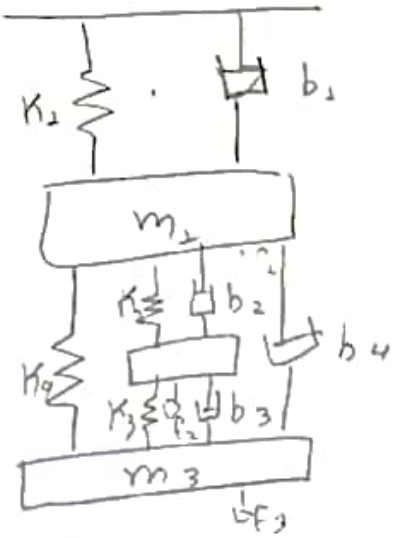
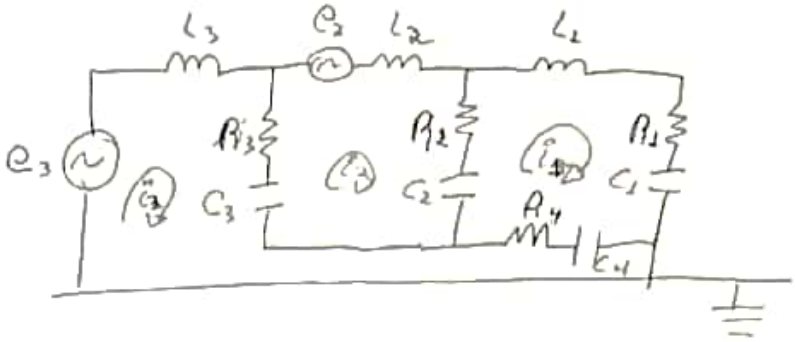
③ Bruno Akira Oshiro – 10771667





↳ malha ③

$$i_3\left(L_3D + R_3 + R_4 + \frac{1}{C_3D} + \frac{1}{C_4D}\right) - i_2\left(R_3 + \frac{1}{C_3D}\right) - i_1\left(R_4 + \frac{1}{C_4D}\right) = e_3$$

$$m_3\ddot{x}_3 + (b_3+b_4)\dot{x}_3 + (K_3+K_4)x_3 - b_3\dot{x}_2 - K_3x_2 - b_4\dot{x}_1 - K_4x_1 = f_3$$

↳ malha ②

$$i_2\left(R_2 + R_3 + \frac{1}{C_2D} + \frac{1}{C_3D} + L_2D\right) - i_1\left(R_2 + \frac{1}{C_2D}\right) - i_3\left(R_3 + \frac{1}{C_3D}\right) = e_2$$

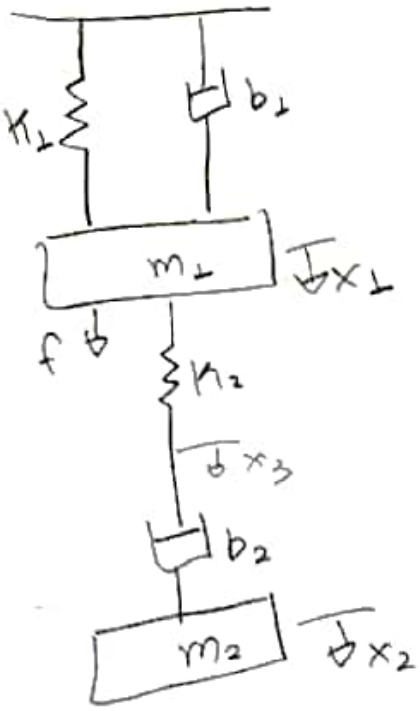
$$m_2\ddot{x}_2 + (b_2+b_3)\dot{x}_2 + (K_2+K_3)x_2 - b_2\dot{x}_1 - K_2x_1 - b_3\dot{x}_3 - K_3x_3 = f_2$$

