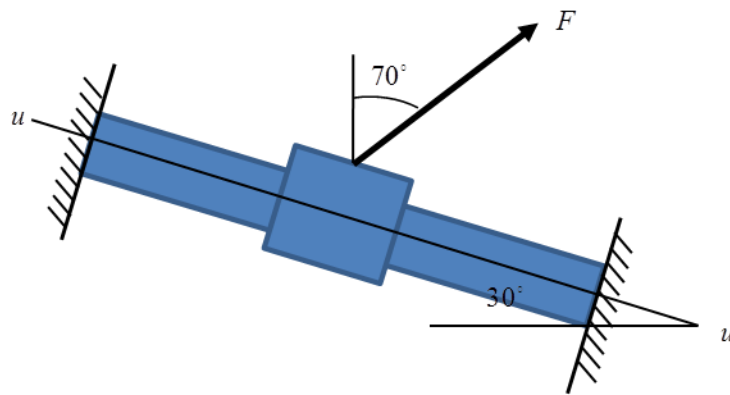
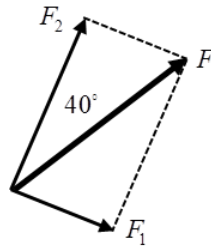


3. The force acting on a beam is normally distributed with  $F \sim N(800, 80^2)$  lb, find the distributions of its two components, one parallel and the other one perpendicular to the  $u$  axis.



**Solution**



$F_1$  stands for the parallel force;  $F_2$  stands for the perpendicular force.

For  $F_1$

$$\mu_1 = \mu_F \sin 40^\circ = 800 \sin 40^\circ = 514.23 \text{ lb}$$

$$\sigma_1 = \sigma_F \sin 40^\circ = 80 \sin 40^\circ = 51.42 \text{ lb}$$

For  $F_2$

$$\mu_2 = \mu_F \cos 40^\circ = 800 \cos 40^\circ = 612.84 \text{ lb}$$

$$\sigma_2 = \sigma_F \cos 40^\circ = 80 \cos 40^\circ = 61.28 \text{ lb}$$

Thus the distributions of  $F_1$  and  $F_2$  follow

$$F_1 \sim N(514.23, 51.42^2) \text{ lb}$$

**Ans.**

$$F_2 \sim N(612.84, 61.28^2) \text{ lb}$$

**Ans.**