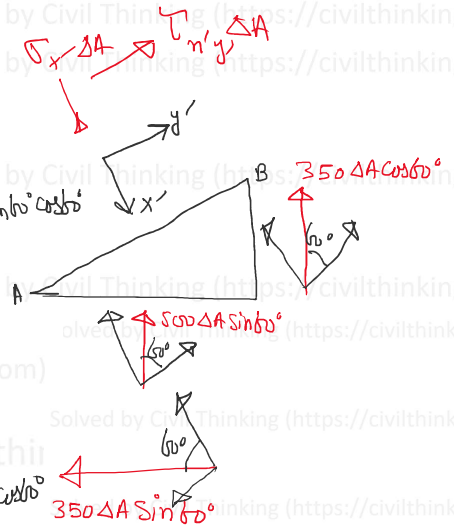
$$\sigma_{x'} \Delta A - 500 \Delta A \sin 60^\circ \sin 60^\circ - 350 \Delta A \sin 60^\circ \cos 60^\circ - 350 \Delta A \cos 60^\circ \sin 60^\circ = 0$$

$$\Rightarrow \sigma_{x'} = 678.109 \text{ MPa}$$

$$\sum F_y = 0$$

$$\tau_{x'y'} \Delta A + 350 \Delta A \cos 60^\circ \cos 60^\circ + 500 \Delta A \sin 60^\circ \cos 60^\circ - 350 \Delta A \sin 60^\circ \sin 60^\circ = 0$$

$$\Rightarrow \tau_{x'y'} = -41.5 \text{ MPa} = 41.5 \text{ MPa (}\swarrow\text{)}$$



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

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