

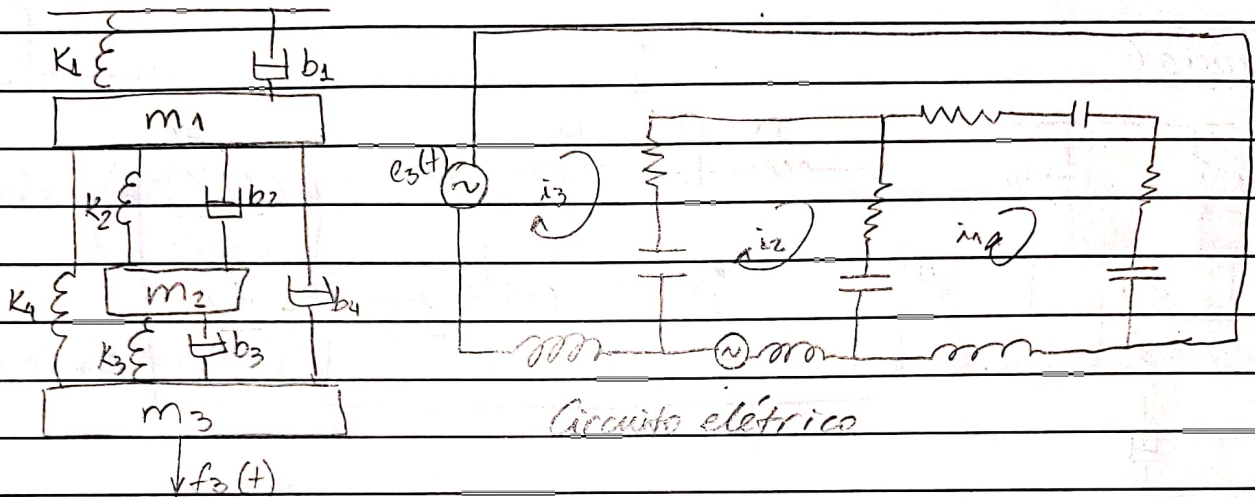


Gabriela Gremes Valejo Sanchez

10772592

Exercícios de Modelagem

Exercício 3



Circuito elétrico

$$\text{Malha 1: } L_1 D i_1 + \frac{1}{C_1 D} (i_1 - i_2) + R_1 (i_1 - i_3) + \frac{1}{C_1 D} i_1 + R_1 i_1 + \frac{1}{C_2 D} (i_1 - i_2) + R_2 (i_1 - i_2) = 0$$

$$\left(L_1 D + R_1 + \frac{1}{C_1 D} \right) i_1 + \left(\frac{R_2 + 1}{C_2 D} \right) (i_1 - i_2) + \left(\frac{R_4 + 1}{C_1 D} \right) (i_1 - i_3) = 0$$

$$\text{Malha 2: } L_2 D i_2 + \left(\frac{1}{C_2 D} \right) (i_2 - i_1) + R_2 (i_2 - i_1) + \left(\frac{1}{C_3 D} \right) (i_2 - i_3) + R_3 (i_2 - i_3) = e_2(t)$$

$$L_2 D i_2 + \left(\frac{R_2 + 1}{C_2 D} \right) (i_2 - i_1) + \left(\frac{R_3 + 1}{C_3 D} \right) (i_2 - i_3) = e_2(t)$$

$$\text{Malha 3: } L_3 D i_3 + \left(\frac{R_3 + 1}{C_3 D} \right) (i_3 - i_2) + \left(\frac{R_4 + 1}{C_1 D} \right) (i_3 - i_1) = e_3(t)$$



