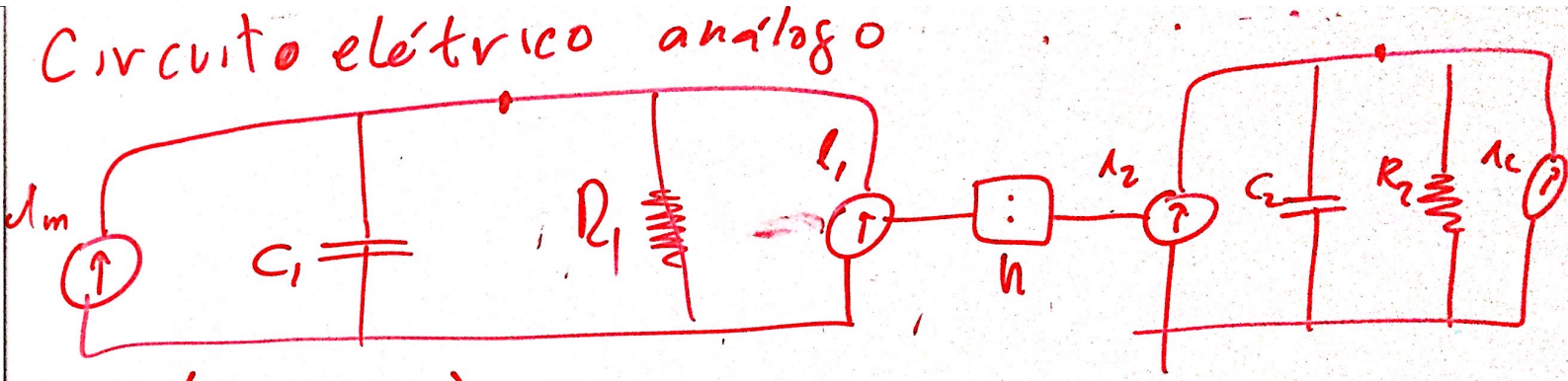
Vítor Facchini - 10772605

Circuito elétrico análogo

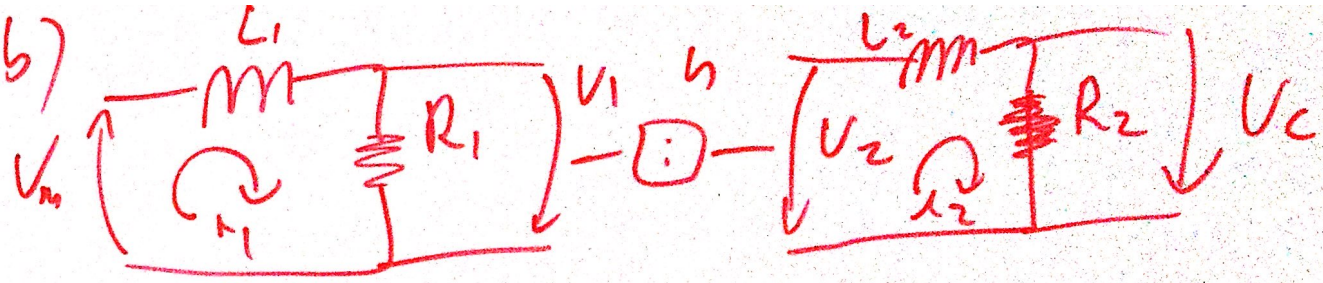


$$\begin{cases} \omega_1(J_1 D + B_1) = T_m - T_1 \\ \omega_2(J_2 D + B_2) = T_2 - T_c \end{cases}$$

$$\downarrow$$

$$\begin{cases} J_1\ddot{\theta}_1 + B_1\dot{\theta}_1 = T_m - T_1 \\ J_2\ddot{\theta}_2 + B_2\dot{\theta} = T_2 - T_c \end{cases} \rightarrow T_2 = nT_1 \text{ e } \theta_2 = \frac{\theta_1}{n}$$

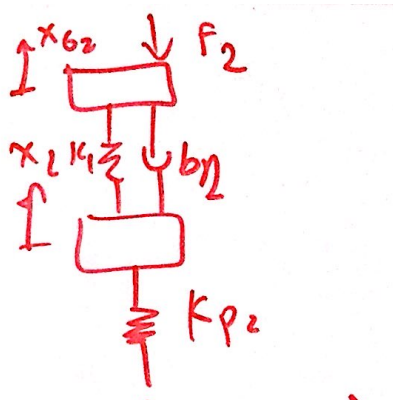
b)

