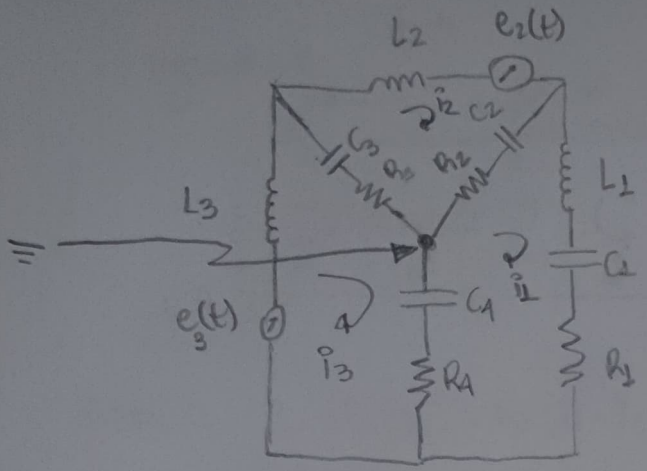
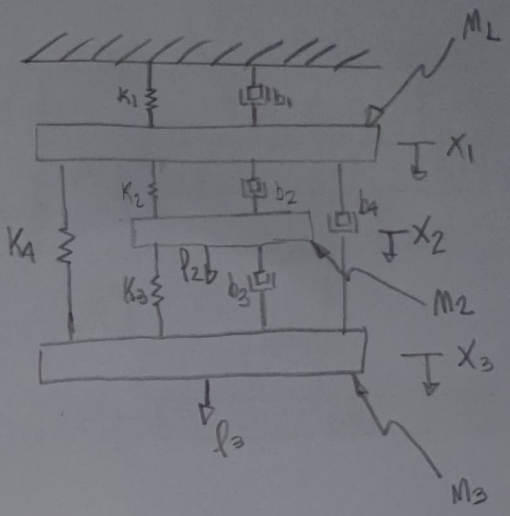
JOÃO PEDRO DIAS NUNES 10705846 - 18/03/2020

EXERCÍCIO (3)





Malha 3: $L_3 D\dot{i}_3 + \frac{1}{C_3 D}(\dot{i}_3 - \dot{i}_2) + R_3(\dot{i}_3 - \dot{i}_2) + \frac{1}{C_4 D}(\dot{i}_3 - \dot{i}_1) + R_4(\dot{i}_3 - \dot{i}_1) = e_3(t)$

Malha 2: $L_2 D\dot{i}_2 + \frac{1}{C_2 D}(\dot{i}_2 - \dot{i}_3) + R_2(\dot{i}_2 - \dot{i}_1) + R_3(\dot{i}_2 - \dot{i}_3) + \frac{1}{C_3 D}(\dot{i}_2 - \dot{i}_3) = e_2(t)$

Malha 1: $L_1 D\dot{i}_1 + \frac{1}{C_1 D} i_1 + R_1 \dot{i}_1 + R_4(\dot{i}_1 - \dot{i}_3) + \frac{1}{C_4 D}(\dot{i}_1 - \dot{i}_3) + R_2(\dot{i}_1 - \dot{i}_2) + \frac{1}{C_2 D}(\dot{i}_1 - \dot{i}_2) = 0$

Fazendo analogia:

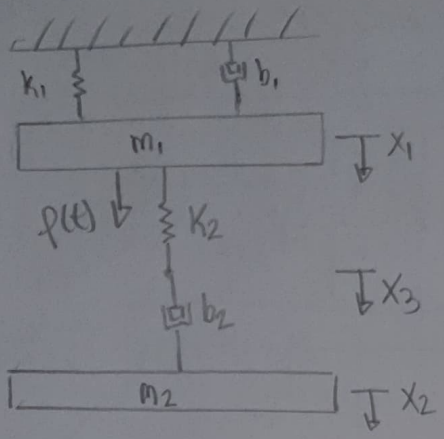
$$m_3\ddot{x}_3 + K_3(x_3 - x_2) + b_3(\dot{x}_3 - \dot{x}_2) + K_4(x_3 - x_1) + b_4(\dot{x}_3 - \dot{x}_1) = f_3(t)$$

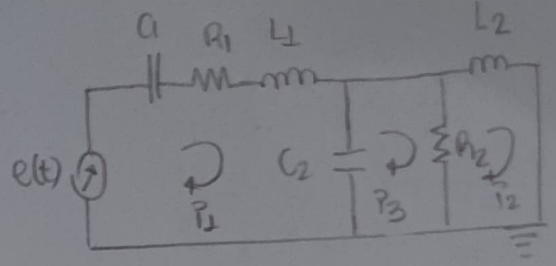
$$m_2\ddot{x}_2 + K_2(x_2 - x_1) + b_2(\dot{x}_2 - \dot{x}_1) + b_3(\dot{x}_2 - \dot{x}_3) + K_3(x_2 - x_3) = f_2(t)$$

$$m_1\ddot{x}_1 + K_1 x_1 + b_1\dot{x}_1 + b_4(\dot{x}_1 - \dot{x}_3) + K_4(\dot{x}_1 - \dot{x}_3) + b_2(\dot{x}_1 - \dot{x}_2) + K_2(x_1 - x_2) = 0$$

São iguais as de Lagrange, ou as de outra analogia, como já feitas na entrega anterior.

