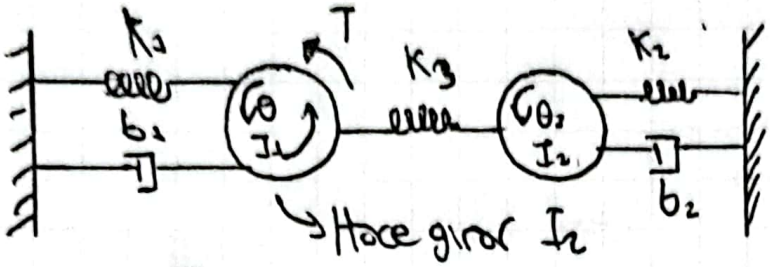
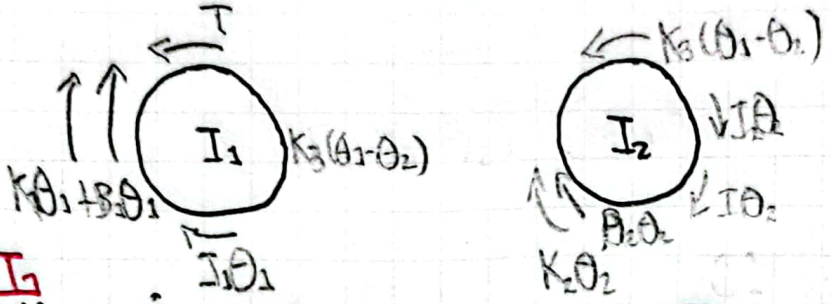
Tarea #1





I_1

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

$$\ddot{\theta}_1=-\frac{B_1\dot{\theta}_1}{I_1}-\frac{K_1\theta_1}{I_1}-\frac{K_3\theta_1}{I_1}+\frac{K_3\theta_2}{I_1}+\frac{T}{I_1} \quad ①$$

$$\ddot{\theta}_1=-\frac{B_1\dot{\theta}_1}{I_1}-\frac{\theta_1(K_1+K_3)}{I_1}+\frac{K_3\theta_2}{I_1}+\frac{T}{I_1} \quad ①$$

I_2

$$K_3(\theta_1-\theta_2)-K_2\theta_2-B_2\dot{\theta}_2-I_2\ddot{\theta}_2=0$$

$$\ddot{\theta}_2=\frac{K_3\theta_1}{I_2}-\frac{\theta_2(K_3+K_2)}{I_2}-\frac{B_2\dot{\theta}_2}{I_2} \quad ②$$

$q_1=\theta_1$, $q_2=\dot{q}_1=\dot{\theta}_1$, $q_3=\dot{q}_2=\ddot{q}_1=\ddot{\theta}_1$

$$\dot{q}_2=-\frac{B_1q_2}{I_1}-\frac{q_1(K_1+K_3)}{I_1}+\frac{K_3q_3}{I_1}+\frac{T}{I_1} \quad ①$$

$q_3=\theta_2$, $q_4=\dot{q}_3=\dot{\theta}_2$,

$q_3=\dot{q}_4=\dot{q}_3=\ddot{\theta}_2$

$$\dot{q}_4=\frac{K_3q_1}{I_2}-\frac{q_3(K_3-K_2)}{I_2}-\frac{B_2q_4}{I_2} \quad ②$$

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

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