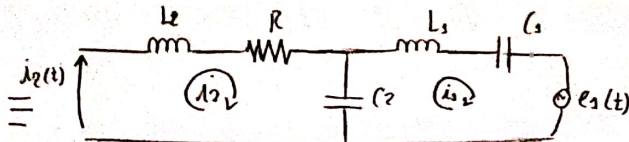
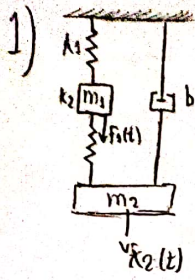


Exercícios p/ 22/09

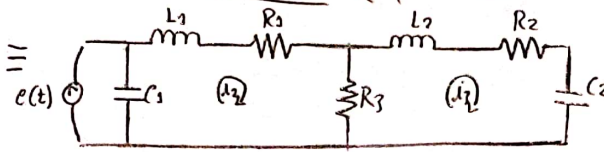
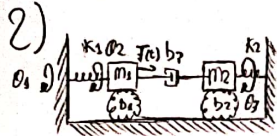


$$e_1(t) = (L_1 D + \frac{1}{C_1 D}) i_1 + \frac{1}{C_2 D} (i_1 - i_2)$$

$i_2 = x_2$ conhecida
logotipos 1 GIL ($i_1(t)$)

Eq final: $F_1(t) = (m_1 D + \frac{k_1}{D}) \dot{x}_1 + \frac{k_2}{D} (x_1 - x_2)$

$\Rightarrow F_1(t) = m_1 \ddot{x}_1 + k_1 x_1 + k_2 x_1 - k_2 x_2$



$$e(t) = (L_1 - L_2) \frac{1}{C_1 D}$$

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

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

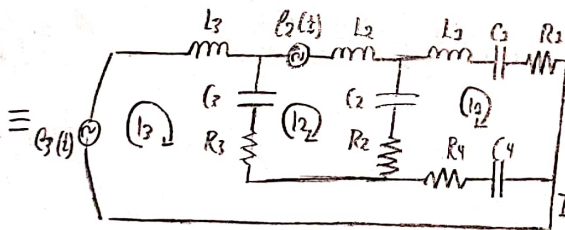
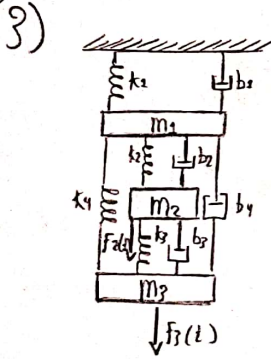
passando para o sistema mecânico:

$$T(t) = (\theta_1 - \theta_2) \cdot \frac{k_2}{D} = \frac{k_2}{D} (\theta_1 - \theta_2)$$

$$(J_1 D + b_1) \dot{\theta}_2 + \frac{k_2}{D} (\theta_1 - \theta_2) + b_2 (\dot{\theta}_2 - \dot{\theta}_1) = 0 \Rightarrow J_1 \ddot{\theta}_2 + b_2 \dot{\theta}_2 + k_1 (\theta_1 - \theta_2) + b_2 (\dot{\theta}_2 - \dot{\theta}_1) = 0$$

$$(J_2 D + b_2) \dot{\theta}_1 + \frac{k_2}{D} \dot{\theta}_1 + b_2 (\dot{\theta}_2 - \dot{\theta}_1) = 0 \Rightarrow J_2 \ddot{\theta}_1 + b_2 \dot{\theta}_1 + k_2 \theta_1 + b_2 (\dot{\theta}_2 - \dot{\theta}_1) = 0$$

