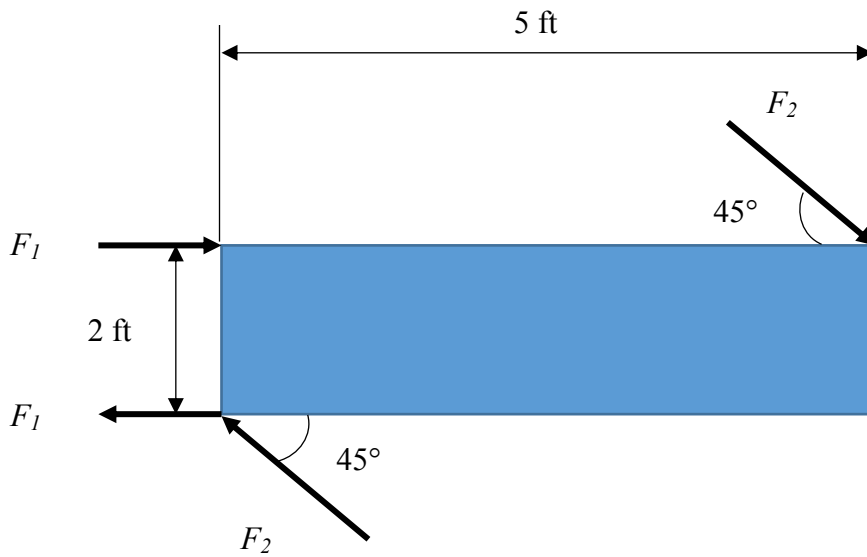


20. Two couples acting on the beam are independently and normally distributed with  $F_1 \sim N(250, 5^2)$  lb and  $F_2 \sim N(400, 3^2)$  lb. Determine the distribution of the resultant couple moment.



Solution

$$\mu_M = \mu_{F_1} (2) + \mu_{F_2} \cos 45^\circ (2) + \mu_{F_2} \sin 45^\circ (5) = 2479.9 \text{ lb} \cdot \text{ft}$$

$$\sigma_M = \sqrt{(2\sigma_{F_1})^2 + (2\sigma_{F_2} \cos 45^\circ)^2 + (5\sigma_{F_2} \sin 45^\circ)^2} = 15.2 \text{ lb} \cdot \text{ft}$$

Thus, the resultant moment is  $M \sim N(2479.9, 15.2^2)$  lb · ft .