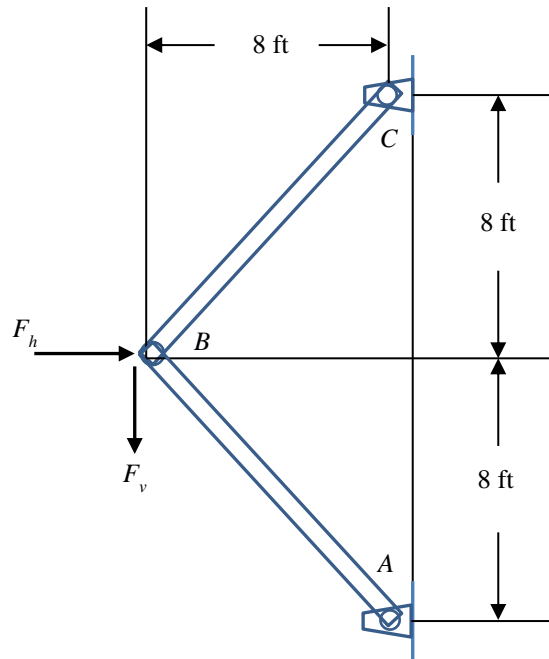
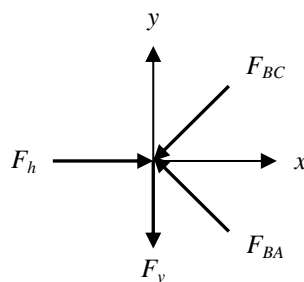


29. Determine the distributions of forces at pins A and C if the vertical and horizontal forces applied on B are independently and normally distributed with $F_v \sim N(10,1^2)$ N and $F_h \sim N(5,0.2^2)$ N, respectively. Neglect the weight of all the members.



Solution



Joint B:

$$\sum F_x = 0; \quad F_h - F_{BC} \cos 45^\circ - F_{BA} \cos 45^\circ = 0$$

$$\sum F_y = 0; \quad F_v + F_{BC} \sin 45^\circ - F_{BA} \sin 45^\circ = 0$$

Solve the above equations, we have

$$F_{BA} = \frac{F_h + F_v}{\cos 45^\circ + \sin 45^\circ}$$

$$F_{BC} = \frac{F_h - F_v}{\cos 45^\circ + \sin 45^\circ}$$

Finally, we obtain

$$F_{BA} \sim N(10.61, 0.72^2) \text{ N}, F_{BC} \sim N(-3.54, 0.72^2) \text{ N}$$

ANS.