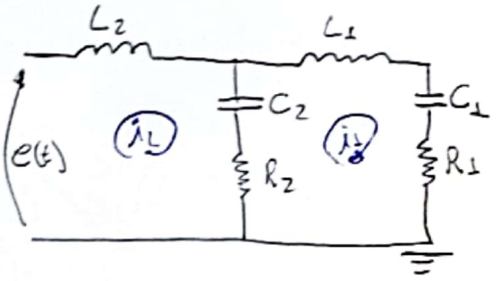
Modelagem - Henrique Silva Barbeta 10769323

Ex. 1)

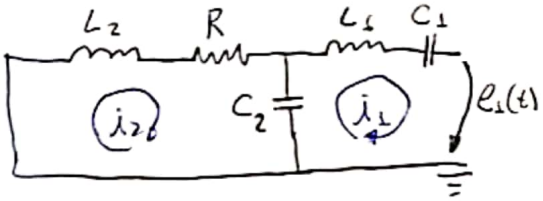


Malha 1: $0 = L_1 D i_1 + \frac{1}{C_1 D} i_1 + R_1 i_1 + \frac{1}{C_2 D}(i_1 - i_2) + R_2(i_1 - i_2)$

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

$$M_1 \ddot{X}_1 + k_1 X_1 + b\dot{X}_1 + k_2(X_1 - X_2) + b_2(\dot{X}_1 - \dot{X}_2) = 0$$
$$M_2 \ddot{X}_2 + k_2(X_2 - X_1) + b_2(\dot{X}_2 - \dot{X}_1) = f(t)$$

Ex. 2)

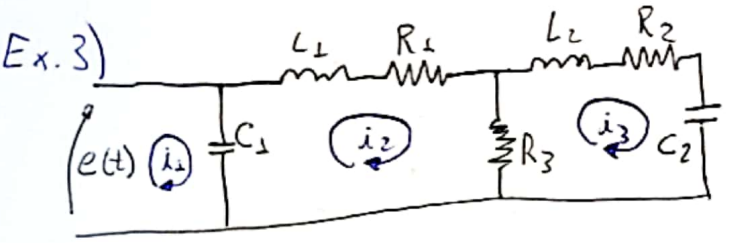


Malha 1: $e_1(t) = L_1 D i_1 + \frac{1}{C_1 D} i_1 + \left(\frac{1}{C_2 D}\right)(i_1 - i_2)$

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

$$m_1 \ddot{x}_1 + K_1 x_1 + K_2(x_1 - x_2) = f_1(t)$$
$$m_2 \ddot{x}_2 + b\dot{x} + K_2(x_2 - x_1) = 0$$

Ex. 3)



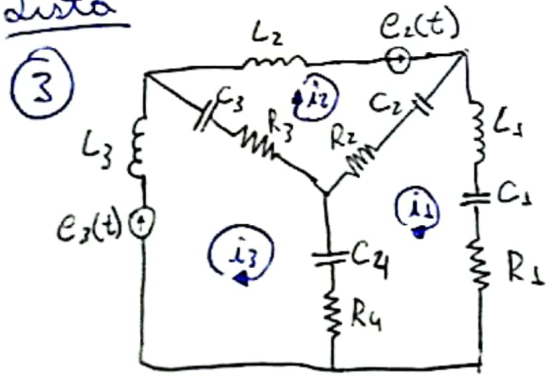
Malha 1: $e(t) = \frac{1}{C_1 D} i_1$

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

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

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

Lista 3



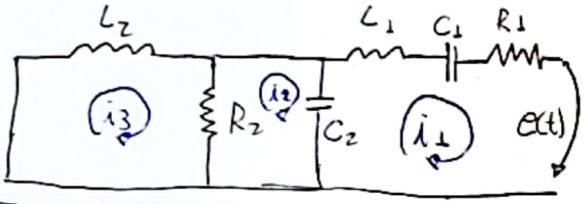
Malha 1: $L_1 D i_1 + \frac{i_1}{C_1 D} + R_1 i_1 + R_4(i_1 - i_3) + \frac{(i_1 - i_3)}{C_1 D} + R_2(i_1 - i_2) + \frac{(i_1 - i_2)}{C_2 D} = 0$

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

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

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

Ex. 6)