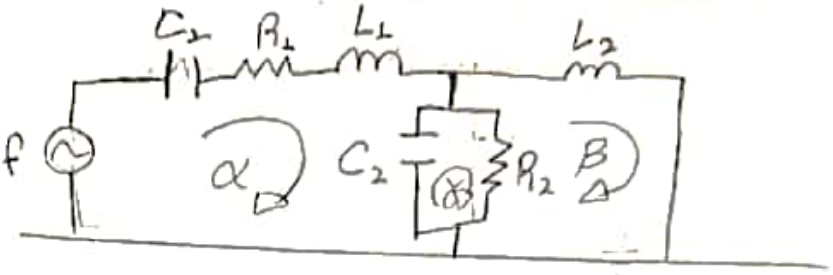
↳ Malha ①

$$i_1\left(R_1 + R_2 + R_4 + \frac{1}{C_1D} + \frac{1}{C_2D} + \frac{1}{C_4D} + L_1D\right) - i_2\left(R_2 + \frac{1}{C_2D}\right) - i_3\left(R_4 + \frac{1}{C_4D}\right) = 0$$

$$m_1\ddot{x}_1 + (b_1+b_2+b_4)\dot{x}_1 + (K_1+K_2+K_4)x_1 - b_2\dot{x}_2 - K_2x_2 - b_4\dot{x}_3 - K_4x_3 = 0$$

(6)





↳ malha α:

$$\alpha\left(\frac{1}{C_1 D} + R_1 + L_1 D\right) - \gamma\left(\frac{1}{C_2 D}\right) = f$$

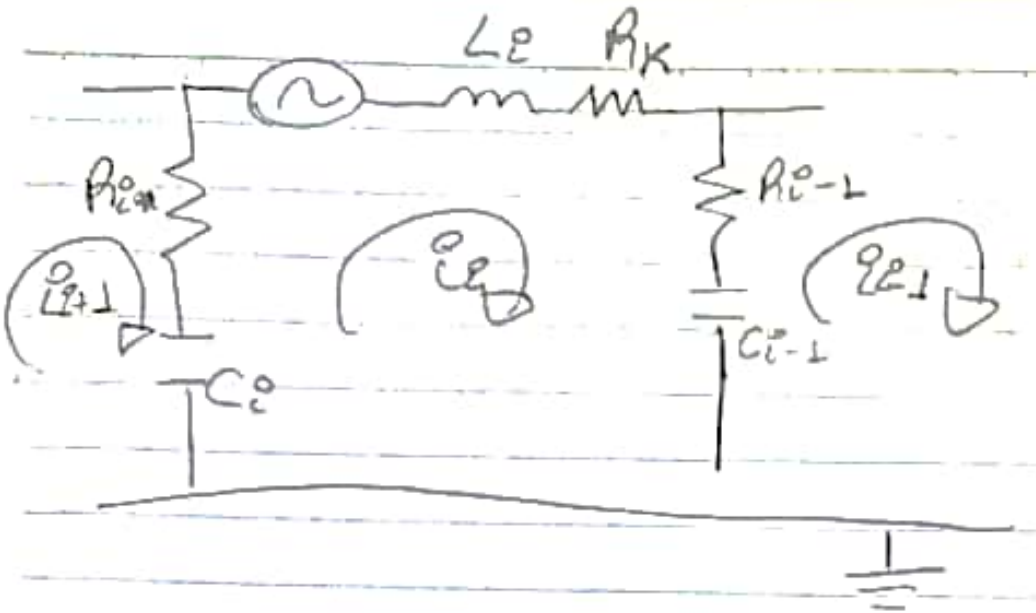
↳ malha γ

$$\gamma\left(\frac{1}{C_2 D} + R_2\right) = \alpha\left(\frac{1}{C_2 D}\right) + \beta(R_2)$$

↳ malha β

$$\beta(L_2 D + R_2) - \gamma(R_2) = 0$$

$$\begin{cases} m_1 \ddot{x}_1 + b_1 \dot{x}_1 + K_1 x_1 - K_2 x_2 = f \\ m_2 \ddot{x}_2 + b_2 \dot{x}_2 + K_2 x_2 - b_{i2} \dot{x}_3 = 0 \end{cases}$$

