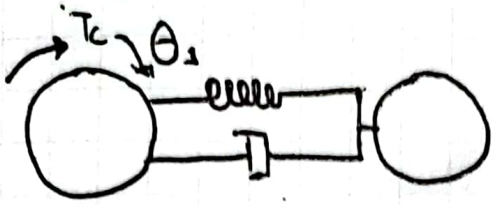
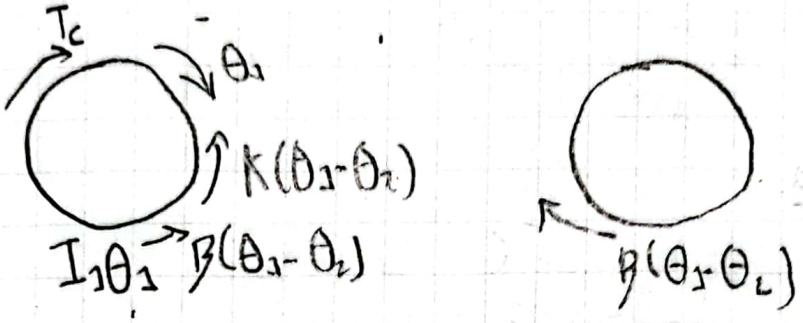
Tarea #2





① $T_C = K(\theta_1 - \theta_2) - B(\dot{\theta}_1 - \dot{\theta}_2) = I_1\ddot{\theta}_1$

② $I_2\ddot{\theta}_2 = K_2(\theta_1 - \theta_2) + B(\dot{\theta}_1 - \dot{\theta}_2)$

↳ $\ddot{\theta}_1 = \frac{T_C}{I_1} - \frac{K_1(\theta_1 - \theta_2)}{I_1} - \frac{B(\dot{\theta}_1 - \dot{\theta}_2)}{I_1}$

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

$q_3 = \theta_2$, $q_4 = \dot{q}_3 = \dot{\theta}_2$
$q_5 = \dot{q}_4 = \ddot{q}_3 = \ddot{\theta}_2$

$\Rightarrow \frac{B\dot{\theta}_1}{I_2} = \frac{B\dot{\theta}_2}{I_2} + \frac{K\theta_1}{I_2} - \frac{K\theta_2}{I_2} = \ddot{\theta}_2$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{K_1}{I_1} & -\frac{b}{I_1} & \frac{K}{I_1} & \frac{b}{I_1} \\ 0 & 0 & 0 & 1 \\ 0 & \frac{(K_1+b)}{I_2} & -\frac{K_1}{I_1} & -\frac{b}{I_1} \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 1/I_1 \\ 0 \\ 0 \end{bmatrix}$$

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