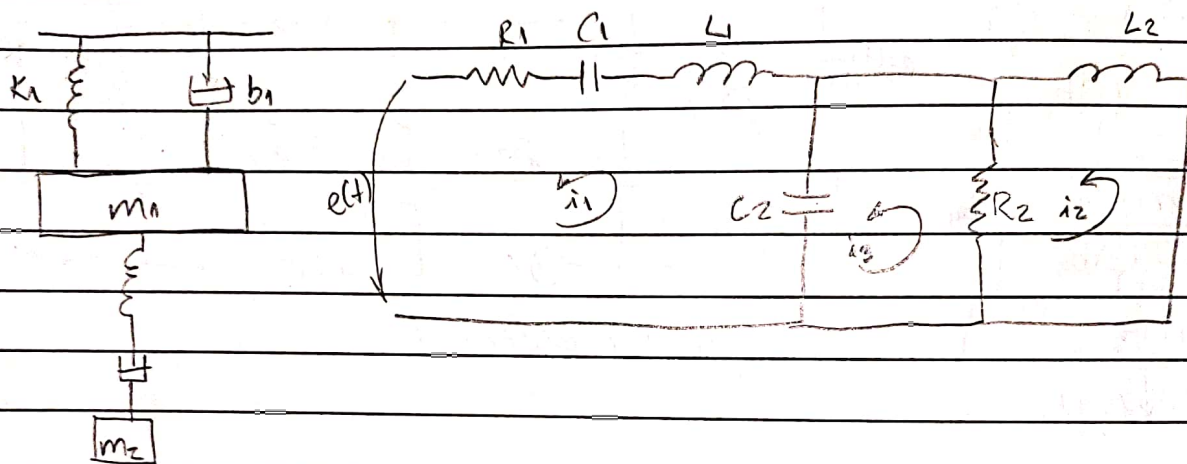
Sistema Mecânico:

$$\text{Malha 1: } m_1 \ddot{x}_1 + (b_1 + b_2 + b_4) \dot{x}_1 + (K_1 + K_2 + K_4) x_1 = b_2 \dot{x}_2 + K_2 x_2 + b_4 \dot{x}_3 + K_4 x_3$$

$$\text{Malha 2: } m_2 \ddot{x}_2 + (b_2 + b_3) \dot{x}_2 + (K_2 + K_3) x_2 = f_2(t) + b_2 \dot{x}_1 + b_3 \dot{x}_3 + K_2 x_1 + K_3 x_3$$

$$\text{Malha 3: } m_3 \ddot{x}_3 + (b_3 + b_4) \dot{x}_3 + (K_3 + K_4) x_3 = f_3(t) + b_3 \dot{x}_2 + K_3 x_2 + b_4 \dot{x}_1 + K_4 x_1$$

Exercício 6



$$\text{Malha 1: } e(t) = L_1 D i_1 + \left(\frac{1}{C_1 D} \right) i_1 + R_1 i_1 + \left(\frac{1}{C_2 D} \right) (i_1 - i_2)$$

$$\text{Malha 2: } 0 = R_2 (i_2 - i_3) + L_2 D i_2$$

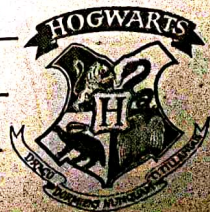
$$\text{Malha 3: } 0 = \frac{1}{C_2 D} (i_3 - i_1) + R_2 (i_2 - i_3)$$

Sistema Mecânico

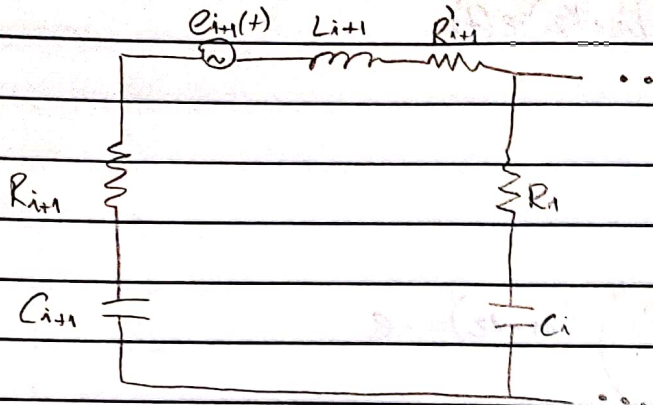
$$m_1 \ddot{x}_1 + K_1 x_1 + b_1 \dot{x}_1 + K_2 (x_1 - x_3) = 0$$

