

PROBLEM 2.133

The end of the coaxial cable AE is attached to the pole AB , which is strengthened by the guy wires AC and AD . Knowing that the tension in wire AC is 120 lb, determine (a) the components of the force exerted by this wire on the pole, (b) the angles θ_x , θ_y , and θ_z that the force forms with the coordinate axes.

SOLUTION

(a)

$$F_x = (120 \text{ lb}) \cos 60^\circ \cos 20^\circ$$

$$F_x = 56.382 \text{ lb} \qquad F_x = +56.4 \text{ lb} \blacktriangleleft$$

$$F_y = -(120 \text{ lb}) \sin 60^\circ$$

$$F_y = -103.923 \text{ lb} \qquad F_y = -103.9 \text{ lb} \blacktriangleleft$$

$$F_z = -(120 \text{ lb}) \cos 60^\circ \sin 20^\circ$$

$$F_z = -20.521 \text{ lb} \qquad F_z = -20.5 \text{ lb} \blacktriangleleft$$

(b)

$$\cos \theta_x = \frac{F_x}{F} = \frac{56.382 \text{ lb}}{120 \text{ lb}} \qquad \theta_x = 62.0^\circ \blacktriangleleft$$

$$\cos \theta_y = \frac{F_y}{F} = \frac{-103.923 \text{ lb}}{120 \text{ lb}} \qquad \theta_y = 150.0^\circ \blacktriangleleft$$

$$\cos \theta_z = \frac{F_z}{F} = \frac{-20.52 \text{ lb}}{120 \text{ lb}} \qquad \theta_z = 99.8^\circ \blacktriangleleft$$