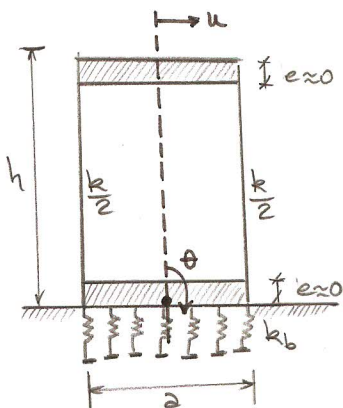
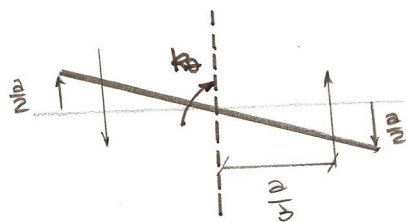


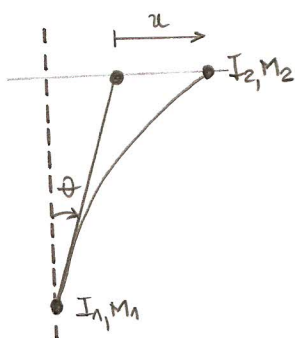


1. RIGIDEZ EQUIVALENTE DE LA CAMA DE RESORTE



$$K_{\theta} = 2 \times \left\{ \frac{1}{8} a^2 b k_b \times \frac{a}{3} \right\} \\ = \frac{a^3 b k_b}{12} \quad (1)$$

2. ENERGÍA CINÉTICA Y ENERGÍA DE DEFORMACIÓN



$$U = \frac{1}{2} K_{\theta} \theta^2 + \frac{1}{2} k u^2 \quad (2a)$$

$$T = \frac{1}{2} (I_1 + I_2) \dot{\theta}^2 + \frac{1}{2} M_2 (h \dot{\theta} + \dot{u})^2 \quad (2b)$$

3. MATRIZ DE RIGIDEZ Y MASA

$$K_{\theta\theta} = K_{\theta} ; K_{\theta u} = 0 ; K_{uu} = k ; [K] = \begin{bmatrix} K_{\theta} & 0 \\ 0 & k \end{bmatrix} \quad (3a)$$

$$M_{\theta\theta} = I_1 + I_2 + M_2 h^2 ; M_{\theta u} = M_2 h ; M_{uu} = M_2 ; [M] = \begin{bmatrix} I_1 + I_2 + M_2 h^2 & M_2 h \\ M_2 h & M_2 \end{bmatrix} \quad (3b)$$

4. FRECUENCIAS Y FORMAS MODALES

$$K_{\theta} = \frac{(4^3)(3)}{12} k_b = 80.000 ;$$

$$k = 2000 ;$$

$$I_1 = \frac{1}{12} (100) (4^2) = 133,3 ;$$

$$I_2 = \frac{1}{12} (50) (4^2) + (50) (3^2) ;$$

$$= 516,67 ;$$

$$[K] = \begin{bmatrix} 80000 & 0 \\ 0 & 2000 \end{bmatrix} \quad (4a)$$

$$[M] = \begin{bmatrix} 1000 & 150 \\ 150 & 50 \end{bmatrix} \quad (4b)$$

$$\omega^2 = \text{Eig}(M^{-1}K) \rightarrow \begin{matrix} \omega_1 = 5,55 & ; & T_1 = 1,133 \text{ [s]} \\ \omega_2 = 12,65 & ; & T_2 = 0,5 \text{ [s]} \end{matrix} \quad (5a)$$

$$\Phi = \begin{bmatrix} 0,0995 & 0,2425 \\ 0,995 & -0,9701 \end{bmatrix} \quad (5b)$$

