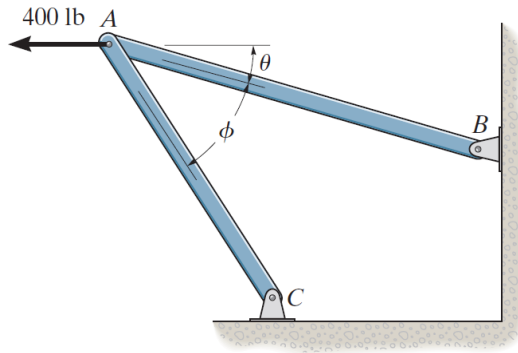


Problem 2-19

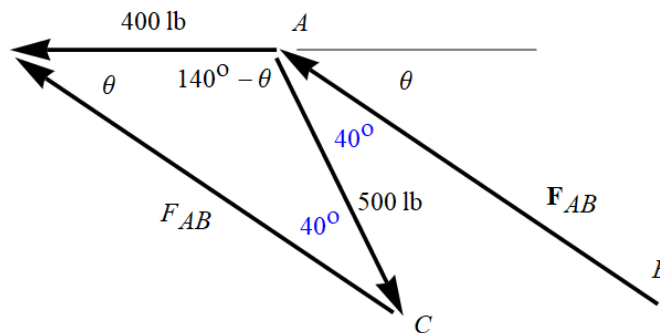
Determine the design angle θ ($0^\circ \leq \theta \leq 90^\circ$) for strut AB so that the 400-lb horizontal force has a component of 500 lb directed from A towards C . What is the component of force acting along member AB ? Take $\phi = 40^\circ$.



Probs. 2-19/20

Solution

Draw the triangle that the 400-lb horizontal force and its components along members AB and AC make.



Use the law of sines to determine θ .

$$\frac{400 \text{ lb}}{\sin 40^\circ} = \frac{500 \text{ lb}}{\sin \theta} \rightarrow \sin \theta = \frac{500 \text{ lb}}{400 \text{ lb}} \sin 40^\circ \rightarrow \theta \approx 53.5^\circ$$

Use the law of sines again to determine the magnitude of \mathbf{F}_{AB} .

$$\frac{F_{AB}}{\sin(140^\circ - \theta)} = \frac{400 \text{ lb}}{\sin 40^\circ} \rightarrow F_{AB} = \frac{400 \text{ lb}}{\sin 40^\circ} \sin(140^\circ - \theta) \approx 621 \text{ lb}$$