Nome: João Pedro Junqueira S. de Morais

NUSP: 10774437

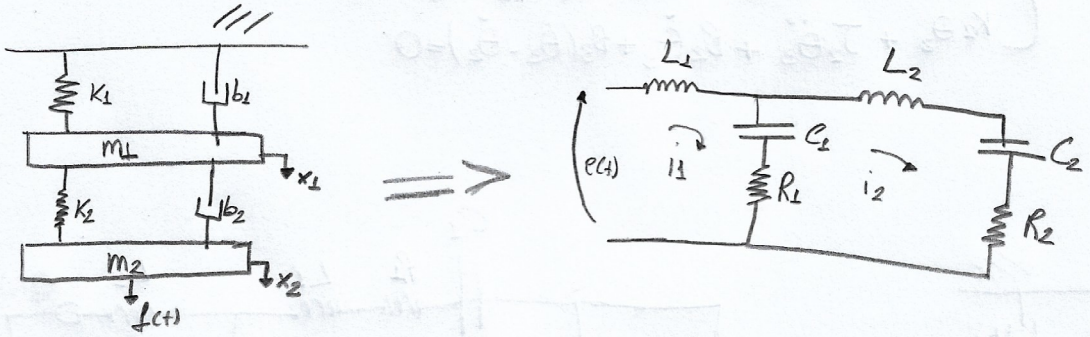
22/09/2020

PME3380 - Modelagem de Sistemas Dinâmicos

Exercícios da Aula do dia 08/09/2020:

SLIDES:

1)



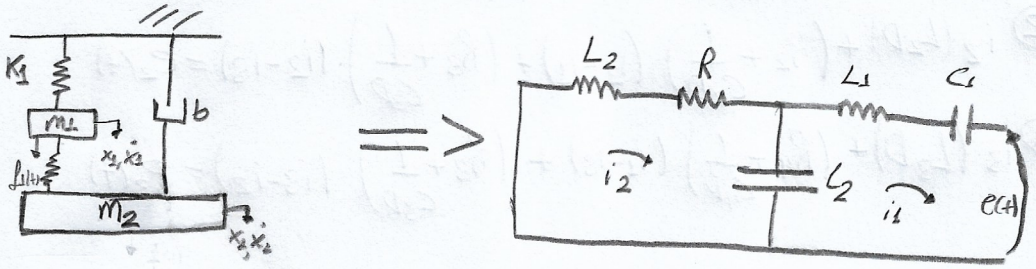
Lei das Malhas: ① $L_1 D i_1 + \left(\frac{1}{C_1 D}(i_1 - i_2)\right) + R_1 (i_1 - i_2) = e(t)$

② $L_2 D i_2 + \frac{1}{C_2 D} i_2 + R_2 i_2 + \frac{1}{C_1 D}(i_2 - i_1) + R_1 (i_2 - i_1) = 0$

Equações:

$$\begin{cases} m_1 \ddot{x}_1 + K_1 x_1 + b_1 \dot{x}_1 + K_2 (x_1 - x_2) + b_2 (\dot{x}_1 - \dot{x}_2) \\ m_2 \ddot{x}_2 + K_2 (x_2 - x_1) + b_2 (\dot{x}_2 - \dot{x}_1) = f(t) \end{cases}$$

2)



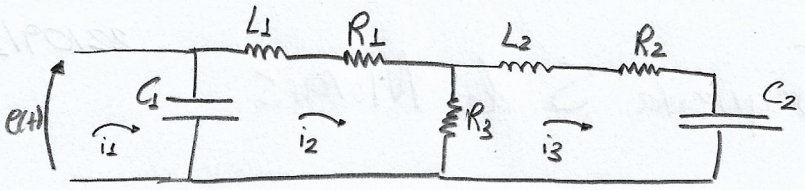
Lei das Malhas: ① $L_1 D i_1 + \left(\frac{1}{C_1 D}\right) i_1 + \left(\frac{1}{C_2 D}\right)(i_1 - i_2) = e(t)$

② $L_2 D i_2 + \left(\frac{1}{C_2 D}\right)(i_2 - i_1) + R i_2 = 0$

Equações:

$$\begin{cases} m_1 \ddot{x}_1 + K_1 x_1 + K_2 (x_1 - x_2) = f(t) \\ m_2 \ddot{x}_2 + b \dot{x}_2 + K_2 (x_2 - x_1) = 0 \end{cases}$$

3)



Leis das Malhas: ① $\frac{1}{C_1 D} i_1 = e(t)$

② $i_2 \cdot (L_1 D + R_1) + \frac{1}{C_1 D} \cdot (i_2 - i_1) + R_3 \cdot (i_2 - i_3) = 0$

