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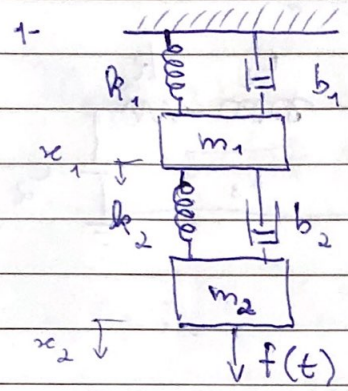
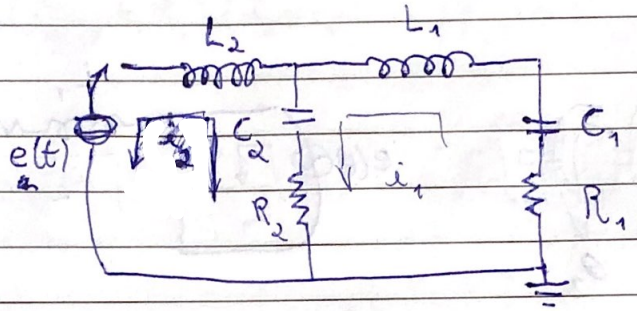
- Exercícios do dia 08/09 -

Dos slides:

1-



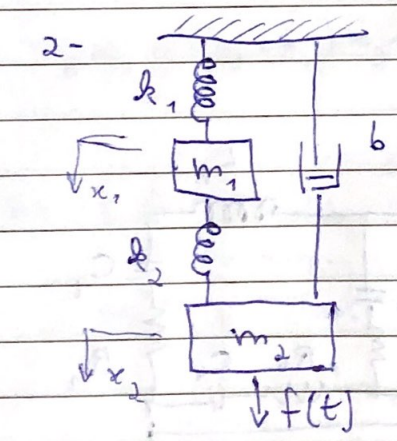


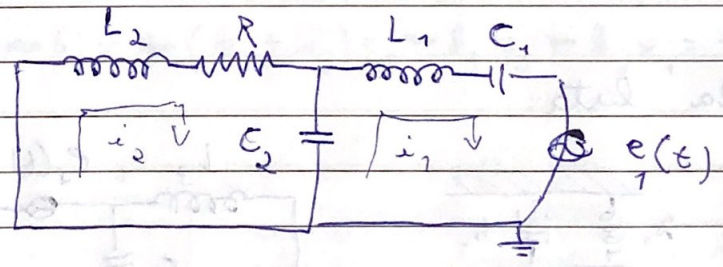
Malha 1: $L_1 D \dot{i}_1 + \frac{1}{C_1 D} \cdot i_1 + R_1 i_1 + \frac{1}{C_2 D}(i_1 - i_2) = 0$

Malha 2: $L_2 D \cdot i_2 + \frac{1}{C_2 D}(i_2 - i_1) + R_2(i_2 - i_1) = e(t)$

$$\begin{cases} m_1 \ddot{x}_1 + b_1 \dot{x}_1 + b_2(\dot{x}_1 - \dot{x}_2) + k_1 x_1 + k_2(x_1 - x_2) \\ m_2 \ddot{x}_2 + b_2(\dot{x}_2 - \dot{x}_1) + k_2(x_2 - x_1) = f(t) \end{cases}$$

2-





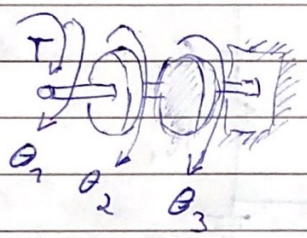
Malha 1:

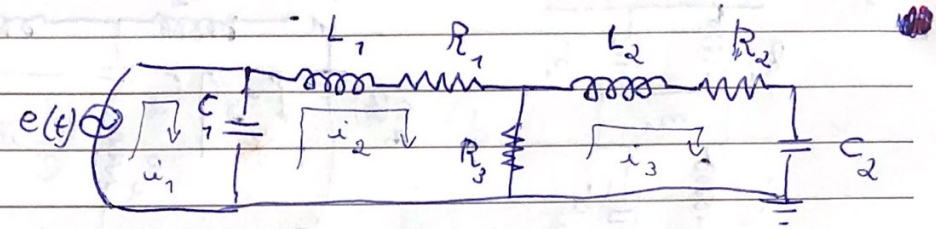
$$L_1 D \cdot i_1 + \frac{1}{C_1 D} \cdot i_1 + \frac{1}{C_2 D}(i_1 - i_2) = 0$$

Malha 2: $L_2 D \cdot i_2 + R \cdot i_2 + \frac{1}{C_2 D} \cdot (i_2 - i_1) = 0$

$$\begin{cases} m_1 \ddot{x}_1 + k_1 x_1 + b_2 (x_1 - x_2) = f_1(t) \\ m_2 \ddot{x}_2 + b \dot{x}_2 + k_2 (x_2 - x_1) = 0 \end{cases}$$

3 -





Malha 1: $\frac{1}{C_1 D}(i_1 - i_2) = e(t)$

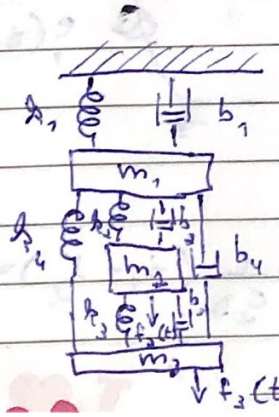
Malha 2: $L_1 D \cdot i_2 + R_1 \cdot i_2 + R_3 (i_2 - i_3) + \frac{1}{C_1 D}(i_2 - i_1) = 0$

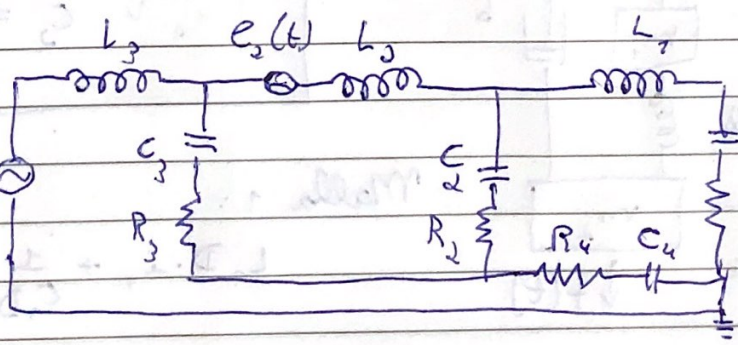
Malha 3: $L_2 D \cdot i_3 + R_2 \cdot i_3 + \frac{1}{C_2 D} \cdot i_3 + R_3 (i_3 - i_2) = 0$

$$\begin{cases} k_1 \theta_1 = T(t) \\ J_1 \ddot{\theta}_2 + b_1 \dot{\theta}_2 + b_3 (\dot{\theta}_2 - \dot{\theta}_3) + k_1 (\theta_2 - \theta_1) = 0 \\ J_2 \ddot{\theta}_3 + b_2 \dot{\theta}_3 + b_3 (\dot{\theta}_3 - \dot{\theta}_2) + k_2 \theta_3 = 0 \end{cases}$$

2da lista:

3 -





Malha 1: $\left(L_1 D + \frac{1}{C_1 D} + R_1\right) i_1 + \left(\frac{1}{C_2 D} + R_2\right)(i_1 - i_2) +$

$+ \left(R_4 + \frac{1}{C_4 D}\right)(i_1 - i_3) = 0$ (1)

Malha 2:

