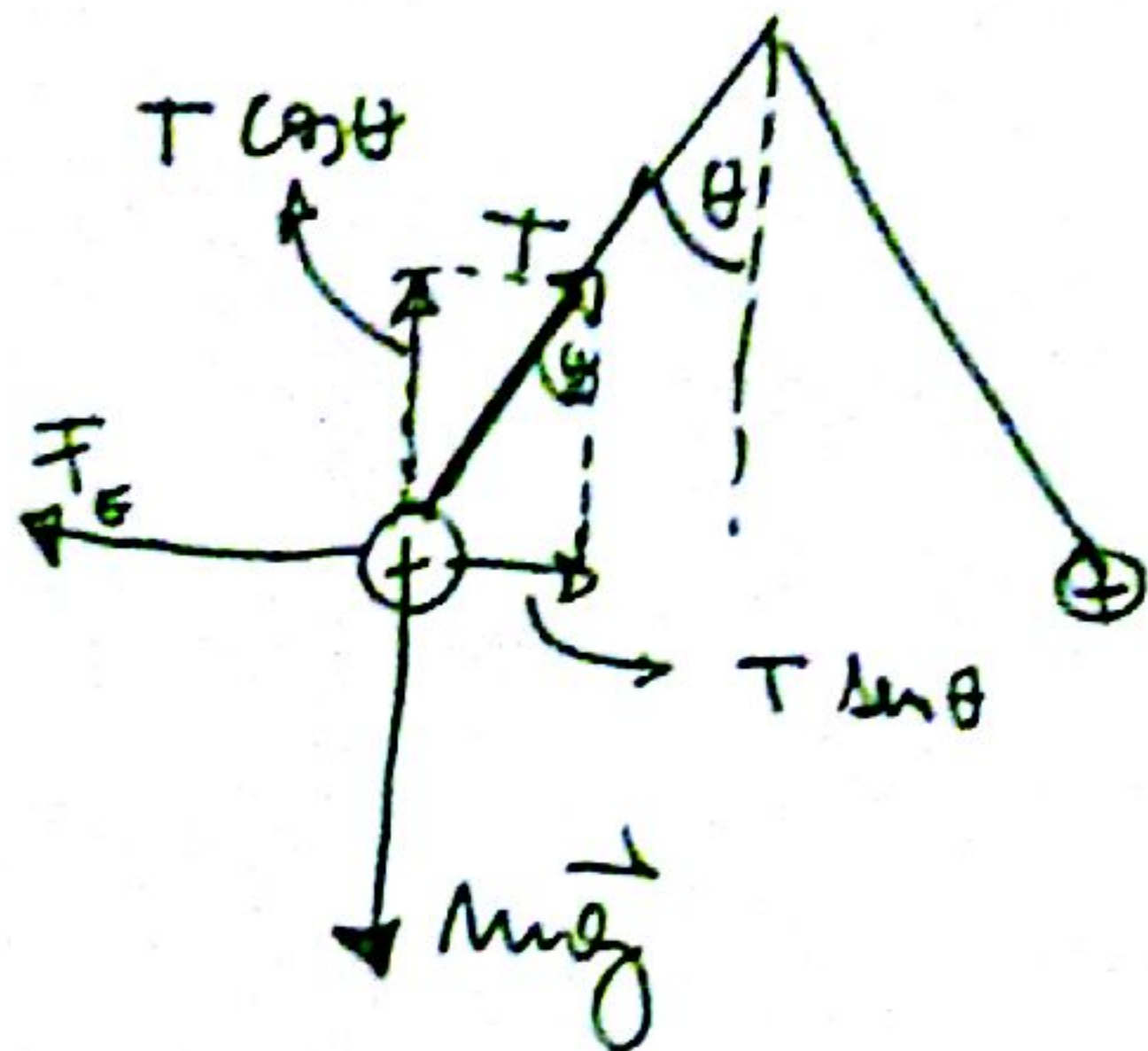




SITUACIÓN Eq:

$$\text{Eje } x: \sum F_x = 0 \rightarrow F_e = T \sin \theta \quad (1)$$

$$\text{Eje } y: \sum F_y = 0 \rightarrow T \cos \theta = mg \quad (2)$$

de (2) $T = \frac{mg}{\cos \theta}$

de (1) $F_e = k_e \frac{q^2}{r^2} = \frac{k q^2}{(2l \sin \theta)^2} = T \sin \theta =$

a)

$$q = \pm \sqrt{(2l \sin \theta)^2 T \sin \theta / k} = \pm 2l \sin \theta \sqrt{\frac{mg \tan \theta}{k}}$$

b)

$$\theta \ll 1 \rightarrow \sin \theta \approx \tan \theta \approx \theta$$

$$\omega = \frac{d\theta}{dt} \quad \frac{dq}{dt} = -\lambda$$

$$\frac{dq}{dt} = \frac{dq}{d\theta} \cdot \frac{d\theta}{dt} = \frac{dq}{d\theta} \cdot \omega \Rightarrow \omega = \frac{dq}{dt} \cdot \frac{1}{\frac{dq}{d\theta}} = -\frac{\lambda}{\frac{dq}{d\theta}}$$

Tenemos $q = + 2l \sin \theta \sqrt{\frac{mg \tan \theta}{k}} \approx 2l \sqrt{\frac{mg}{k}} \theta^{3/2} = 2l \sqrt{\frac{mg}{k}} \theta^{3/2}$

$$\frac{dq}{d\theta} = 3l \sqrt{\frac{mg}{k}} \theta^{1/2}$$

luego

$$\omega = -\frac{\lambda}{3l \sqrt{\frac{mg}{k}} \theta^{1/2}}$$

Estera 12 puntos $\vec{\omega}_{12} = \frac{-\lambda}{3l \sqrt{\frac{mg}{k}} \theta^{1/2}} \hat{n}$

Estera de $\vec{\omega}_{de} = -\vec{\omega}_{12} = \frac{\lambda}{3l \sqrt{\frac{mg}{k}} \theta^{1/2}} \hat{n}$