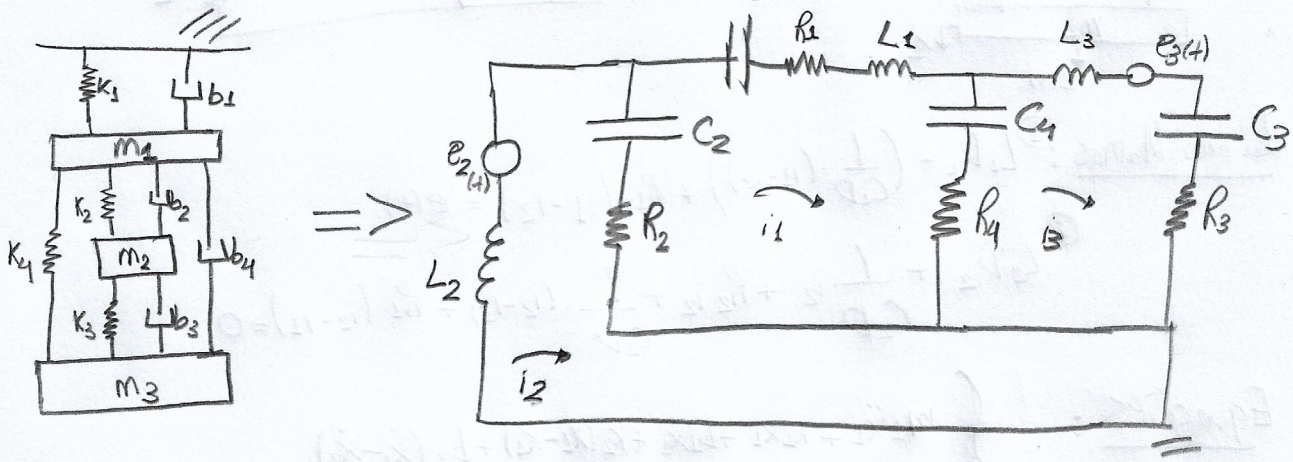
③ $i_3 \cdot (L_2 D + R_2) + R_3 \cdot (i_3 - i_2) + \frac{i_3}{C_2 D} = 0$

Equações:

$$\begin{cases} K_1 \theta_1 = T \\ K_1(\theta_2 - \theta_1) + J_1 \ddot{\theta}_2 + B_1 \dot{\theta}_2 + B_3 (\dot{\theta}_2 - \dot{\theta}_3) = 0 \\ K_2 \theta_3 + J_2 \ddot{\theta}_3 + B_2 \dot{\theta}_3 + B_3 (\dot{\theta}_3 - \dot{\theta}_2) = 0 \end{cases}$$

LISTA:

3)



Leis das Malhas: ① $i_1 \cdot \left(L_1 D + R_1 + \frac{1}{C_1 D}\right) + \left(R_2 + \frac{1}{C_2 D}\right) \cdot (i_1 - i_2) + \left(R_4 + \frac{1}{C_4 D}\right) \cdot (i_1 - i_3) = 0$

