

①

Exo 1

Robot "Trooper"

TD Schema bloc 1

Q1

$$U_m(s) = R I_m(s) + E(s)$$

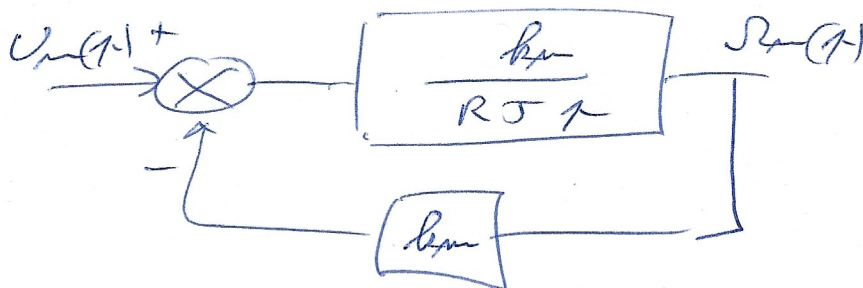
$$I_m(s) = \frac{U_m(s) - E(s)}{R} = \frac{1}{R} [U_m(s) - E(s)]$$

$$J s \theta_m(s) = \omega_m(s) - \omega(s)$$

$$\theta_m(s) = \frac{1}{J s} [\omega_m(s) - \omega(s)]$$

$$\omega_m(s) = k_v I_m(s)$$

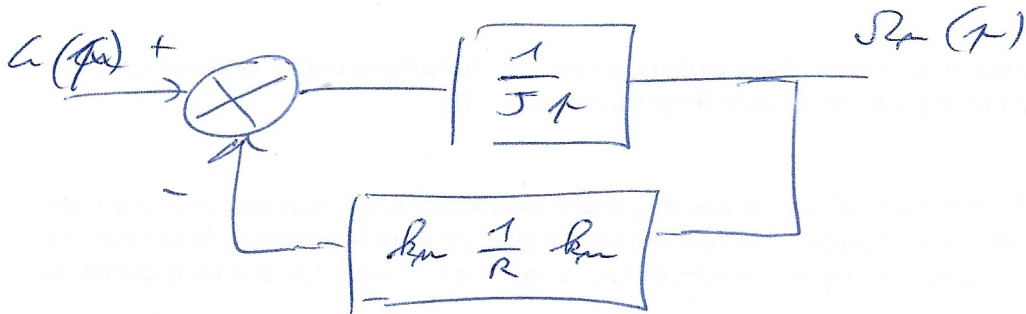
$$E(s) = k_p \theta_m(s)$$

Q2 Calcul de $H_1(s)$: $\omega(s) = 0$ 

$$\left(\frac{G}{1 + GF} \right)$$

$$H_1(s) = \frac{\frac{k_v}{R s}}{1 + \frac{k_v}{R s} \cdot k_p} = \frac{k_v}{R s^2 + k_p^2}$$

② Q2 Calcul de H_2 ($\omega(\tau)=0$)



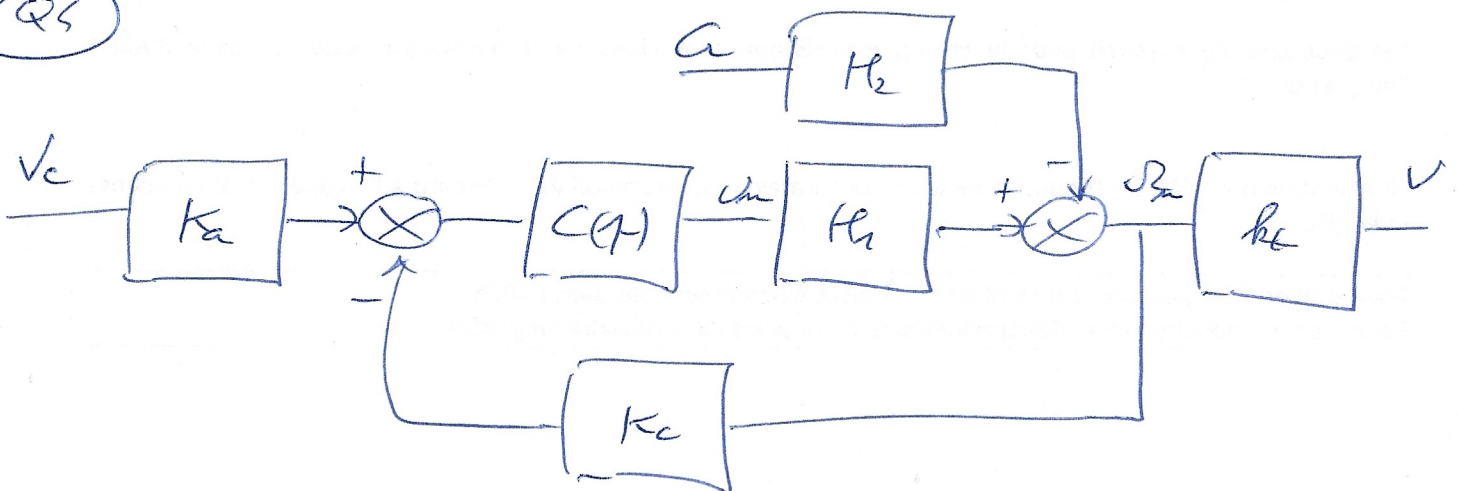
$$H_2(\tau) = \frac{\frac{1}{Js}}{1 + \frac{1}{Js} \times \frac{k_m^2}{R}} = \frac{R}{Js\tau + k_m^2}$$