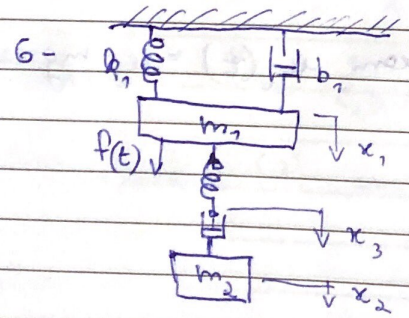
$L_2 D \cdot i_2 + \left(\frac{1}{C_2 D} + R_2\right)(i_2 - i_1) + \left(\frac{1}{C_3 D} + R_3\right)(i_2 - i_3) = e_2$ (2)

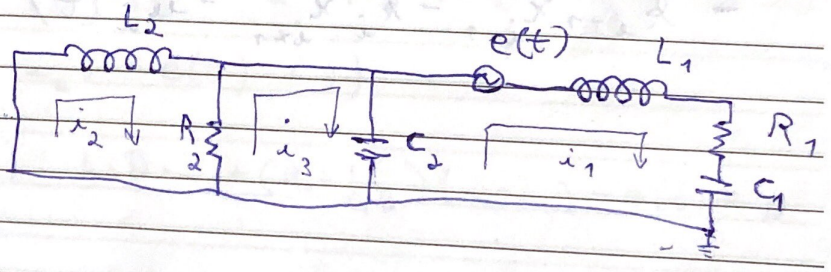
Malha 3:

$L_3 D \cdot i_3 + \left(\frac{1}{C_3 D} + R_3\right)(i_3 - i_2) + \left(\frac{D}{L_4} + \frac{1}{C_4 D}\right)(i_3 - i_1)$

$$\begin{cases} m_1\ddot{x}_1 + (b_1+b_2+b_4)\dot{x}_1 - b_4\dot{x}_3 - b_2\dot{x}_2 + (k_1+k_2+k_4)x_1 - k_4x_3 - k_2x_2 = \\ m_2\ddot{x}_2 + (b_2+b_3)\dot{x}_2 - b_3\dot{x}_3 - b_2\dot{x}_1 + (k_2+k_3)x_2 - k_3x_3 - k_2x_1 = f_2(t) \\ m_3\ddot{x}_3 + (b_3+b_4)\dot{x}_3 - b_3\dot{x}_2 - b_4\dot{x}_1 + (k_3+k_4)x_3 - k_3x_2 - k_4x_1 = f_3(t) \end{cases} = 0$$

6-



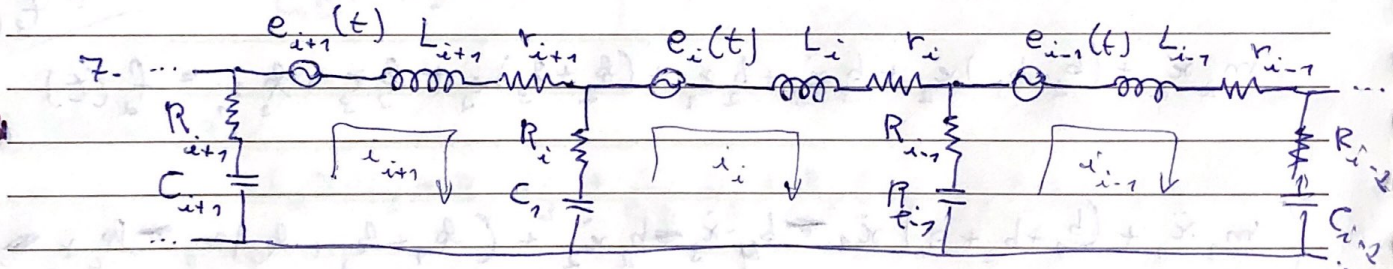


Malha 1: $\left(L_1 D + R_1 + \frac{1}{C_1 D}\right) i_1 + \frac{1}{C_2 D}(i_1 - i_3) = e(t)$

