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In-class Exercise Week #1: Matrix structural analysis

Exercise #1:

What is the magnitude and direction of the force P at point a required to displace that point a vertically downward 5mm without any horizontal displacement? Assume that $E = 200 \text{ GPa}$.

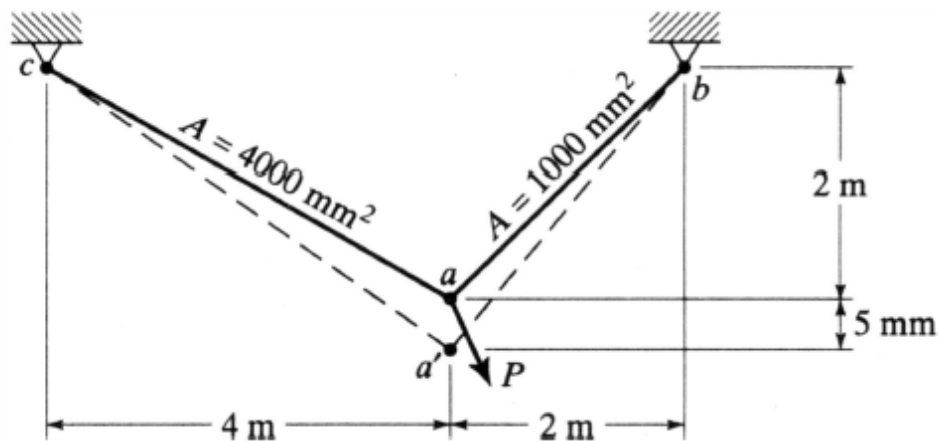


Figure 1. Schematic representation of the truss frame when subjected to the force P

Exercise #2:

Two bars ab and bc are pinned together as shown. Bar bc is cooled 40°C . Determine the displacement of b and the force in the bars. The coefficient of thermal expansion $\alpha = 1.17 \times 10^{-5} \text{ mm/mm}^\circ\text{C}$. Assume that $E = 200 \text{ GPa}$.

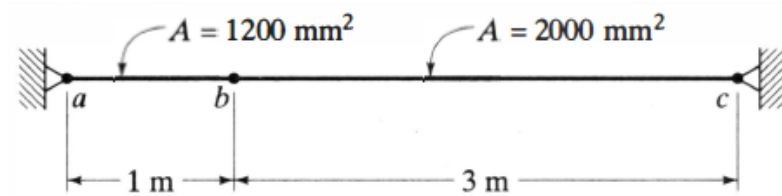


Figure 2. Bar system under temperature loading