CORRECCIÓN PARCIAL.

1.

$$\dddot{x} + \ddot{x} + 2\dot{x} + x = 2f(t)$$

$$XS^3 + XS^2 + 2XS + X = 2f(S)$$

$$X(S)[S^3 + S^2 + 2S + 1] = 2f(S)$$

- $$X(S) = \frac{2}{S^3 + S^2 + 2S + 1}$$

- $$\dddot{y}_3 + \ddot{y}_3 + 2y_2 + y_1 = 2f(t)$$

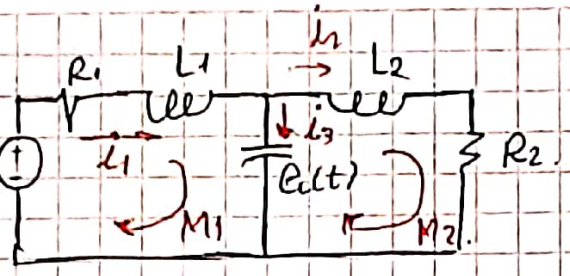
$$\dot{y}_1 = y_2$$

$$\dot{y}_2 = y_3$$

$$\dot{y}_3 = -y_3 - 2y_2 - y_1 + 2f(t).$$

$$\begin{bmatrix} \dot{y}_1 \\ \dot{y}_2 \\ \dot{y}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -2 & -1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} f(t)$$

①



Variables de estado. ① $V_{L1} = L_1 \frac{di_1(t)}{dt}$ ② $V_{L2} = L_2 \frac{di_2(t)}{dt}$ ③ $i_c = C \frac{dV_c(t)}{dt}$.

Malla #1

$V_i = V_{R1} + V_{L1} + V_c$

Malla #2

$V_c = V_{L2} + V_{R2}$

Nodo $V_1 = i_1 = i_3 + i_2$

Para $V_{L1} \rightarrow V_{L1} = V_i - V_{R1} - V_c$

$V_{L1} = V_i - R_1 i_1 - V_c$

$\frac{di_1}{dt} = \frac{V_i}{L_1} - \frac{R_1}{L_1} i_1 - \frac{1}{L_1} V_c$ (1)

Con $i_3 = i_c \rightarrow i_1 = i_3 + i_2$

$i_c = i_3 = i_1 + i_2$

$C \frac{dV_c(t)}{dt} = \dot{V}_c = \frac{i_1}{C} - \frac{1}{C} i_2$

Para $V_{L2} \rightarrow V_{L2} = V_c - V_{R2}$

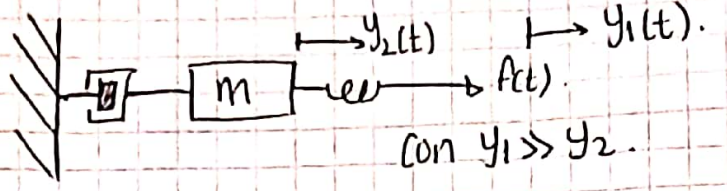
$V_{L2} = V_c - R_2 i_2$

$L_2 \frac{di_2(t)}{dt} = V_c - i_2 R_2$

$\frac{di_2(t)}{dt} = \frac{1}{L_2} V_c - \frac{R_2 i_2}{L_2}$ (2)

$$\begin{bmatrix} \dot{i}_1 \\ \dot{i}_2 \\ \dot{V}_c \end{bmatrix} = \begin{bmatrix} -R_1/L_1 & 0 & -1/L_1 \\ 0 & -R_2/L_2 & 1/L_2 \\ 1/C & -1/C & 0 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \\ V_c \end{bmatrix} + \begin{bmatrix} 1/L_1 \\ 0 \\ 0 \end{bmatrix} V_i$$

$$V_{R2} = \begin{bmatrix} 0 & R_2 & 0 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} + [0] V_i$$



con $y_1 \gg y_2$.

Para y_2:

$$m\ddot{y}_2 = -b\dot{y}_2 + K(y_1 - y_2)$$

$$\ddot{y}_2 = -\frac{b\dot{y}_2}{m} + \frac{K}{m}(y_1 - y_2)$$

$$\ddot{y}_2 = -\frac{b\dot{y}_2}{m} + \frac{K}{m}y_1 - \frac{K}{m}y_2$$

Para y_1

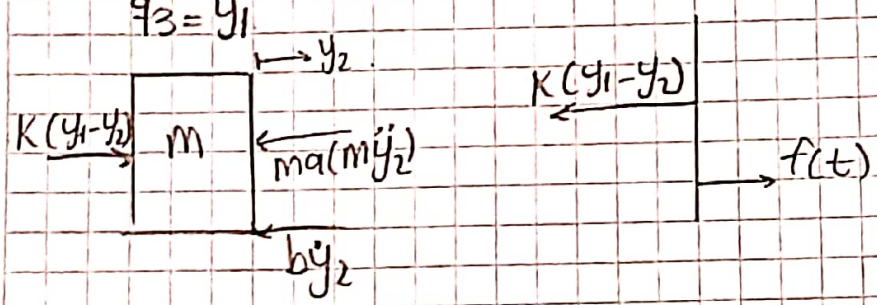
$$0 = f(t) - K(y_1 - y_2)$$

$$\rightarrow \quad q_1 = y_2$$

$$q_2 = \dot{y}_2$$

$$q_3 = y_1$$

$$\dot{q}_2 = -\frac{bq_2}{m} + \frac{Kq_3}{m} - \frac{K}{m}q_1$$



$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ -K/m & -b/m & K/m \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} f(t)$$

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \end{bmatrix} f(t)$$