



Salidas θ_1 y θ_2

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

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

$$x_1 = \theta_1$$

$$x_3 = \theta_2$$

$$x_2 = \dot{\theta}_1$$

$$x_4 = \dot{\theta}_2$$

$$\dot{x}_2 = \ddot{\theta}_1 = \frac{T}{I_1} - \frac{B_1}{I_1} \dot{\theta}_1 - \frac{(K_1 + K_3)}{I_1} \theta_1 + \frac{K_3}{I_1} \theta_2$$

$$\dot{x}_2 = \frac{T}{I_1} - \frac{B_1}{I_1} x_2 - \frac{(K_1 + K_3)}{I_1} x_1 + \frac{K_3}{I_1} x_3$$

$$\dot{x}_4 = \ddot{\theta}_2 = -\frac{B_2}{I_2} \dot{\theta}_2 + \frac{K_3}{I_2} \theta_1 + \frac{(K_2 + K_3)}{I_2} \theta_2$$

$$\dot{x}_4 = -\frac{B_2}{I_2} x_4 + \frac{K_3}{I_2} x_1 + \frac{(K_2 + K_3)}{I_2} x_3$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \\ \dot{x}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -\frac{(K_1 + K_3)}{I_1} & -\frac{B_1}{I_1} & \frac{K_3}{I_1} & 0 \\ 0 & 0 & 0 & 1 \\ \frac{K_3}{I_2} & 0 & \frac{K_2 + K_3}{I_2} & -\frac{B_2}{I_2} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{T}{I_1} \\ 0 \\ 0 \end{bmatrix}$$

$$y = \begin{bmatrix} \theta_1 \\ \theta_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix} T$$