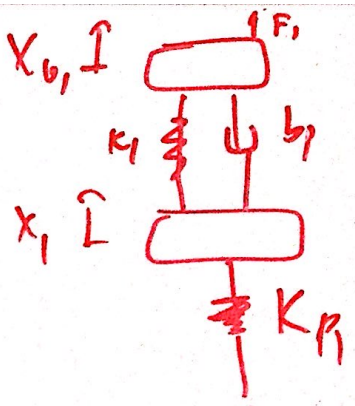


$$\begin{cases} L_1 D\lambda_1 + R_1 \lambda_1 = V_m - V_1 \\ L_2 D\lambda_2 + R_2 \lambda_2 = V_2 - V_c \end{cases}$$

$$\downarrow$$

$$\begin{cases} J_1 \omega_1 + B_1 \omega_1 = T_m - T_1 \\ J_2 \omega_2 + B_2 \omega_2 = V_2 - V_c \end{cases}$$

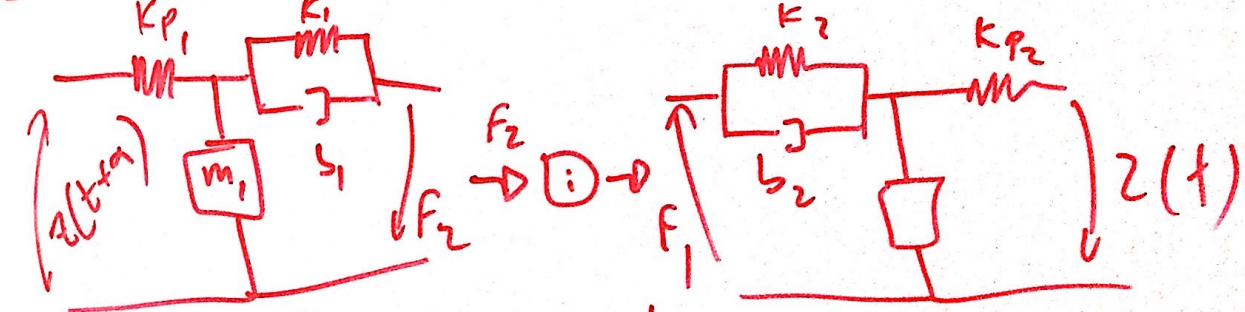


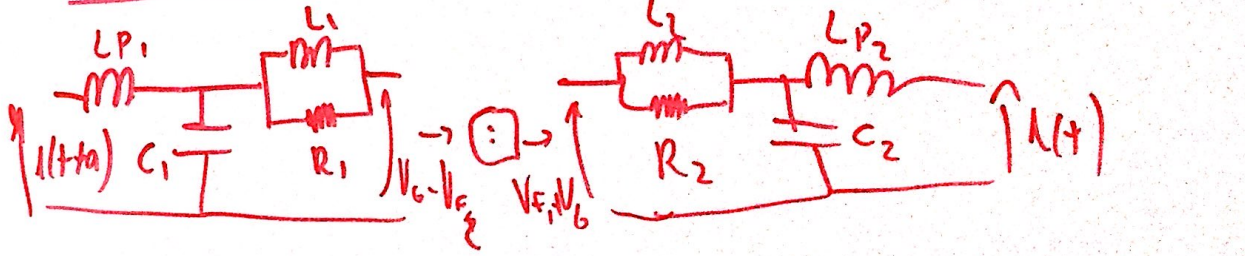


$$F_2 l_2 - F_1 l_1$$

$$\frac{F_2}{F_1} = \frac{l_1}{l_2} = n$$

Sist. mecânico:





Lei das malhas:

$$\begin{cases} i_1\left(L_1 D + R_1 + \frac{1}{C_1 D} + \frac{1}{C_{p_1} D}\right) - \frac{i_2}{C_{p_1} D} = V_{f_1} - V_G \\ i_2\left(L_2 D + R_2 + \frac{1}{C_2 D} + \frac{1}{C_{p_2} D}\right) - i_1(t+a) \cdot \frac{1}{C_{p_2} D} = V_G - V_{f_2} \end{cases}$$

Logo:

$$\begin{cases} m_1 \ddot{x}_1 + b_1 \dot{x}_1 + k_1 x_1 + k_{p_1} x_1 - k_{p_1} z(t) - F_1 - M\ddot{x}_1 = 0 \\ m_2 \ddot{x}_2 + b_2 \dot{x}_2 + k_2 x_2 + k_{p_2} x_2 - k_{p_2} z(t+a) + F_2 - M\ddot{x}_2 = 0 \end{cases}$$