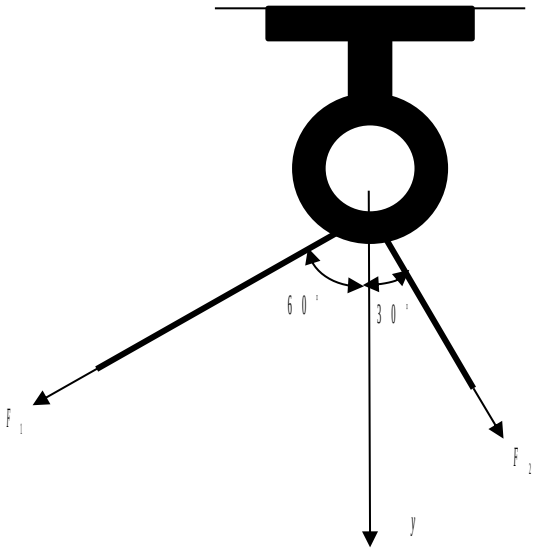
10. The ring is subjected to two random and independent forces $F_1 \sim N(3, 0.04)$ kN and $F_2 \sim N(4, 0.03)$ kN. Determine the distribution of the resultant force in the *y* direction.



Solution

The force in *y* axis F_y is

$$F_y = F_1 \cos 60^\circ + F_2 \cos 30^\circ$$

$$\mu_{F_y} = \mu_{F_1} \cos 60^\circ + \mu_{F_2} \cos 30^\circ = 3\left(\frac{1}{2}\right) + 4\left(\frac{\sqrt{3}}{2}\right) = 4.96 \text{ kN}$$

$$\sigma_{F_y} = \sqrt{\left(\sigma_{F_1} \cos 60^\circ\right)^2 + \left(\sigma_{F_2} \cos 30^\circ\right)^2} = \sqrt{\left(0.04\left(\frac{1}{2}\right)\right)^2 + \left(0.03\left(\frac{\sqrt{3}}{2}\right)\right)^2} = 0.033$$

The distribution of the resultant force is $F_{Ry} \sim N(4.96, 0.033)$ kN. **Ans.**