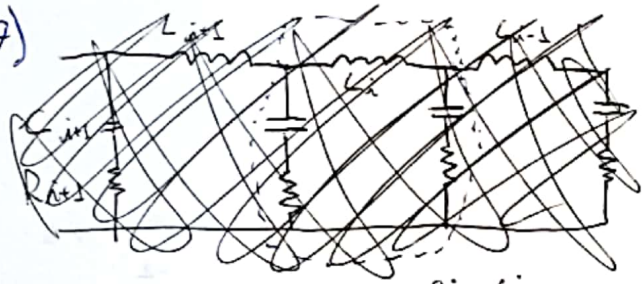
$$m_1\ddot{x}_1 + K_1 x_1 + b_1\dot{x}_1 + K_2(x_1 - x_2) = f(t)$$
$$m_2\ddot{x}_3 + b_2(\dot{x}_3 - \dot{x}_2) = 0$$
$$b_2(\dot{x}_2 - \dot{x}_3) + K_2(x_2 - x_1) = 0$$

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

Malha 2: $R_2(i_2 - i_3) + \frac{(i_2 - i_1)}{C_2 D} = 0$

Malha 3: $L_2 D i_3 + R_2(i_3 - i_2) = 0$

Ex. 7)

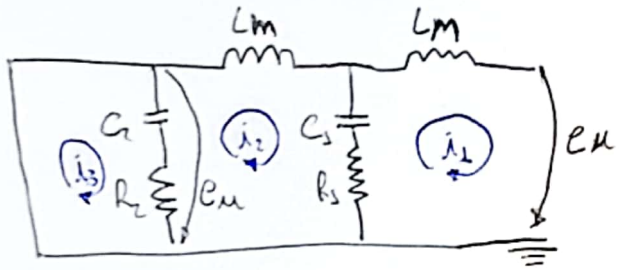


Malha 1: $i_1(L_1 D) + (i_1 - i_2)\left(R_1 + \frac{1}{C_1 D}\right) = e_1(t)$

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

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

Ex. 8) a)



$M\ddot{X}_1 + K_1(X_1 - X_2) + b_1(\dot{X}_1 - \dot{X}_2) = U$

$m\ddot{X}_2 + K_1(X_2 - X_1) + b_1(\dot{X}_2 - \dot{X}_1) + K_2(X_2 - W) + b_2(\dot{X}_2 - \dot{W}) = -U$

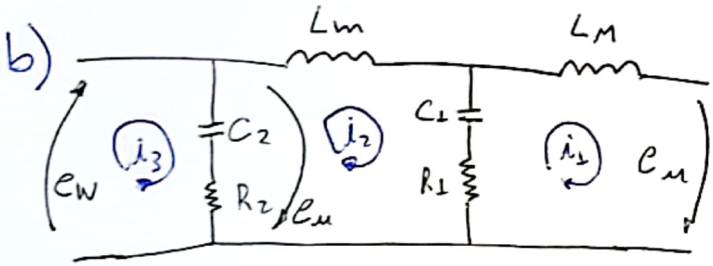
$K_2(W - X_2) + b_2(\dot{W} - \dot{X}_2) = 0$

Malha 1: $L_m D i_1 + \frac{(i_1 - i_2)}{C_1 D} + R_1(i_1 - i_2) = e_m$

Malha 2: $L_m D i_2 + \frac{(i_2 - i_1)}{C_1 D} + R_1(i_2 - i_1) + \frac{(i_2 - i_3)}{C_2 D} + R_2(i_2 - i_3) = -e_m$

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

b)



$M\ddot{X}_1 + K_1(X_1 - X_2) + b_1(\dot{X}_1 - \dot{X}_2) = U$

$m\ddot{X}_2 + K_1(X_2 - X_1) + b_1(\dot{X}_2 - \dot{X}_1) + K_2(X_2 - X_3) + b_2(X_2 - X_3) = -U$

$K_2(X_3 - X_2) + b_2(\dot{X}_3 - \dot{X}_2) = W(t)$

Malha 1: $L_m D i_1 + \frac{(i_1 - i_2)}{C_1 D} + R_1(i_1 - i_2) = e_m$

Malha 2: $L_m D i_2 + \frac{(i_2 - i_1)}{C_2 D} + R_1(i_2 - i_1) + \frac{1}{C_2 D}(i_2 - i_3) + R_2(i_2 - i_3) = -e_m$

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