TAREAS 2do Corte.

1ra Entrega.

Sistemas Dinamicos Grp 005 - 1

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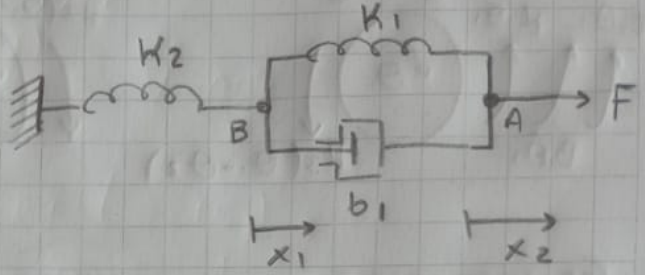
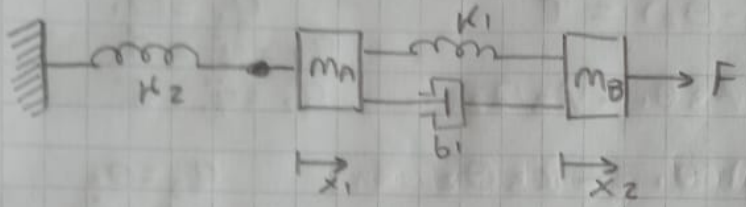
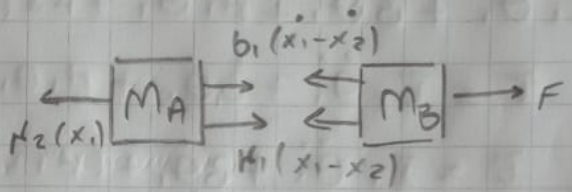
Tarea 1.

- agregar masa puntual en los diagramas de fuerzas del siguiente ejemplo:



adicionando las masas:





Ecuaciones: $+\rightarrow \sum F = m \cdot a$

$$-K_2 x_1 + b_1(\dot{x}_1 - \dot{x}_2) + K_1(x_1 - x_2) = m_A \ddot{x}_1$$

$$\ddot{x}_1 = -\frac{K_2 x_1}{m_A} + \frac{b_1 \dot{x}_1}{m_A} - \frac{b_1 \dot{x}_2}{m_A} + \frac{K_1 x_1}{m_A} - \frac{K_1 x_2}{m_A} \quad (1)$$

$$-b_1(\dot{x}_1 - \dot{x}_2) - K_1(x_1 - x_2) + F = m_B \ddot{x}_2$$

$$\ddot{x}_2 = -\frac{b_1 \dot{x}_1}{m_B} + \frac{b_1 \dot{x}_2}{m_B} - \frac{K_1 x_1}{m_B} + \frac{K_1 x_2}{m_B} + \frac{F}{m_B} \quad (2)$$

$x_1 = q_1$

$q_2 = \dot{x}_1 = \dot{q}_1$

$q_3 = x_2$

$q_4 = \dot{x}_2 = \dot{q}_3$

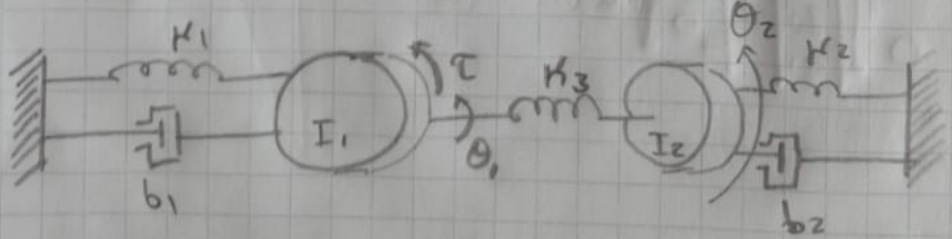
$$\dot{q}_2 = -\frac{K_2 q_1}{m_A} + \frac{b_1 q_2}{m_A} - \frac{b_1 q_4}{m_A} + \frac{K_1 q_1}{m_A} - \frac{K_1 q_3}{m_A} \quad (1)$$

$$\dot{q}_4 = -\frac{b_1 q_1}{m_B} + \frac{b_1 q_4}{m_B} - \frac{K_1 q_1}{m_B} + \frac{K_1 q_3}{m_B} + \frac{F}{m_B} \quad (2)$$

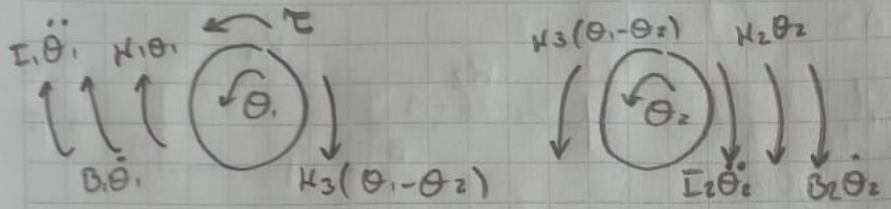
$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{K_2+K_1}{m_A} & \frac{b_1}{m_A} & \frac{K_1}{m_A} & -\frac{b_1}{m_A} \\ 0 & 0 & 0 & 1 \\ \frac{-b_1-K_1}{m_B} & 0 & \frac{K_1}{m_B} & b_1/m_B \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1/m_B \end{bmatrix} F$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix} F$$

TAREA 2.



Diagramas:



Ecuaciones:

$$I_1\ddot{\theta}_1 + B_1\dot{\theta}_1 + K_1\theta_1 + K_3(\theta_1-\theta_2) = \tau$$

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

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

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

$$K_3\theta_1 - K_3\theta_2 - K_2\theta_2 - B_2\dot{\theta}_2 - I_2\ddot{\theta}_2 = 0 \quad (2)$$

Definiendo variables:

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

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

$$\tau = I_1\dot{q}_2 + B_1q_2 + K_1q_1 + K_3q_1 - K_3q_3$$

$$\dot{q}_2 = \frac{\tau}{I_1} - \frac{B_1q_2}{I_1} - \frac{K_1q_1}{I_1} - \frac{K_3q_1}{I_1} + \frac{K_3q_3}{I_1} \quad (1)$$

$$K_3q_1 - K_3q_3 - K_2q_3 - B_2q_4 - I_2\dot{q}_4 = 0$$

$$\dot{q}_4 = \frac{K_3q_1}{I_2} - \frac{K_3q_3}{I_2} - \frac{K_2q_3}{I_2} - \frac{B_2q_4}{I_2} \quad (2)$$

$$\begin{bmatrix}\dot{q}_1\\ \dot{q}_2\\ \dot{q}_3\\ \dot{q}_4\end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\left(\frac{K_1+K_3}{I_1}\right) & -\frac{B_1}{I_1} & K_3/I_1 & 0 \\ 0 & 0 & 0 & 1 \\ K_3/I_2 & 0 & -\frac{(K_3+K_2)}{I_2} & -\frac{B_2}{I_2}\end{bmatrix} \cdot \begin{bmatrix}q_1\\ q_2\\ q_3\\ q_4\end{bmatrix} + \begin{bmatrix}0\\ 1/I_1\\ 0\\ 0\end{bmatrix}\tau$$

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