EXERCÍCIO ⑥





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

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

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

Aplicado analogia:

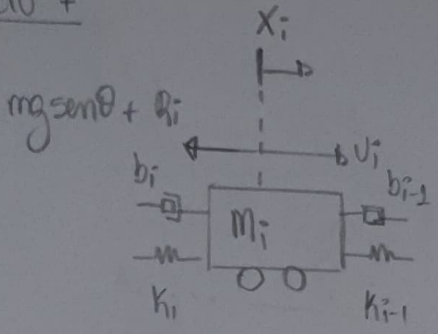
$K_1 X_1 + b_1 \dot{X}_1 + m_1 \ddot{X}_1 + K_2 (X_1 - X_3) = e(t)$

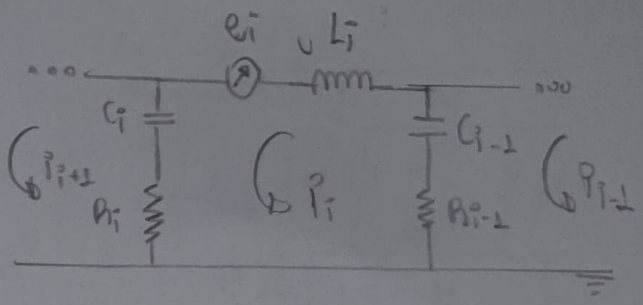
$m_2 \ddot{X}_2 + b_2 (\dot{X}_2 - \dot{X}_3) = 0$

$K_2 (X_3 - X_1) + b_2 (\dot{X}_3 - \dot{X}_2) = 0$

Iguais por Lagrange ou pela outra analogia.

Exercício 7





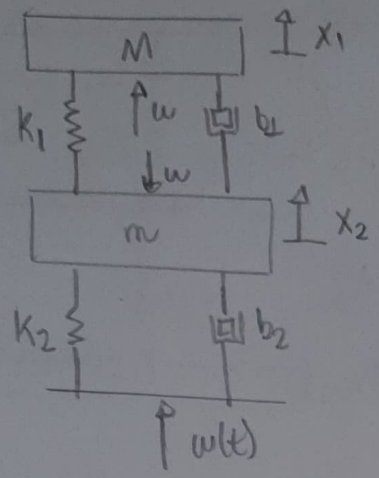
Malha i: $\frac{1}{C_i D}(P_i - P_{i+1}) + R_i(P_i - P_{i+1}) + \frac{1}{C_{i-1} D}(P_i - P_{i-1}) + R_{i-1}(P_i - P_{i-1}) + L_i D P_i = e_i(t)$

Aplicando analogia.

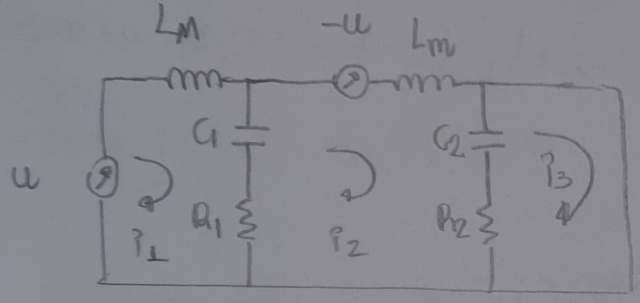
$$K_i(x_i - x_{i+1}) + b_i(\dot{x}_i - \dot{x}_{i+1}) + K_{i-1}(x_i - x_{i-1}) + b_{i-1}(\dot{x}_i - \dot{x}_{i-1}) + m_i \ddot{x}_i = u_i - mg\,sen\theta_i - R_i.$$

Igual por Lagrange, ou por outra analogia.