③ Q3 Réseaux forme "canonique"

$$H_1(s) = \frac{K_1}{1 + \tau_1 s} = \frac{1/k_m}{1 + \frac{RJ}{k_m^2} s}$$

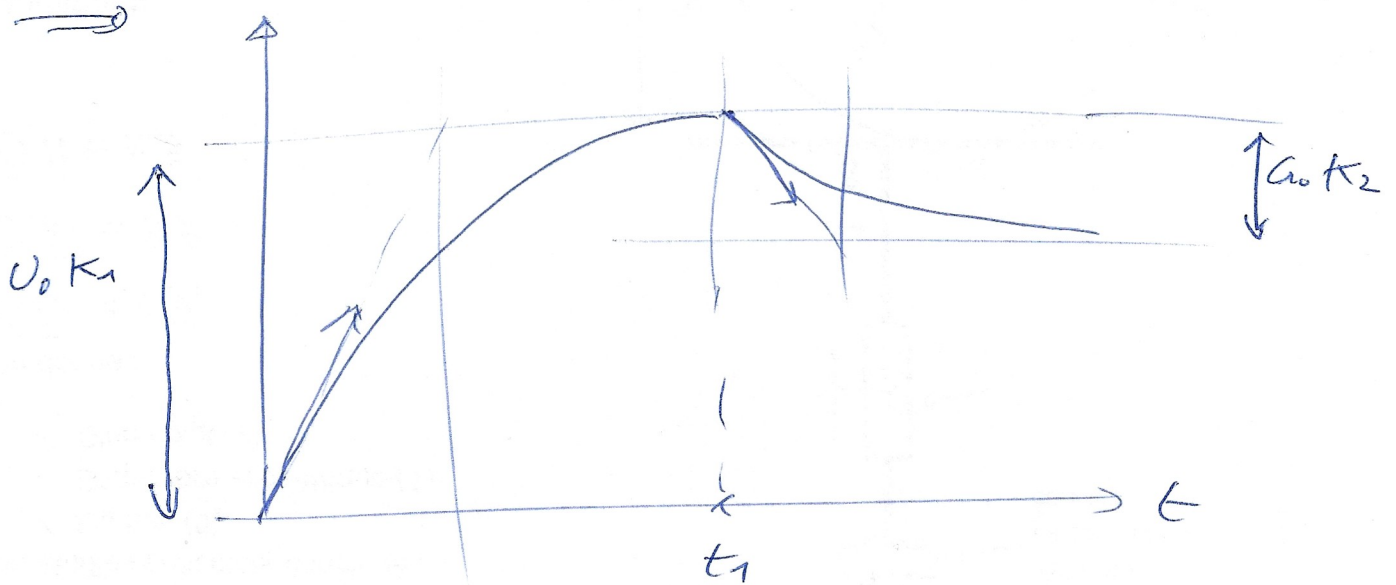
$$H_2(s) = \frac{K_2}{1 + \tau_2 s} = \frac{\frac{R}{k_m^2}}{1 + \frac{RJ}{k_m^2} s}$$

④ Q4



3

Rem : on sollicite le moteur avec une tension U_0 puis on a $t=0$ puis on fait intervenir un couple résistant C_{r0} à $t=t_1$



④

Exo 3

$$1) \quad U_c(\tau) = R I(\tau) + L \tau I(\tau) + E(\tau)$$

$$\left| \begin{aligned} I(\tau) &= \frac{U_c(\tau) - E(\tau)}{R + L\tau} = \frac{1}{R + L\tau} [U_c(\tau) - E(\tau)] \\ C_m(\tau) &= k_e I(\tau) \Rightarrow H_1 \text{ et } B_5 \end{aligned} \right.$$

$$E(\tau) = k_e \Omega_m(\tau) \Rightarrow B_6 =$$

$$2) \quad J \tau^2 \alpha(\tau) - m g Z \alpha(\tau) = m Z \Gamma(\tau) + \frac{C_m(\tau)}{\lambda}$$

$$\alpha(\tau) = \frac{1}{J \tau^2} \left[m Z \Gamma(\tau) + m g Z \alpha(\tau) + \frac{C_m(\tau)}{\lambda} \right]$$

$$\Rightarrow B_7 = \frac{1}{J} \quad B_1 = m Z \quad B_2 = m g Z$$

$$B_3 = \frac{1}{\lambda} \quad B_5 =$$

$$\underline{Rem} : \quad \Omega_m(\tau) = \frac{1}{\lambda} \tau \alpha(\tau) \Rightarrow B_4 = \frac{1}{\lambda}$$