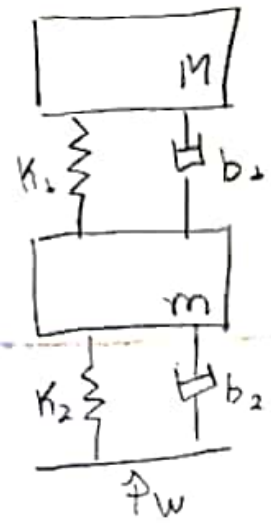


$$i_i\left(L_iD + R_K + R_i + R_{i-1} + \frac{1}{C_i} + \frac{1}{C_iD}\right) - i_{i-1}\left(R_{i-1} + \frac{1}{C_{i-1}D}\right) - i_{i+1}\left(R_i + \frac{1}{C_iD}\right) = 0$$

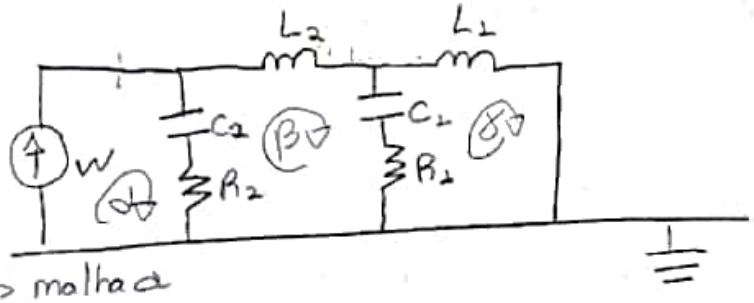
$$m_i\ddot{x}_i + (R_i + d_i + d_{i-1})\dot{x}_i + (K_i + K_{i-1})x_i - b_{i-1}\dot{x}_{i-1} - K_{i-1}\cdot x_{i-1} - b_i\cdot\dot{x}_i - K_i\cdot x_i = 0$$

(8)

a)



a) w = deslocamento



↳ malha α

$\alpha = w$

↳ malha β

$$\beta\left(R_2 + \frac{1}{C_2 D} + L_2 D + \frac{1}{C_1 D} + R_1\right) - \alpha\left(\frac{1}{C_2 D} + R_2\right) - \gamma\left(\frac{1}{C_1 D} + R_1\right) = 0$$

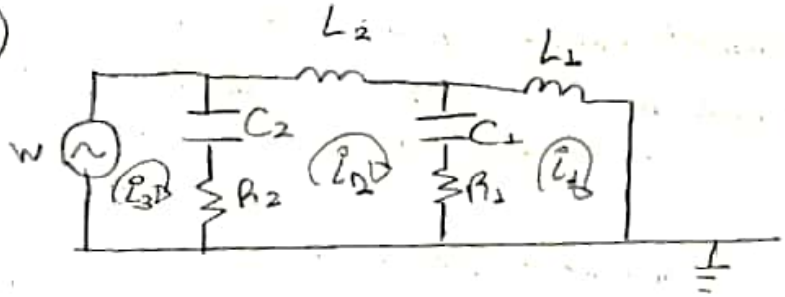
$$m_2 \ddot{x}_2 + (b_1 + b_2)\dot{x}_2 + (K_1 + K_2)x_2 - b_1 \dot{x}_1 - K_1 x_1 = b_2 \dot{w} + K_2 w$$

↳ malha γ

$$\gamma\left(L_1 D + \frac{1}{C_1 D} + R_1\right) - \beta\left(\frac{1}{C_1 D} + R_1\right) = 0$$

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

b)



↳ malha i_2

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

$$m\ddot{x}_2+(b_2+b_1)\dot{x}_2+(K_1+K_2)x_2-b_1\dot{x}_1-K_1x_1=w$$

↳ malha i_1

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

$$m_1\ddot{x}_1+b_1\dot{x}_1+K_1\dot{x}_1-b_1\dot{x}_2-K_1x_2=0$$