Exercício 8:



Supondo w(t) = deslocamento:



$i_3 = \dot{w}$

Obtendo as malhas

$$L_M D i_1 + \frac{1}{C_1 D}(i_1 - i_2) + R_1(i_1 - i_2) = u$$

$$R_1(i_2 - i_1) + \frac{1}{C_1 D}(i_2 - i_3) + L_m D i_2 + \frac{1}{C_2 D}(i_2 - i_3) + R_2(i_2 - i_3) = -u$$

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

Aplicando analogia:

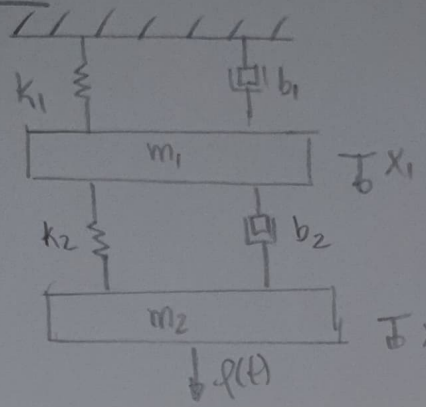
$$M\ddot{x}_1 + K_1(x_1 - x_2) + b_1(\dot{x}_1 - \dot{x}_2) = u$$

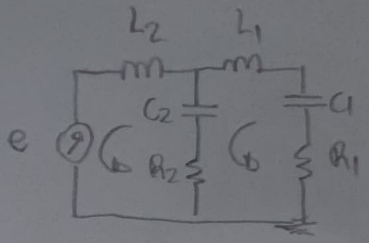
$$m\ddot{x}_2 + K_1(x_2 - x_1) + b_1(\dot{x}_2 - \dot{x}_1) + K_2(x_2 - x_3) + b_2(\dot{x}_2 - \dot{x}_3) = -u$$

$$b_2(\underbrace{\dot{x}_3}_{\dot{w}} - \dot{x}_2) + K_2(\underbrace{x_3}_{w} - x_2) = 0$$

Iguais por Lagrange e pela outra analogia

EXERCÍCIO (1)





Analogia:

$$K_1 x_1 + b_1 \dot{x}_1 + m_1 \ddot{x}_1 + k_2(x_1 - x_2) + b_2(\dot{x}_1 - \dot{x}_2) = 0$$

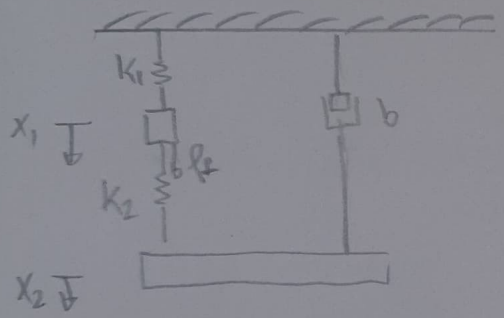
$$m_2 \ddot{x}_2 + k_2(x_2 - x_1) + b_2(\dot{x}_2 - \dot{x}_1) = f(t)$$

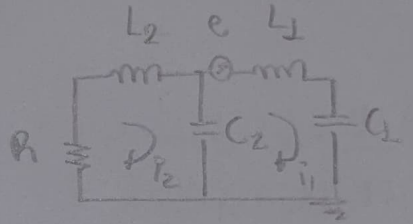
Malha 1:

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

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

EXERCÍCIO (2)





Malha 2:

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

Malha 1:

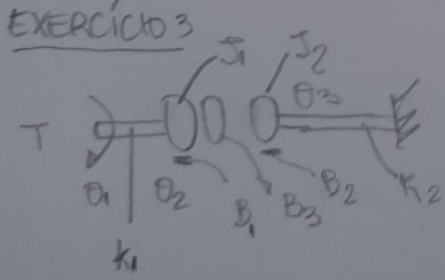
$$L_1 D i_1 + \frac{1}{C_1 D} i_1 + \frac{1}{C_2 D}(i_1 - i_2) = e(t)$$

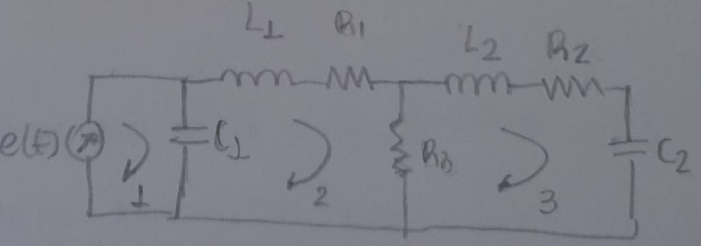
Analogia:

$$m_2 \ddot{x}_2 + k_2(x_2 - x_1) + b \dot{x}_2 = 0$$

$$m_1 \ddot{x}_1 + k_1 x_1 + k_2(x_1 - x_2) = f(t)$$

EXERCÍCIO 3





Malha 1:

$$\frac{1}{C_1 D} i_3 = e(t)$$

Malha 2:

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

Malha 3:

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

ANALOGIA

$K_1 \theta_1 = T$

$$K_1(\theta_2 - \theta_1) + J_1 \ddot{\theta}_2 + B_1 \dot{\theta}_2 + B_3(\dot{\theta}_2 - \dot{\theta}_3) = 0$$

$$B_3(\dot{\theta}_3 - \dot{\theta}_2) + J_2 \ddot{\theta}_3 + B_2 \dot{\theta}_3 + K_2 \theta_3 = 0$$