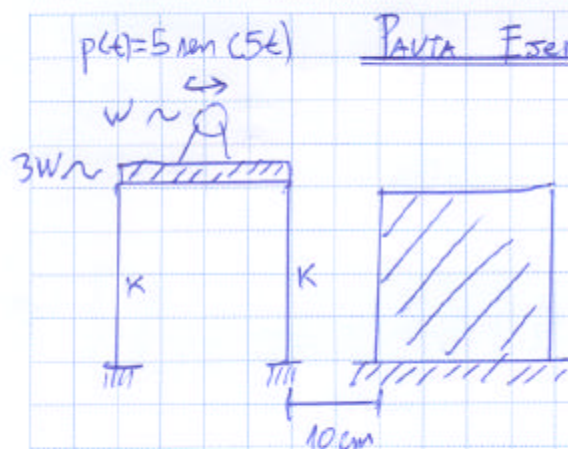


Fecha:



PAUTA Ejercicio 4 CI42G

$$W = 1 \text{ ton} \quad g = 9,8 \text{ m/s}^2 \quad \beta = 0,05$$

$$p_0 = 5 \text{ ton} \quad v_0 = \dot{v}_0 = 0 \quad \bar{w} = 5 \text{ rad/seg.}$$

• K? T_f $A_p = 6 \text{ cm}$

$$K_p(t) = \frac{p_0}{K^*} D \sin(\bar{w}t - \theta)$$

$$m = \frac{4W}{g} = 0,408 \left[\frac{\text{ton} \cdot \text{s}^2}{\text{m}} \right]$$

$$K^* = 2K \quad w = \sqrt{\frac{K^*}{m}} = \sqrt{\frac{2K}{m}}$$

$$D = \frac{1}{\sqrt{(1 - \gamma^2)^2 + (2\beta\gamma)^2}}$$

$$\gamma = \frac{\bar{w}}{w}$$

Luego $A_p = \frac{p_0}{2K} \cdot D$

$$0,06 = \frac{5}{2K} \cdot \frac{1}{\sqrt{\left(1 - 25 \frac{m}{2K}\right)^2 + \left(2 \cdot 0,05 \cdot 5 \cdot \sqrt{\frac{m}{2K}}\right)^2}} \quad / \cdot m$$

$$0,06 \cdot m \sqrt{\left(1 - 25 \frac{m}{2K}\right)^2 + \left(2 \cdot 0,05 \cdot 5 \cdot \sqrt{\frac{m}{2K}}\right)^2} = 5 \cdot \frac{m}{2K}$$

Tomando

$$X = \frac{m}{2K} \Rightarrow \sqrt{\left(1 - 25X\right)^2 + \left(2 \cdot 0,05 \cdot 5\right)^2} X = \frac{5}{0,06 \cdot m} \cdot X \quad / ()^2$$

Fecha:

$$(1 - 25x)^2 + (2 \cdot 0,05 \cdot 5)^2 x = \left(\frac{5}{0,06 \cdot m} \right)^2 x^2$$

$$1 - 50x + 625x^2 + (2 \cdot 0,05 \cdot 5)^2 x = \left(\frac{5}{0,06 \cdot m} \right)^2 x^2$$

$$\Rightarrow \left[\left(\frac{5}{0,06 \cdot m} \right)^2 - 625 \right] x^2 - (2 \cdot 0,05 \cdot 5)^2 x + 50x - 1 = 0$$

$$\left[\left(\frac{5}{0,06 \cdot m} \right)^2 - 625 \right] x^2 + [50 - (2 \cdot 0,05 \cdot 5)^2] x - 1 = 0$$

$$41059,03 x^2 + 49,75 x - 1 = 0$$

$$\Rightarrow x = \frac{-49,75 \pm \sqrt{(49,75)^2 + 4 \times 41059,03}}{2 \times 41059,03}$$

$$\begin{matrix} 4,366 \times 10^{-3} \\ -5,578 \times 10^{-3} \end{matrix}$$

$$\Rightarrow \frac{m}{2K} = 4,366 \times 10^{-3} \Rightarrow K = \frac{m}{2 \times 4,366 \times 10^{-3}} = 46,74 \frac{\text{ton}}{m}$$

chequeando $\Delta_{est} = \frac{5}{2 \times 46,74} = 0,053 \text{ m}$

$\sim \Delta_p = D \cdot \Delta_{est} = 0,06 \text{ m}$

$$w = \sqrt{\frac{2K}{m}} = 15,13 \frac{\text{rad}}{\text{seg}} \Rightarrow D = 1,122$$

✓OK

Fecha:

- Régimen Transiente:

$$x(t) = e^{-\beta \omega t} \cdot (A \sin(\omega t) + B \cos(\omega t)) + 0,06 \cdot \sin(5t - \theta)$$

$$\theta = \arctan\left(\frac{2\beta\gamma}{1-\gamma^2}\right) \quad \gamma = \frac{5}{15,13} = 0,33 \Rightarrow \theta = 2,125^\circ$$

$$\dot{x}(t) = -\beta \omega e^{-\beta \omega t} (A \sin(\omega t) + B \cos(\omega t)) + e^{-\beta \omega t} \cdot (A \omega \cos(\omega t) - B \omega \sin(\omega t)) + 0,06 \cdot 5 \cos(5t - 2,125^\circ)$$

$$x(t=0) = B + 0,06 \sin(-2,125^\circ) = 0 \Rightarrow B = 0,0022 \text{ m}$$

$$\dot{x}(t=0) = -\beta \omega B + \omega A + 0,06 \cdot 5 \cos(-2,125^\circ) = 0$$

$$\Rightarrow A = \frac{\beta \omega B - 0,06 \cdot 5 \cos(-2,125^\circ)}{\omega \sqrt{1-\beta^2}}$$

$$\Rightarrow A = -0,0197 \text{ m}$$

$$\Rightarrow x_h = \rho \cdot \cos(\omega t - \varphi) \cdot e^{-\beta \omega t} \quad \rho = \sqrt{A^2 + B^2} = 0,0199 \text{ m}$$

$$\Rightarrow A_{\text{perm}} + \rho < 10 \text{ cm} \Rightarrow \text{No choca.}$$

La Amplitud en régimen transiente siempre es menor A ρ .
lo que implica que la estructura no choca.