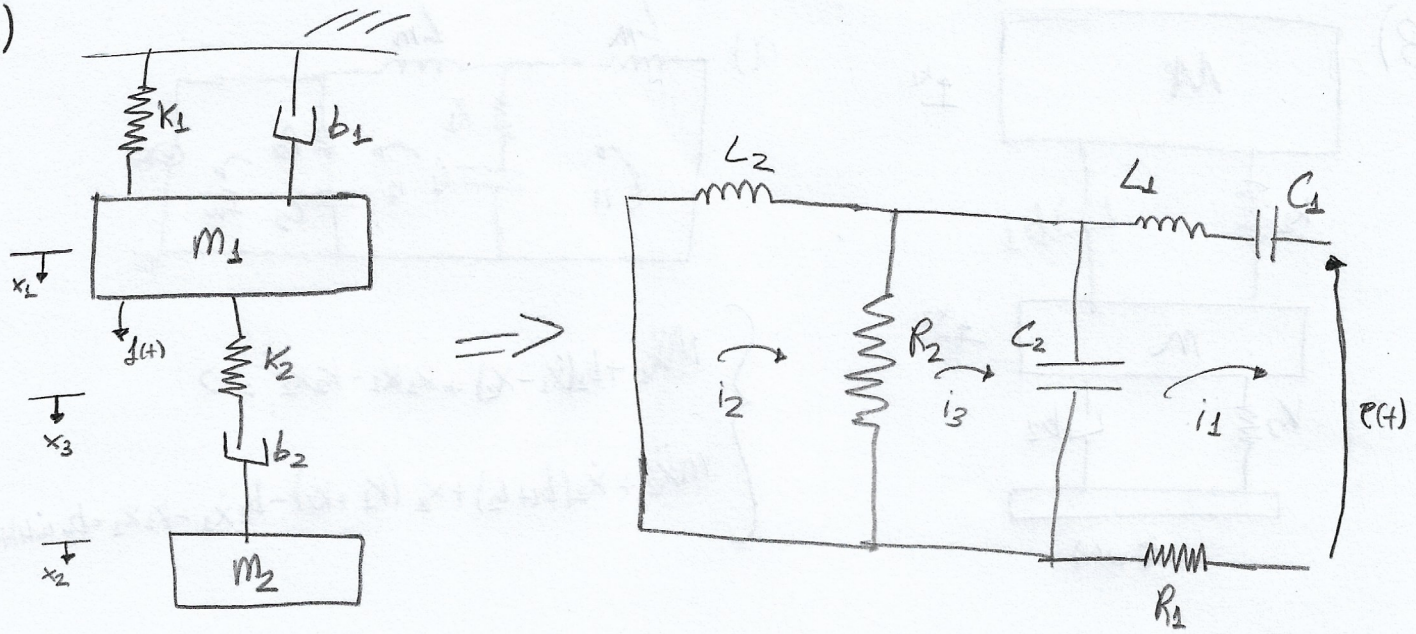
② $i_2 (L_2 D) + \left(R_2 + \frac{1}{C_2 D}\right) \cdot (i_2 - i_1) + \left(R_3 + \frac{1}{C_3 D}\right) \cdot (i_2 - i_3) = e_2(t)$

③ $i_3 \cdot (L_3 D) + \left(R_4 + \frac{1}{C_4 D}\right) \cdot (i_1 - i_3) + \left(R_3 + \frac{1}{C_3 D}\right) \cdot (i_3 - i_2) = e_3(t)$

Equações:

$$\begin{cases} m_1 \ddot{x}_1 + \dot{x}_1 (b_1 + b_2 + b_4) + x_1 (K_1 + K_2 + K_4) - b_2 \dot{x}_2 - b_4 \dot{x}_3 - K_2 x_2 - K_4 x_3 = 0 \\ m_2 \ddot{x}_2 + \dot{x}_2 (b_1 + b_2) + x_2 (K_1 + K_2) - b_3 \dot{x}_3 - K_2 x_1 - K_3 x_3 = f_2(t) \\ m_3 \ddot{x}_3 + \dot{x}_3 (b_3 + b_4) + x_3 (K_3 + K_4) - b_4 \dot{x}_1 - b_3 \dot{x}_2 - K_3 x_2 - K_4 x_1 = f_3(t) \end{cases}$$

6)



Leis das Malhas:

$$\textcircled{1}\ L_1 D i_1 + \frac{1}{C_1 D} i_1 + R_1 i_1 + \frac{1}{C_2 D}(i_1 - i_3) = e(t)$$

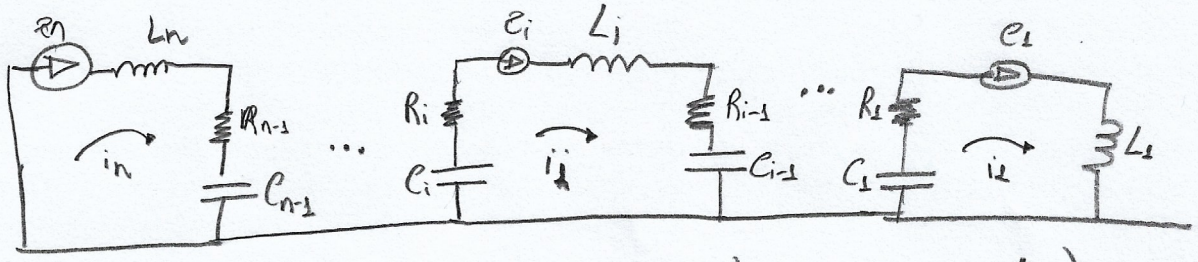
$$\textcircled{2}\ L_2 D i_2 + R_2 (i_2 - i_3) = 0$$

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

Equações:

$$\begin{cases} m_1 \ddot{x}_1 + b_1 \dot{x}_1 + K_1 \dot{x}_1 + K_2 (x_1 - x_3) = f(t) \\ m_2 \ddot{x}_2 + b_2 (\dot{x}_2 - \dot{x}_3) = 0 \\ b_2 (\dot{x}_3 - \dot{x}_2) + K_2 (x_3 - x_1) = 0 \end{cases}$$

