

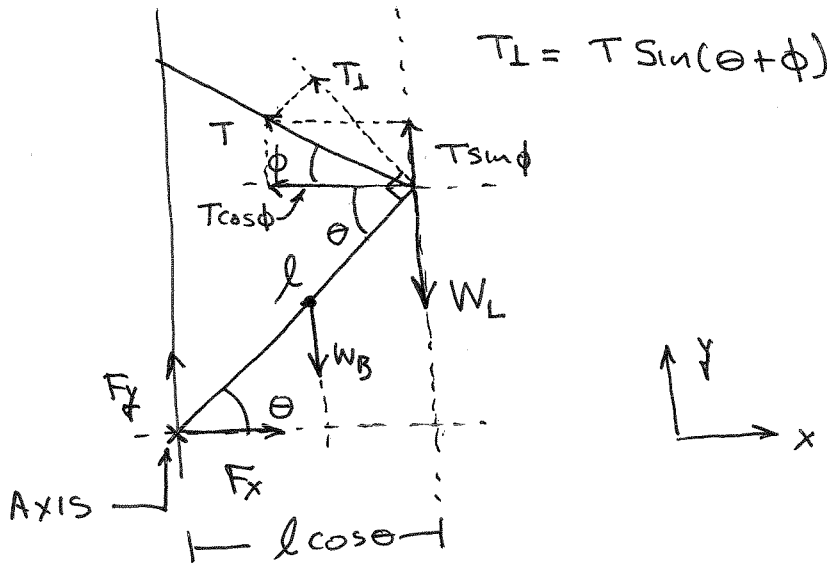
g-20

$$\theta = 30^\circ$$

$$\phi = 50^\circ$$

$W_B \equiv$ BEAM WEIGHT

$W_L \equiv$ LOAD WEIGHT



LINEAR STATICS $\sum F_x = 0$ $\sum F_y = 0 \implies$

$$X: F_x - T \cos \phi = 0 \quad (I)$$

$$Y: F_y + T \sin \phi - W_B - W_L = 0 \quad (II)$$

ROTATIONAL STATICS $\sum \tau = 0$

$$T_{\perp} l - \frac{W_B l \cos \theta}{2} - W_L l \cos \theta = 0$$

$$T_{\perp} = T \sin(\theta + \phi) \implies T \sin(\theta + \phi) l - \frac{W_B l \cos \theta}{2} - W_L l \cos \theta = 0$$

$$T \sin(\theta + \phi) - \frac{W_B}{2} \cos \theta - W_L \cos \theta = 0 \quad (III)$$

$$F_x = T \cos \phi$$

$$F_y = [W_B + W_L] - T \sin \phi$$

$$T = \frac{[W_B/2 + W_L] \cos \theta}{\sin(\theta + \phi)}$$