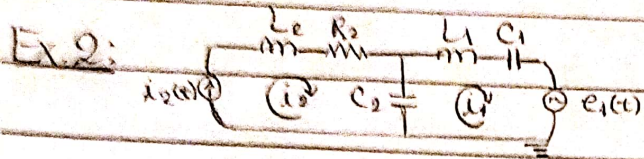


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PME 3380 - Exercícios da Aula 08/09

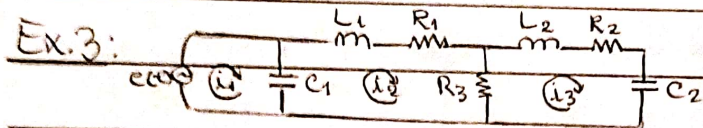


malha 1:  $e_1(t) = (L_1 D + \frac{1}{C_1 D}) i_1 + \frac{1}{C_2 D} (i_1 - i_2)$

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

Equações do sistema mecânico:

$m_1 \ddot{x}_1 + (k_1 + k_2) x_1 = f_1(t) + k_2 x_2$
$m_2 \ddot{x}_2 + b \dot{x}_2 + k_2 x_2 = k_2 x_1$



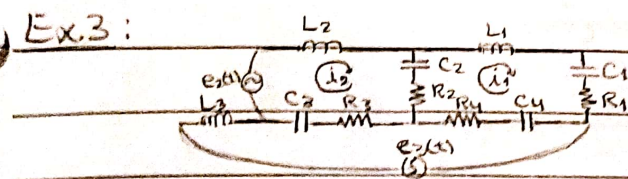
malha 1:  $e_1(t) = \frac{1}{C_1 D} (i_1 - i_2)$

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

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

Sistema mecânico:

$T(t) = k_1 (\theta_1 - \theta_2)$
$J_1 \ddot{\theta}_2 + (B_1 + B_2) \dot{\theta}_2 + k_1 \theta_2 = B_3 \dot{\theta}_3 + k_1 \theta_1$
$J_2 \ddot{\theta}_3 + (B_2 + B_3) \dot{\theta}_3 + k_2 \theta_3 = B_3 \dot{\theta}_2$



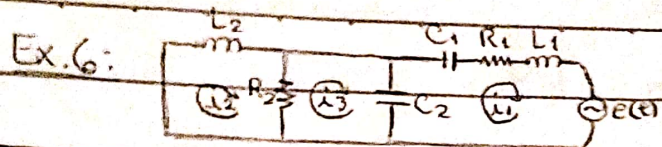
malha 1:  $(L_1 D + R_1 + \frac{1}{C_1 D}) i_1 + (R_2 + \frac{1}{C_2 D}) (i_1 - i_2) + (R_4 + \frac{1}{C_4 D}) (i_1 - i_3) = 0$

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

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

Sistema mecânico:

$m_1 \ddot{x}_1 + (b_1 + b_2 + b_4) \dot{x}_1 + (k_1 + k_2 + k_4) x_1 = b_2 \dot{x}_2 + k_2 x_2 + b_4 \dot{x}_3 + k_4 x_3$
$m_2 \ddot{x}_2 + (b_2 + b_3) \dot{x}_2 + (k_2 + k_3) x_2 = b_2 \dot{x}_1 + k_2 x_1 + b_3 \dot{x}_3 + k_3 x_3 + f_2(t)$
$m_3 \ddot{x}_3 + (b_3 + b_4) \dot{x}_3 + (k_3 + k_4) x_3 = b_4 \dot{x}_1 + k_4 x_1 + b_3 \dot{x}_2 + k_3 x_2 + f_3(t)$



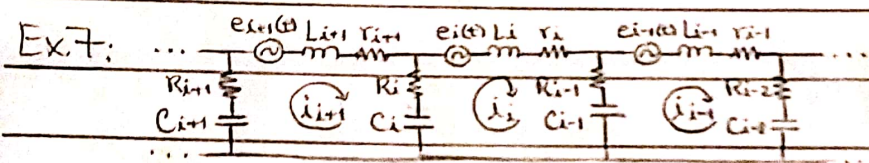
malha 1:  $(L_1 D + R_1 + \frac{1}{C_2 D}) i_1 + \frac{1}{C_2 D} (i_1 - i_3) = e(t)$

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

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

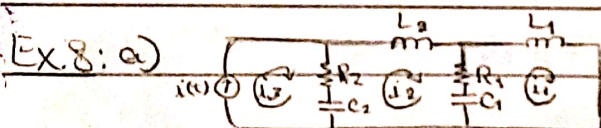
Sistema mecânico:

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



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

Sistema mecânico:  $m_i \ddot{x}_i + (d_{i-1} + d_i + b_i) \dot{x}_i + (k_{i-1} + k_i) x_i = d_{i-1} \dot{x}_{i-1} + k_{i-1} x_{i-1} + d_i \dot{x}_{i+1} + k_i x_{i+1} + u(t)$



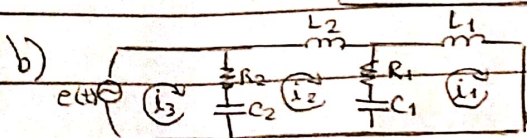
malha 1:  $L_1 D i_1 + (R_1 + \frac{1}{C_1 D}) (i_1 - i_2) = 0$

malha 2:  $L_2 D i_2 + (R_1 + \frac{1}{C_1 D}) (i_2 - i_1) + (R_2 + \frac{1}{C_2 D}) (i_2 - i_3) = 0$

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

Sistema mecânico:

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



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

malha 2:  $L_2 D i_2 + (R_1 + \frac{1}{C_1 D}) (i_2 - i_1) + (R_2 + \frac{1}{C_2 D}) (i_2 - i_3) = 0$

malha 3:  $(R_2 + \frac{1}{C_2 D}) (i_3 - i_2) = e(t)$

Sistema mecânico:

$$\begin{cases} M \ddot{x}_1 + b_1 \dot{x}_1 + k_1 x_1 = b_1 \dot{x}_2 + k_1 x_2 \\ m \ddot{x}_2 + (b_1 + b_2) \dot{x}_2 + (k_1 + k_2) x_2 = b_1 \dot{x}_1 + k_1 x_1 + b_2 \dot{x}_3 - k_2 x_3 = 0 \\ b_2 \dot{x}_3 + k_2 x_3 = b_2 \dot{x}_2 + k_2 x_2 + w(t) \end{cases}$$