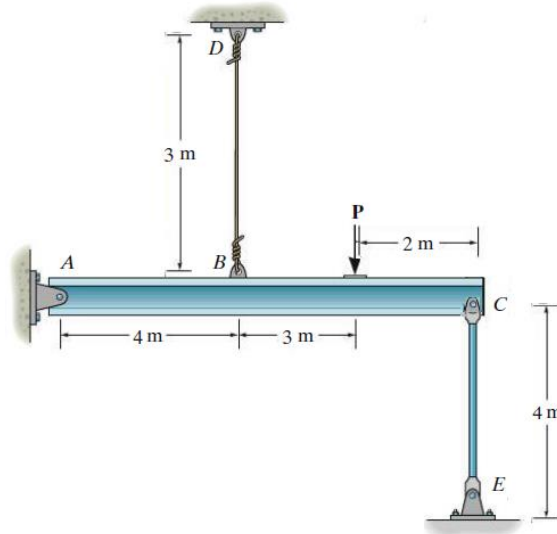


Birzeit University
Faculty of Engineering & Technology
Department of Civil & Environmental Engineering
ENCE233 Mechanics of Materials
Homework assignment #2

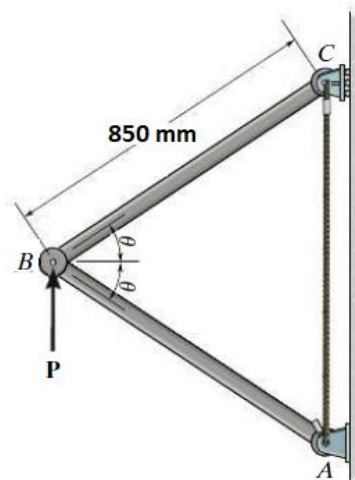
Problem 1:

The rigid beam is supported by a pin at A and wire BD and link CE. If the load P on the beam causes the end B to be displaced 6 mm downward, determine the normal strain developed in members CE and BD.



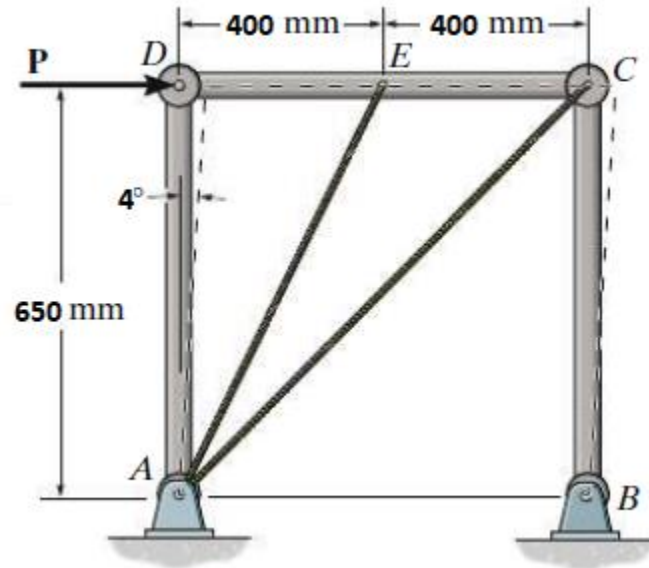
Problem 2:

The pin-connected rigid rods AB and BC are inclined at $\theta = 30^\circ$ when they are unloaded. When the force P is applied θ becomes 30.2° . Determine the average normal strain developed in wire AC.

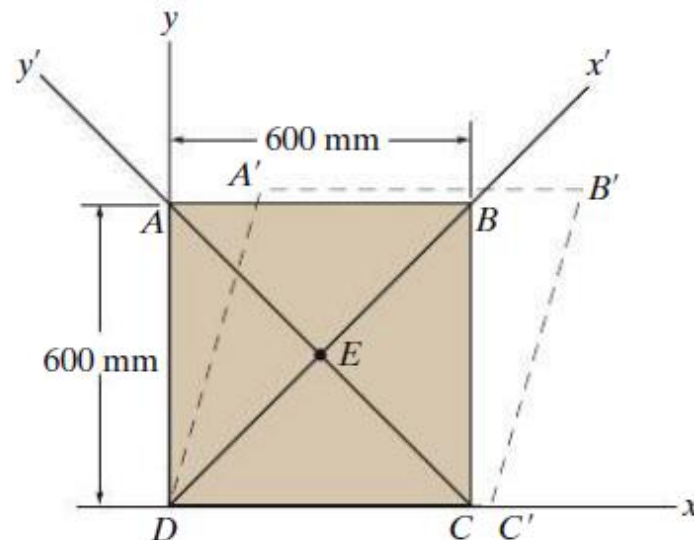


Problem 3:

The force P applied at joint D of the square frame causes the frame to sway and form the dashed rhombus. Determine the average normal strain developed in wire AE . Assume the three rods are rigid.

