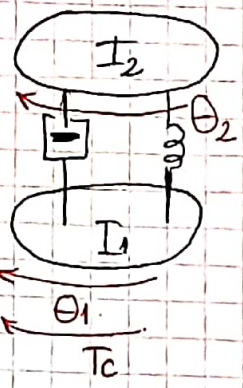

$$T_c - K(\theta_1 - \theta_2) - B(\dot{\theta}_1 - \dot{\theta}_2) = I\ddot{\theta}_1 \quad (1)$$

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

Salidas θ_1 y θ_2

$$\rightarrow T_c - K\theta_1 + K\theta_2 - B\dot{\theta}_1 + B\dot{\theta}_2 = I_1\ddot{\theta}_1$$

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

$X_1 = \theta_1 \qquad X_3 = \theta_2$

$X_2 = \dot{\theta}_1 \qquad X_4 = \dot{\theta}_2$

$$\dot{X}_2 = \ddot{\theta}_1 = \frac{T_c}{I_1} - \frac{K}{I_1}\theta_1 + \frac{K}{I_1}\theta_2 - \frac{B}{I_1}\dot{\theta}_1 + \frac{B}{I_1}\dot{\theta}_2$$

$$\dot{X}_2 = \frac{1}{I_1}T_c - \frac{K}{I_1}X_1 + \frac{K}{I_1}X_3 - \frac{B}{I_1}X_2 + \frac{B}{I_1}X_4$$

$$\dot{X}_4 = \ddot{\theta}_2 = \frac{B}{I_2}\dot{\theta}_1 - \frac{B}{I_2}\dot{\theta}_2 + \frac{K}{I_2}\theta_1 - \frac{K}{I_2}\theta_2 = \frac{B}{I_2}X_2 - \frac{B}{I_2}X_4 + \frac{K}{I_2}X_1 - \frac{K}{I_2}X_3$$

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \\ \dot{X}_3 \\ \dot{X}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -K/I_1 & -B/I_1 & K/I_1 & B/I_1 \\ 0 & 0 & 0 & 1 \\ K/I_2 & B/I_2 & -K/I_2 & -B/I_2 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 1/I_1 \\ 0 \\ 0 \end{bmatrix} T_c$$

$$\begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} + [0]T_c$$