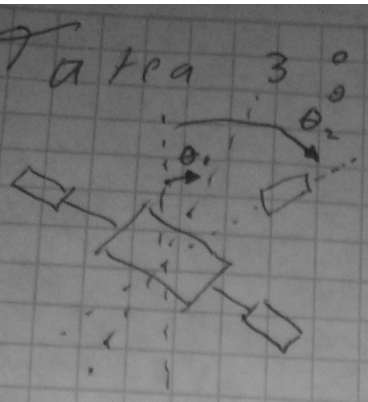
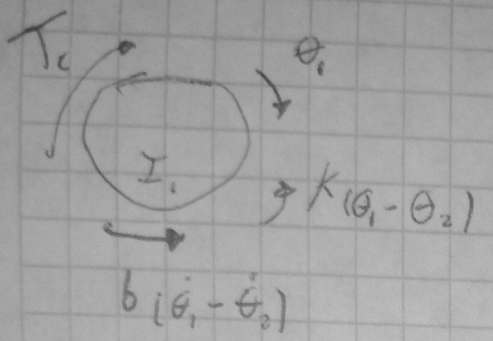
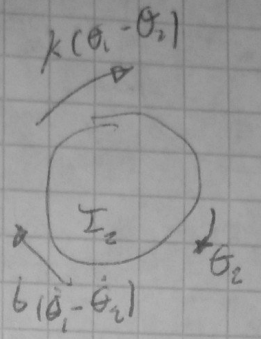
Tarea 3

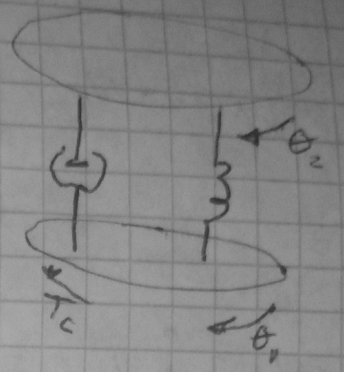


θ_2 : Sensor

θ_1 : Body







$$T_c - k(\theta_1-\theta_2) - b(\dot{\theta}_1-\dot{\theta}_2) = I\ddot{\theta}_1 \qquad \ddot{\theta}_1 = ?$$

$$b(\dot{\theta}_1-\dot{\theta}_2) + k(\theta_1-\theta_2) = I_2\ddot{\theta}_2 \qquad \ddot{\theta}_2 = ?$$

$q_1 = \theta_1$ $\qquad y_1 = \theta_2$

$q_2 = \dot{\theta}_1 = \dot{q}_1$ $\qquad y_2 = \dot{y}_1$

$q_3 = \dot{q}_2 = \ddot{q}_1$ $\qquad y_3 = \dot{y}_2$

$$q_3 = \frac{T_c}{I_1} - \frac{K}{I_1}(q_1 - y_2) - \frac{B}{I_1}(\dot{q}_1 - \dot{y}_1)$$

$$y_3 = \frac{K}{I_2}(q_1 - y_1) + \frac{B}{I_2}(\dot{q}_1 - \dot{y})$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{y}_1 \\ \dot{y}_2 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -\frac{K}{I_1} & \frac{K}{I_1} & -\frac{B}{I_1} & 0 \\ \frac{K}{I_2} & -\frac{K}{I_2} & 0 & -\frac{B}{I_2} \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ y_1 \\ y_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ \frac{1}{I_1} \\ 0 \end{bmatrix} T$$

$$\begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ y_1 \\ y_2 \end{bmatrix}$$