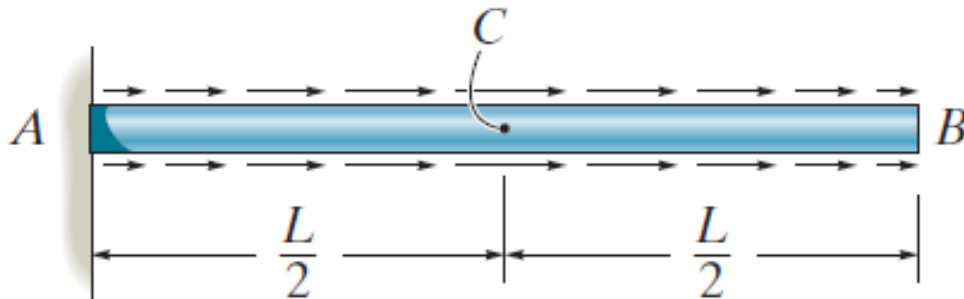
**Problem 4:**

The square plate is deformed into the shape shown by the dashed lines. If DC has a normal strain $\epsilon_x = 0.006$, DA has a normal strain $\epsilon_y = 0.003$ and at D , $\gamma_{xy} = 0.02\text{ rad}$, determine the average normal strain along diagonal CA .

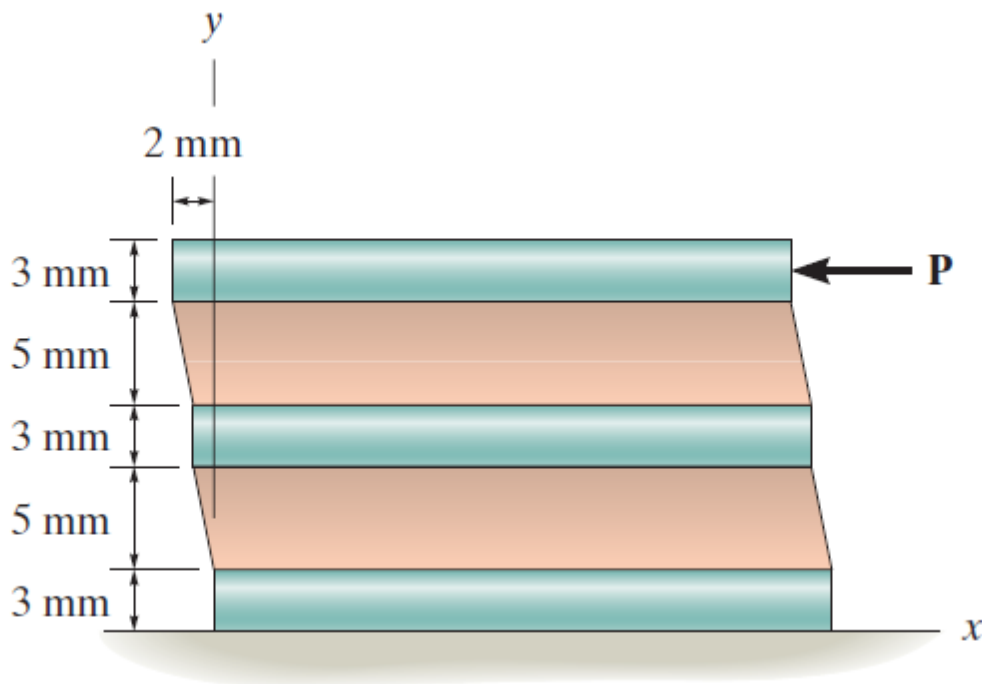


Problem 5:

The nonuniform loading causes a normal strain in the shaft that can be expressed as $\epsilon_x = k \sin(\pi/L x)$, k is a constant. Determine the displacement of the point C. what is the average normal strain in the rod? If $L = 3$ m and the displacement at point B is 0.1m. Determine the value of k ?

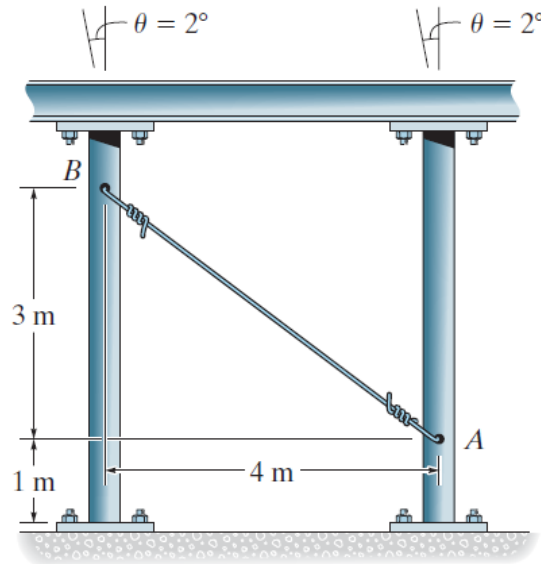
**Problem 6:**

Nylon strips are fused to glass plates. When moderately heated the nylon will become soft while the glass stays approximately rigid. Determine the average shear strain in the nylon due to the load P when the assembly deforms as indicated.



Problem 7:

The guy wire AB of a building frame is originally unstretched. Due to an earthquake, the two columns of the frame tilt $\theta = 2^\circ$. Determine the approximate normal strain in the wire when the frame is in this position. Assume the columns are rigid and rotate about their lower supports.

**Problem 8:**

If the unstretched length of the bowstring is 887.5 mm, determine the average normal strain in the string when it is stretched to the position shown.