7)



Leis das Malhas:

$$\textcircled{n}\ i_n \left(L_n D + \frac{1}{C_{n-1} D} + R_{n-1}\right) - i_{n-1}\left(R_{n-1} + \frac{1}{C_{n-1} D}\right) = e_n(t)$$

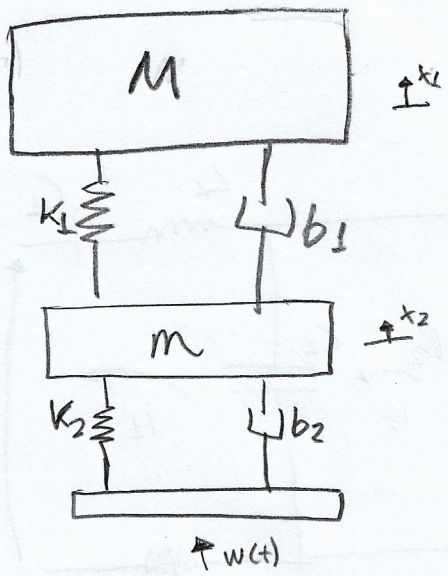
$$\textcircled{i}\ i_1 L_1 D + \left(\frac{1}{C_i D} + \frac{1}{C_{i-1} D}\right) \cdot L_i + (R_i + R_{i+1}) \cdot i_i - \left(\frac{1}{C_i D} + R_i\right) i_{i+1} - i_{i-1} \cdot \left(\frac{1}{C_{i-1} D} + R_{i-1}\right) = e_i(t)$$

$$\textcircled{1}\ i_1 (L_1 D) + R_1 (i_1 - i_2) + \frac{1}{C_1 D} = e_1(t)$$

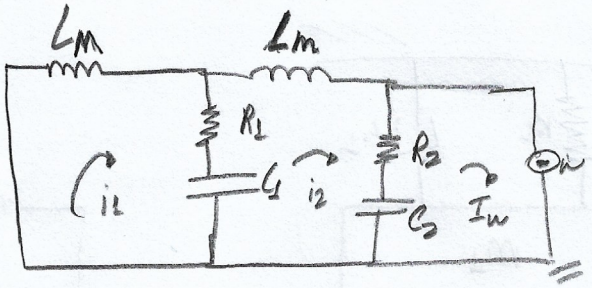
Equações:

$$\begin{cases} m_n \ddot{x}_n + b_{n-1} \dot{x}_n - b_{n-1} \dot{x}_{n-1} + (x_n - x_{n-1}) \cdot K_{n-1} = f_n(t) \\ m_i \ddot{x}_i + \dot{x}_i (b_i + b_{i-1}) + x_i \cdot (K_i + K_{i-1}) - b_i \dot{x}_{i+1} - b_{i-1} \dot{x}_{i-1} - K_{i-1} x_{i-1} - K_i x_{i+1} = f_i(t) \\ m_1 \ddot{x}_1 + b_1 \dot{x}_1 - b_1 \dot{x}_2 + K_1 x_1 - K_1 x_2 = f_1(t) \end{cases}$$

8)

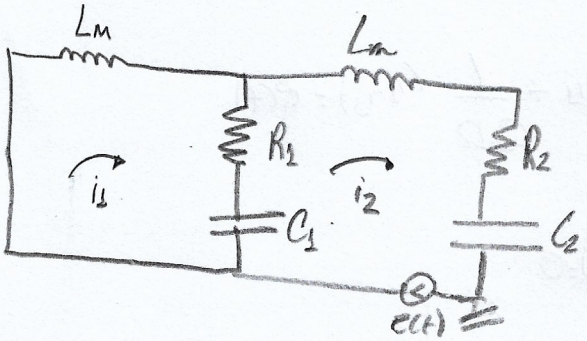


a)



$$\begin{cases} M\ddot{x}_1 + b_1(\dot{x}_1 - \dot{x}_2) + K_1 x_1 - K_2 x_2 = 0 \\ m\ddot{x}_2 + \dot{x}_2(b_1+b_2) + x_2(K_1+K_2) - b_1\dot{x}_1 - K_1 x_1 = b_2\dot{w}(t) + K_2 w(t) \end{cases}$$

b)



$$\begin{cases} M\ddot{x}_1 + b_1(\dot{x}_1 - \dot{x}_2) + K_1 x_1 - K_2 x_2 = 0 \\ m\ddot{x}_2 + (b_1+b_2)\dot{x}_2 - (b_1+K_1)\dot{x}_1 + (K_1+K_2)x_2 = w(t) \end{cases}$$