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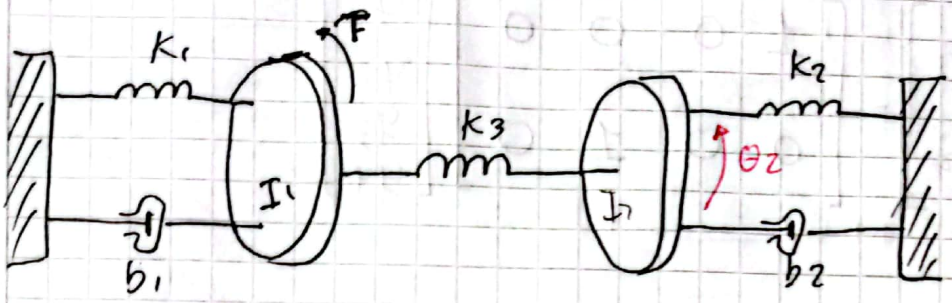
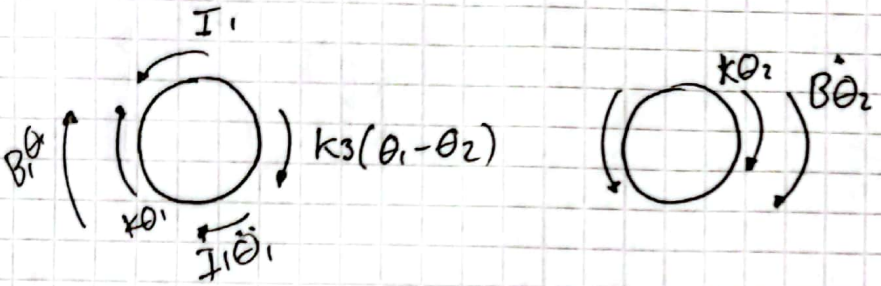
Tarea





$$I_1\ddot{\theta}_1 + B\dot{\theta}_1 + k\theta_1 + K_3(\theta_1 - \theta_2) = T$$

$$T = I_1\ddot{\theta}_1 + B\dot{\theta} + (k_1 + k_3)\theta_1 - k_3\theta_2 \quad (1)$$

$$-k_3\theta_1 + I_2\ddot{\theta}_2 + B_2\dot{\theta}_2 + (k_2 + k_3)\theta_2 = 0 \quad (2)$$

$q_1 = \theta_1$ $\quad q_3 = \theta_2$

$q_2 = \dot{q}_1 = \dot{\theta}_1$ $\quad q_4 = \dot{q}_3 = \dot{\theta}_2$

$\dot{q}_2 = \ddot{q}_1 = \ddot{\theta}_1$ $\quad \dot{q}_4 = \ddot{q}_3 = \ddot{\theta}_2$

$$\ddot{\theta}_1 = \frac{I}{I_1} - \frac{B}{I_1}\dot{\theta}_1 - \frac{(k_1 + k_3)}{I_1}\theta_1 + \frac{k_3\theta_2}{I_1}$$

$$\ddot{\theta}_2 = \frac{k_3\theta_1}{I_2} - \frac{B_2}{I_2}\dot{\theta}_2 - \frac{(k_2 + k_3)}{I_2}\theta_2$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{(k_1+k_3)}{I_1} & -\frac{B}{I_1} & \frac{k_3}{I_1} & 0 \\ 0 & 0 & 0 & 1 \\ \frac{k_3}{I_2} & 0 & \frac{-(k_2+k_3)}{I_2} & -\frac{B_2}{I_2} \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{1}{I_1} \\ 0 \\ 0 \end{bmatrix} T$$

$$\begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix}$$