Início da lista adicional



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

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

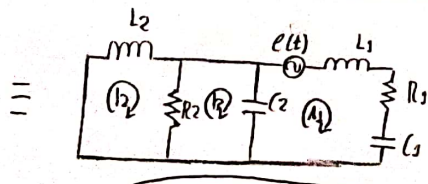
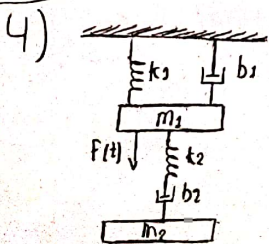
$$(L_1 D + \frac{1}{C_1 D} + R_1) i_1 + (R_2 + \frac{1}{C_2 D}) (i_1 - i_2) + (R_4 + \frac{1}{C_4 D}) (i_1 - i_3) = 0$$

passamos I, II e III para o sistema mecânico:

$$F_3(t) = m_3 \ddot{x}_3 + b_2 (x_3 - x_2) + k_3 (x_3 - x_2) + b_4 (x_3 - x_1) + k_4 (x_3 - x_1)$$

$$F_2(t) = m_2 \ddot{x}_2 + b_2 (x_2 - x_1) + k_2 (x_2 - x_1) + b_3 (x_2 - x_3) + k_3 (x_2 - x_3)$$

$$m_1 \ddot{x}_1 + k_1 x_1 + b_1 \dot{x}_1 + b_2 (x_1 - x_2) + k_2 (x_1 - x_2) + b_4 (x_1 - x_3) + k_4 (x_1 - x_3) = 0$$



$$L_2 D i_2 + R_2 (i_2 - i_1) = 0$$

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

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

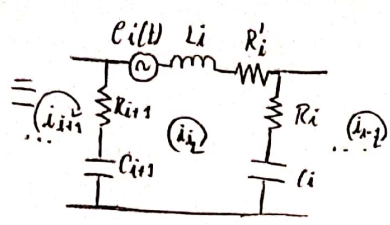
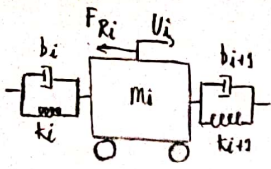
passando p/ sistema mecânico

$$m_2 \ddot{x}_2 + b_2 (x_2 - x_1) = 0$$

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

$$F(t) = m_1 \ddot{x}_1 + b_1 \dot{x}_1 + k_1 (x_1 - x_2)$$

5)

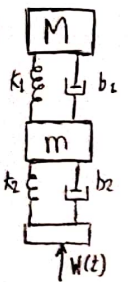


$$e_i(t) = (L_i D + R_i) i_i + (R_i + \frac{1}{C_i D}) (i_i - i_{i-1}) + (R_{i+1} + \frac{1}{C_{i+1} D}) (i_i - i_{i+1})$$

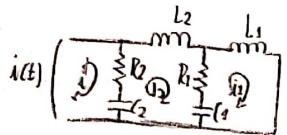
passando p/ mecânica:

$$U_i = m_i \ddot{x}_i + F_{Ri} \dot{x}_i + (k_i - k_{i-1}) b_i + k_i (x_i - x_{i-1}) + (k_i - k_{i+1}) b_{i+1} + (k_i - k_{i+1}) x_{i+1}$$

6)



a)

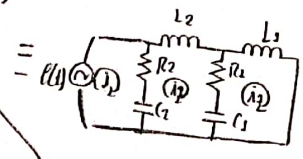


$$L_1 D i_1 + (R_1 + \frac{1}{C_1 D}) (i_1 - i_2) = 0$$

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

⊕ $M \ddot{x}_1 + (k_1 - k_2) b_1 + k_2 (x_1 - x_2) = 0$
 ⊖ $m \ddot{x}_2 + (k_2 - k_1) b_1 + k_1 (x_2 - x_1) + (k_2 - k_2) b_2 + (k_2 - k_2) x_2 = 0$

b)



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

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

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

passando p/ sistema mecânica:

⊕ $M \ddot{x}_1 + (k_1 - k_2) b_1 + k_2 (x_1 - x_2) = 0$
 ⊖ $m \ddot{x}_2 + (k_2 - k_1) b_1 + k_1 (x_2 - x_1) + (k_2 - k_2) b_2 + (k_2 - k_2) x_2 = 0$
 ⊖ $W(t) = b_2 (\dot{x}_1 - \dot{x}_2) + k_2 (x_1 - x_2)$