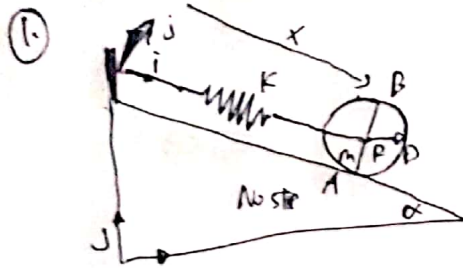


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Pers. Energi :

↳ Energi potensial $V = \frac{1}{2} k (x - L) - mgx \sin \alpha$

↳ untuk Energi Kinetik

• $P_{ku} = \frac{ds}{dt}$

Kombinasi translasi dan rotasi adalah

$$T = \frac{1}{2} \frac{mR^2}{2} \omega^2 + \frac{1}{2} m \left(\frac{ds}{dt} \right)^2$$

$$= \frac{1}{2} \frac{3m}{2} \left(\frac{ds}{dt} \right)^2$$

↳ $T + V = \text{konstan}$

⇒ $\frac{d}{dt} (T + V) = 0$

$$\frac{3m}{2} \frac{ds}{dt} \frac{ds}{dt} + k(s - L) \frac{ds}{dt} - mg \frac{ds}{dt} \sin \alpha = 0$$

$$\Rightarrow \frac{3m}{2k} \frac{d^2 s}{dt^2} + s = L + \frac{mg}{k} \sin \alpha$$

$$s = x - \frac{mg}{k} \sin \alpha - L$$

substitusi → $\frac{3m}{2k} \frac{d^2 x}{dt^2} + \frac{mg}{k} \sin \alpha + L = L + \frac{mg}{k} \sin \alpha$

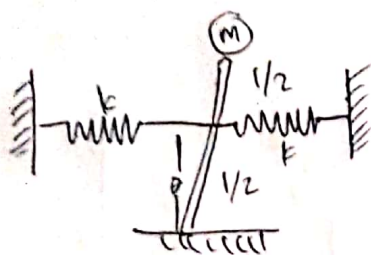
$$\frac{3m}{2k} \frac{d^2 x}{dt^2} + s = 0$$

• $\frac{1}{\omega_n^2} \frac{d^2 x}{dt^2} + s = 0$

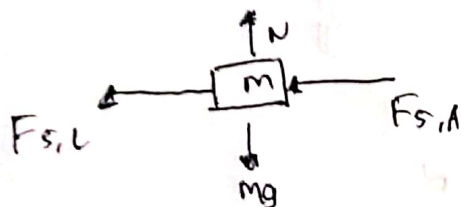
$\omega_n = \sqrt{\frac{2k}{3m}} \rightarrow \text{rad/s}$

$= \frac{1}{241} \sqrt{\frac{2k}{3m}} \rightarrow \text{Hz}$

2



Free Body Diagram



N = gaya normal

mg = berat

$F_{s,L}$ = gaya pegas ke kiri $(\frac{k}{2} \sin \theta)$

$F_{s,R}$ = gaya pegas tekan dari kanan $(\frac{k}{2} \sin \theta)$

$$F_{s,L} = k \frac{l}{2} \sin \theta$$

$$F_{s,R} = k \frac{l}{2} \sin \theta$$

$$\text{so } F = k \cdot x$$

$$N = mg$$

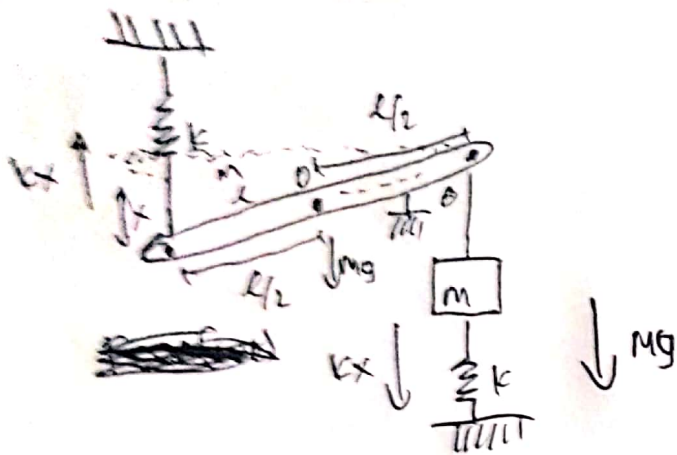
$$\star F_{s,L} + F_{s,R} = ma$$

$$\rightarrow 2k \frac{l}{2} \sin \theta = ma$$

$$kl \sin \theta = ma$$

$$\text{pers. gerak} \rightarrow a = \frac{kl \sin \theta}{m}$$

3



$$\text{torque} = \frac{l}{2} kx$$

$$\text{torque} = \frac{l}{2} (mg - kx)$$