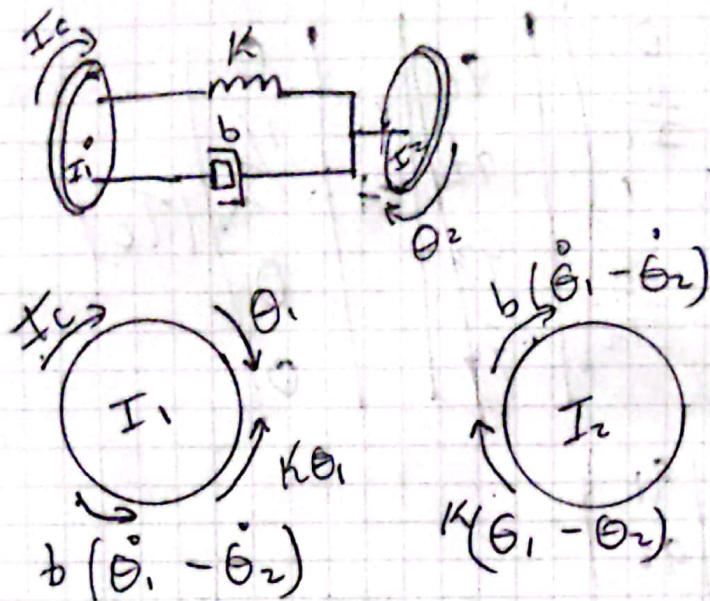# Tarea 3

$$T_c - K(\theta_1 - \theta_2) - b(\dot{\theta}_1 - \dot{\theta}_2) = I_1 \ddot{\theta}_1 \quad \text{I}$$

$$b(\dot{\theta}_1 - \dot{\theta}_2) + K(\theta_1 - \theta_2) = I_2 \ddot{\theta}_2 \quad \text{II}$$

Para I

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

Para II

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

$$\frac{T_c}{J_1} - \frac{K}{I_1} q_1 + K \frac{q_3}{I_1} - b \frac{q_2}{I_1} + b \frac{q_4}{I} = \dot{q}_2 \quad \text{I}$$

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

$$\frac{b q_2}{I_2} - \frac{b q_4}{I_2} + \frac{K q_2}{I_2} - \frac{K q_3}{I_2} = \dot{q}_4 \quad \text{II}$$

$$
\begin{vmatrix} \dot{q_1} \\ \dot{q_2} \\ \dot{q_3} \\ \dot{q_4} \end{vmatrix} =
\begin{vmatrix}
0 & 1 & 0 & 0 \\
\dfrac{-K}{I_1} & \dfrac{-b}{I_1} & \dfrac{K}{I_1} & \dfrac{b}{I_1} \\
0 & 0 & 0 & 1 \\
0 & \dfrac{(K+b)}{I_2} & \dfrac{-K}{I_2} & \dfrac{-b}{I_2}
\end{vmatrix}
\begin{vmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{vmatrix}
+
\begin{vmatrix} 0 \\ 1/I_1 \\ 0 \\ 0 \end{vmatrix} |T_C|
$$

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