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

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

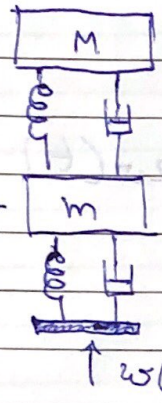
$$\begin{cases} m_1 \ddot{x}_1 + b_1 \dot{x}_1 + (k_1 + k_2) x_1 - k_2 x_3 = f(t) \\ m_2 \ddot{x}_2 + b_2 \dot{x}_2 - b_2 \dot{x}_3 = 0 \\ b_2 \dot{x}_3 - b_2 \dot{x}_2 + k_2 x_3 - k_2 x_1 = 0 \end{cases}$$

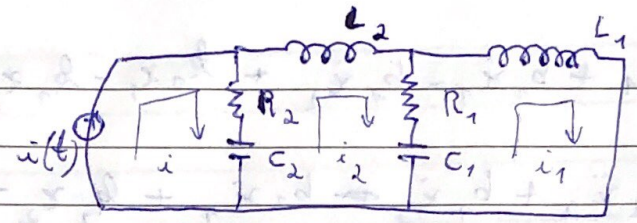


$$(L_i D + r_i) i_i + \left(R_{i-1} + \frac{1}{C_{i-1} D}\right)(i_i - i_{i-1}) + \left(R_i + \frac{1}{C_i D}\right)(i_i - i_{i+1}) = e_i(t)$$

$$\begin{cases} m_i \ddot{x}_i + (B_{i-1} + B_i + b_i)\dot{x}_i - B_{i-1}\dot{x}_{i-1} - B_i \dot{x}_{i+1} + (k_{i-1} + k_i) x_i + \\ - k_{i-1} x_{i-1} - k_i x_{i+1} = u_i(t) \end{cases}$$

com $u_i(t) = u_i - m_i g \operatorname{sen} \theta_i$

8- 

a) 

Malha 1:

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

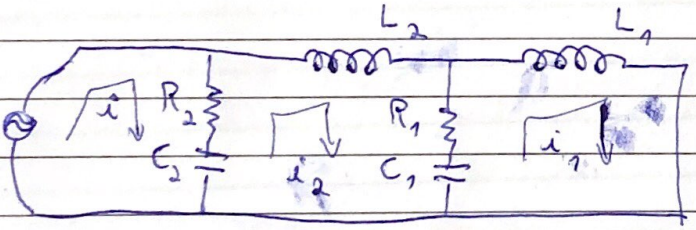
Malha 2:

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

~~Malha 3: $(R_2 + \frac{1}{C_2 D})(i - i_2) = e(t)$~~

$$M\ddot{x}_1 + b_1\dot{x}_1 - b_1\dot{x}_2 + k_1 x_1 - k_1 x_2 = 0$$

$$m\ddot{x}_2 + (b_1 + b_2)\dot{x}_2 - b_1\dot{x}_1 + (k_1 + k_2)x_2 - k_1 x_1 = b_2\dot{w}(t) + k_2 w(t)$$

b) 

Malha 1: $L_1 D \cdot i_1 + \left(R_1 + \frac{1}{C_1 D}\right)(i_1 - i_2) = 0$ (1)

Malha 2: $L_2 D \cdot i_2 + \left(R_1 + \frac{1}{C_1 D}\right)(i_2 - i_1) + \left(R_2 + \frac{1}{C_2 D}\right)(i_2 - i) = 0$ (2)

Malha i: $\left(R_2 + \frac{1}{C_2 D}\right)(i - i_2) = e(t)$ (3)

Substituindo (3) em (2): $L_2 D \cdot i_2 + \left(R_1 + \frac{1}{C_1 D}\right)(i_2 - i_1) - e(t) = 0$

$$\begin{cases} M\ddot{x}_1 + b_1\dot{x}_1 - b_1\dot{x}_2 + k_1x_1 - k_1x_2 = 0 \\ m_2\ddot{x}_2 + b_1\dot{x}_2 - b_1\dot{x}_1 + k_1x_2 - k_1x_1 = w(t) \end{cases}$$