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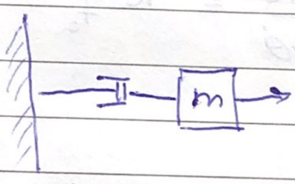
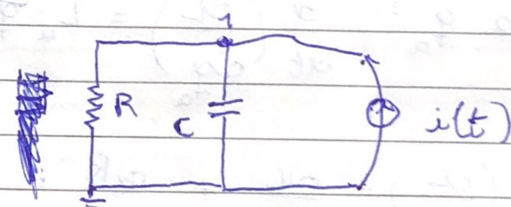
– Exercícios do dia 10/09 –

1- Cone de ar de alto falante

Analogia do tipo 2



$\rightarrow f(t) = l \cdot B_i \Rightarrow$

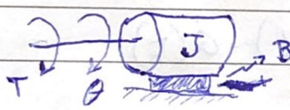


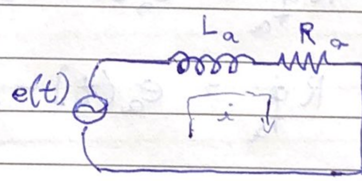
Nó 1:

$$V\left(\frac{1}{R} + CD\right) = i(t) \Rightarrow v\left(\frac{1}{R} + CD\right) = f(t)$$

$$\Rightarrow m\ddot{x} + b\dot{x} = l \cdot B_i$$

2-





Analogia do tipo 1:

$$\text{Malha: } (L_a D + R_a)\, i = e(t) \Rightarrow (JD + B)\,\omega = k \cdot i_a(t)$$

$$\Rightarrow J\ddot{\theta} + B\dot{\theta} = k \cdot i_a(t)$$

$$T = \frac{J \cdot \dot{\theta}^2}{2} + \frac{L_a \cdot i_a^2}{2} \quad \Big| \quad V = 0 \quad \Big| \quad R = \frac{B \cdot \dot{\theta}^2}{2} + \frac{R_a \cdot i_a^2}{2}$$

$$= \frac{J\dot{\theta}^2}{2} + \frac{L_a \cdot \dot{q}_a^2}{2} \qquad\qquad = \frac{B \cdot \dot{\theta}^2}{2} + \frac{R_a \cdot \dot{q}_a^2}{2}$$

$$L = T - V$$

Coordenadas generalizadas: θ, q_a

Para θ: $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{\theta}}\right) = J\ddot{\theta}$ | $\frac{\partial L}{\partial \theta} = 0$ | $\frac{\partial R}{\partial \dot{\theta}} = B \cdot \dot{\theta}$

Para q_a: $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_a}\right) = L_a \cdot \ddot{q}_a$ | $\frac{\partial L}{\partial q_a} = 0$ | $\frac{\partial R}{\partial \dot{\theta}} = R \cdot \dot{q}_a$

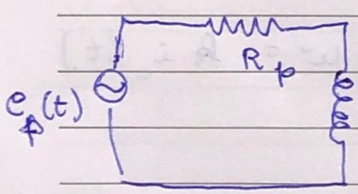
$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_i}\right) - \frac{\partial L}{\partial q_i} + \frac{\partial R}{\partial \dot{q}_i} = F_{ext}$$

Para θ: $J\ddot{\theta} + B\dot{\theta} = k \cdot \dot{q}_a$

Para q_a: $L_a \ddot{q}_a + R\dot{q}_a = e_a(t) - e_b(t)$

$\Rightarrow L_a \ddot{q}_a + R\dot{q}_a = e_a(t) - k_b(t) \cdot \dot{\theta}(t)$

b) Eletroímã



$B(f) = k_p \cdot i_p(t) \Rightarrow T(f) = k \cdot l_p(t$

Analogia do tipo 1 e Lagrange

$T = \frac{J\dot{\theta}^2}{2} + \frac{L_p q_p^2}{2}$ | $V = 0$ | $R = \frac{B\dot{\theta}^2}{2} + \frac{R_p q_p^2}{2}$

$L = T - V$

Coordenadas generalizadas: θ ; q_p

Para θ: $\quad \frac{d}{dt}\left(\frac{\partial L}{\partial \dot\theta}\right) = J\ddot\theta \quad \Big| \quad \frac{\partial L}{\partial \theta} = 0 \quad \Big| \quad \frac{\partial R}{\partial \dot\theta} = B\dot\theta$

Para q_p: $\quad \frac{d}{dt}\left(\frac{\partial L}{\partial \dot q_p}\right) = L_p \ddot q_p \quad \Big| \quad \frac{\partial L}{\partial q_p} = 0 \quad \Big| \quad \frac{\partial R}{\partial \dot q_p} = R_p \cdot \dot q_p$

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot q_i}\right) - \frac{\partial L}{\partial q_i} + \frac{\partial R}{\partial \dot q_i} = F_{ext}$$

Para θ: $\quad J\ddot\theta + B\dot\theta = k \cdot \dot q_p(t)$

Para q_p: $\quad L_p \ddot q_p + R_p \dot q_p = e(t)$