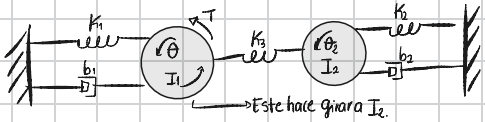
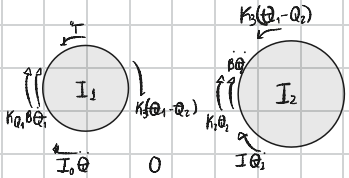
Tarea #1



Tarea #1



$I_0\ddot{\theta} + B_1\dot{\theta}_1 + K_1\theta_1 + K_3(\theta_1 - \theta_2) = T$

$\ddot{\theta}_1 = \frac{-B_1}{I_1}\dot{\theta}_1 - \frac{K_1}{I_1}\theta_1 - \frac{K_3}{I_1}\theta_1 + \frac{K_2}{I_1}\theta_2 + \frac{T}{I_1}$

$\ddot{\theta}_1 = \frac{-B_1}{I_1}\dot{\theta}_1 - \theta_1\left(\frac{K_3+K_1}{I_1}\right) + \frac{K_2}{I_1}\theta_2 + \frac{T}{I_1}$ ②

$K_3(\theta_1 - \theta_2) - K_1\theta_1 - B_2\dot{\theta}_2 - I_1\ddot{\theta}_1 = 0$

$\frac{K_3}{I_2}(\theta_1) - \theta_2\left(\frac{K_3+K_2}{I_2}\right) - \frac{B_2}{I_2}\dot{\theta}_2 = \ddot{\theta}_2$ ①

$q_1 = \theta_1$

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

$q_3 = \dot{q}_2 = \ddot{q}_1 = \ddot{\theta}_1$

$q_3 = \theta_2$

$q_4 = \dot{\theta}_2 = \dot{q}_3$

$q_4 = \dot{q}_4 = \ddot{q}_3 = \ddot{\theta}_2$

Para ②

$\dot{q}_2 = \frac{-B_1}{I_1}q_2 - q_1\left(\frac{K_3+K_1}{I_1}\right) + \frac{K_2}{I_1}q_3 + \frac{T}{I_1}$ ②

Para ①

$\frac{K_3}{I_2}(q_1) - q_3\left(\frac{K_3+K_2}{I_2}\right) - \frac{B_2}{I_2}q_4 = \dot{q}_4$ ①

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{(K_3+K_1)}{I_1} & -\frac{B_1}{I_1} & \frac{K_2}{I_1} & 0 \\ 0 & 0 & 0 & 1 \\ \frac{K_3}{I_2} & 0 & -\frac{(K_3+K_2)}{I_2} & -\frac{B_2}{I_2} \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{1}{I_1} \\ 0 \\ 0 \end{bmatrix} [T]$$

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