Tarea 2
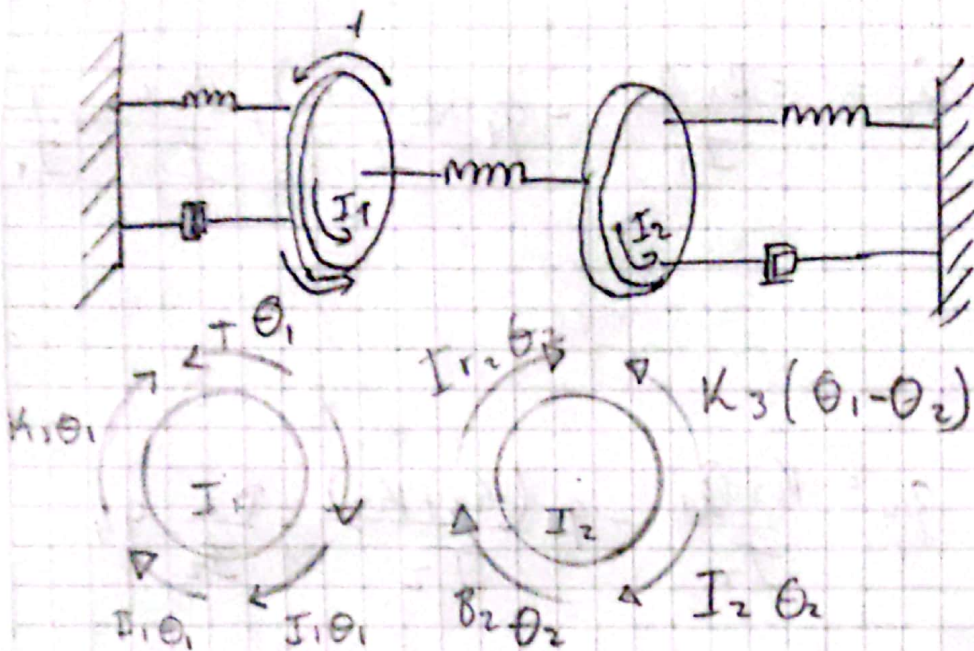

$$I_1 \ddot{\theta}_1 + B_1 \dot{\theta}_1 + K \theta_1 + K_3 (\theta_1 - \theta_2) = T$$

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

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

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

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

Para I

$q_1 = \Theta_1$

$\left.\begin{array}{l} q_2 = \dot{q}_1 = \dot{\Theta}_1 \\ \dot{q}_2 = \ddot{q}_1 = \ddot{\Theta}_1 \end{array}\right\} \Rightarrow \dot{q}_2 = -\dfrac{B_1\,q_2}{I_1} - q_1\dfrac{(K_3+K_1)}{I_1} + \dfrac{K_2\,q_3}{I_1} + \dfrac{T}{I_1}$

Para II

$q_3 = \Theta_2$

$\left.\begin{array}{l} q_4 = \dot{\Theta}_2 = \dot{q}_3 \\ \dot{q}_4 = \ddot{q}_3 = \ddot{\Theta}_2 \end{array}\right\} \quad \dot{q}_4 = \dfrac{K_3\,Q_1}{I_2} - q_3\dfrac{(K_3+K_2)}{I_2} - \dfrac{B_2}{I_2}\,q_4$

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

$$\begin{bmatrix} \Theta_1 \\ \Theta_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix}$$