$$m_2 \ddot{x}_2 + b_2 (\dot{x}_2 - \dot{x}_3) = 0$$

$$b_2 (\dot{x}_3 - \dot{x}_2) + K_2 (x_3 - x_1) = 0$$



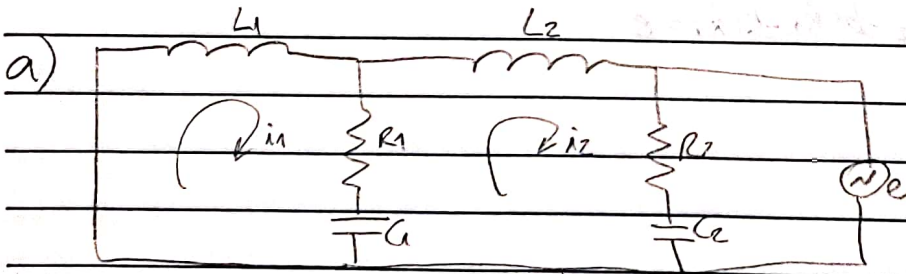
Exercício 7



$$e(t) = -\left(\frac{R_{i+1}}{C_i D}\right) i_{i+1} - \left(\frac{R_{i-1} + 1}{C_i D}\right) i_{i+1} + \left(\frac{L_i D + R_{i+1} + R_i, R_{i+1} + 1}{C_{i-1} D C_i D} + 1\right)$$

$$m_n \ddot{x}_n + K_i(x_n - x_{n+1}) + b_i(\dot{x}_n - \dot{x}_{n+1}) + K_{n-1}(x_n - x_{n-1}) + b_{n-1}(\dot{x}_n - \dot{x}_{n-1}) = U_i - R_i$$

Exercício 8



$$L_1 D i_1 + \left(\frac{1}{C_1 D}\right) (i_1 - i_2) + R_1 (i_2 - i_1) = e(t)$$

$$L_2 D i_2 + \left(\frac{1}{C_2 D}\right) (i_2 - i_1) + R_2 (i_2 - i_1) + \left(\frac{1}{C_2 D} + R_2\right) (i_2 - i_3) = -e(t)$$

$$\left(\frac{1}{C_2 D}\right) (i_3 - i_2) + R_2 (i_3 - i_2) = 0$$



$$m\ddot{x}_1 + b_1\dot{x}_1 + k_1x_1 - b_2\dot{x}_2 - k_2x_2 = 0$$

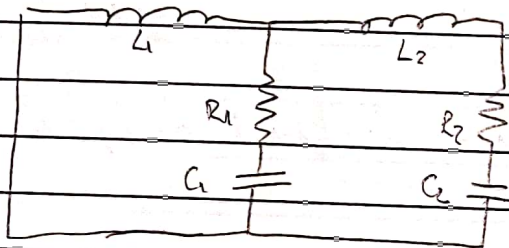
$$m\ddot{x}_2 + (b_1 + b_2)\dot{x}_2 + (k_1 + k_2)x_2 - b_1\dot{x}_1 - k_1x_1 = (b_2 + k_2) \cdot e(t)$$

b)

$$L_1 D i_1 + \left(\frac{1}{C_1 D} \right) (i_1 - i_2) + R_1 (i_1 - i_2) = e$$

$$L_2 D i_2 + \left(\frac{1}{C_1 D} + R_1 \right) (i_1 - i_2) + \left(\frac{1}{C_2 D} + R_2 \right) (i_2 - i_3) = -e$$

$$\left(\frac{1}{C_2 D} + R_2 \right) (i_3 - i_2) = 0$$



$$m\ddot{x}_1 + b_1\dot{x}_1 + k_1x_1 - b_2\dot{x}_2 - k_2x_2 = 0$$

$$m\ddot{x}_2 + (b_1 + b_2)\dot{x}_2 + (k_1 + k_2)x_2 - b_1\dot{x}_1 - k_1x_1 = e$$

