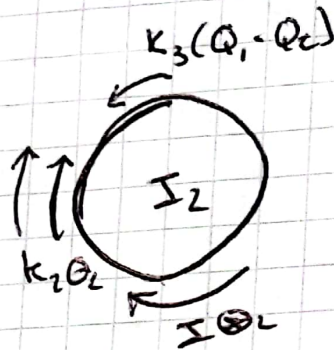
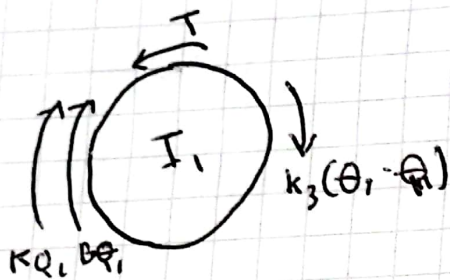
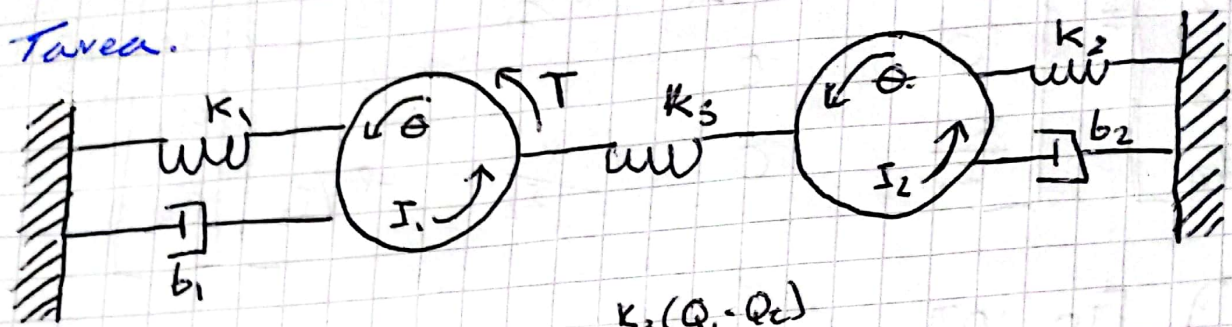


Tarea.



$$I_1 \ddot{\theta}_1 + b_1 \dot{\theta}_1 + k_1 \theta_1 + k_3 (\theta_1 - \theta_2) = T$$

$$\ddot{\theta}_1 = -\frac{b_1 \dot{\theta}_1}{I_1} - \frac{\theta_1 (k_3 + k_1)}{I_1} + \frac{k_2 \theta_2}{I_1} + \frac{T}{I_1} \quad (2)$$

$$k_3 (\theta_1 - \theta_2) - k_2 \theta_2 - b_2 \dot{\theta}_2 - I_2 \ddot{\theta}_2 = 0$$

$$k_3 (\theta_1 - \theta_2) - k_2 \theta_2 - b_2 \dot{\theta}_2 - I_2 \ddot{\theta}_2 = 0$$

$$\frac{k_3 (\theta_1)}{I_2} - \frac{\theta_2 (k_3 + k_2)}{I_2} - \frac{b_2 \dot{\theta}_2}{I_2} = \ddot{\theta}_2 \quad (1)$$

$$q_1 = \theta_1$$

$$q_2 = \dot{q}_1 = \dot{\theta}_1$$

$$\ddot{q}_1 = \ddot{q}_2 = \ddot{q}_1 = \ddot{\theta}_1$$

$$\ddot{q}_2 = \frac{-b_1 q_2}{I_1} - \frac{q_1 (k_3 + k_1)}{I_1} + \frac{k_2 q_2}{I_1} + \frac{T}{I_1}$$

(2)

①

$$q_3 = \theta_2$$

$$\dot{q}_4 = \dot{\theta}_2 = \dot{q}_3$$

$$\ddot{q}_5 = \ddot{q}_4 = \ddot{q}_3 = \ddot{\theta}_2$$

$$\frac{k_3(q_1)}{I_2} - \frac{q_3(k_3+k_2)}{I_2} - \frac{B_2 \dot{q}_4}{I_2} = \ddot{q}_4$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{(k_1+k_2)}{I_1} & -B_1/I_1 & k_2/I_1 & 0 \\ 0 & 0 & 0 & 1 \\ \frac{k_1}{I_1} & -\frac{(B_1+k_1)}{I_2} & -B_2/I_2 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} T$$

$$\begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix} = \begin{bmatrix} 10 & 0 \\ 00 & 10 \end{bmatrix}$$