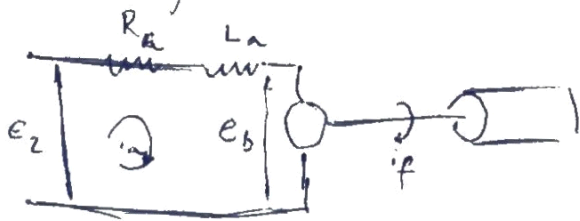


Exercício 10/09 - Sistemas Eletromecânicos

Paulo Montjo Bandeira 9348449



$$V_L + V_B = e(t) \Rightarrow J\ddot{\theta} + B\dot{\theta} = T$$



$$\Rightarrow V_{R_a} + V_{L_a} + e_b = e_a \Rightarrow e_a - i_a R_a = e_b \Rightarrow i_a = \frac{e_a - e_b}{R_a}$$

$$T = K i_a \Rightarrow T = K \left(\frac{e_a - e_b}{R_a} \right)$$

$$e_b = K_b \dot{\theta}$$

$$J\ddot{\theta} + B\dot{\theta} = K \left(\frac{e_a - K_b \dot{\theta}}{R_a} \right) \Rightarrow J\ddot{\theta} + \dot{\theta} \left(B + \frac{K K_b}{R_a} \right) = \frac{K e_a}{R_a} \Rightarrow$$

$$\Rightarrow \ddot{\theta} + \dot{\theta} \left(\frac{R_a B + K K_b}{R_a J} \right) = \frac{K e_a}{R_a J} \quad \therefore \ddot{\theta} + \frac{1}{Z_m} \dot{\theta} = K_m e_a$$