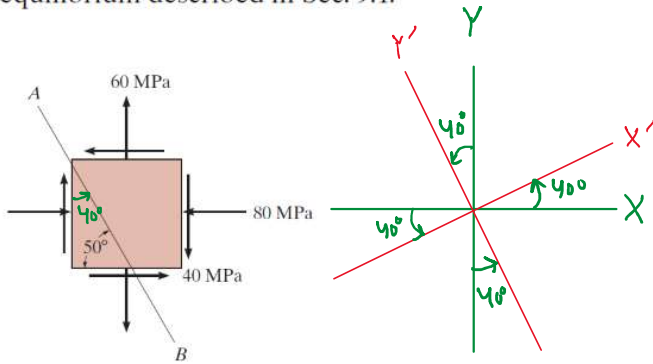


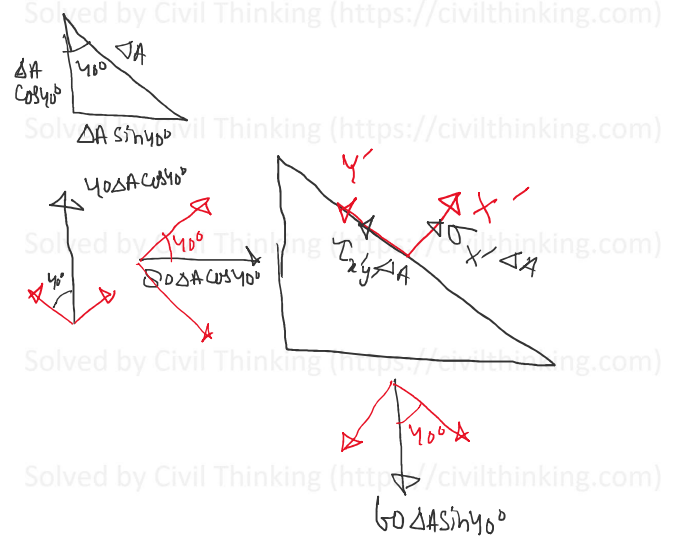
Plane Stress Transformation question solution using Method of Equilibrium

9-7. Determine the stress components acting on the inclined plane AB . Solve the problem using the method of equilibrium described in Sec. 9.1.



Probs. 9-7/8

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



$$\begin{aligned}
 + \sum F_{x'} = 0 : & \sigma_{x'} \Delta A - 60 \Delta A \sin 40^\circ \sin 40^\circ + 40 \Delta A \sin 40^\circ \cos 40^\circ + 80 \Delta A \cos 40^\circ \cos 40^\circ \\
 & + 40 \Delta A \cos 40^\circ \sin 40^\circ = 0 \\
 \Rightarrow & \sigma_{x'} = -61.55 \text{ MPa} = 61.55 \text{ MPa [compressive]}
 \end{aligned}$$

$$\begin{aligned}
 + \sum F_{y'} = 0 : & \tau_{xy'} \Delta A - 60 \Delta A \sin 40^\circ \cos 40^\circ - 40 \Delta A \sin 40^\circ \sin 40^\circ - 80 \Delta A \cos 40^\circ \sin 40^\circ + 40 \Delta A \cos 40^\circ \cos 40^\circ = 0 \\
 \Rightarrow & \tau_{xy'} = 62 \text{ MPa}
 \end{aligned}$$

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