Corrigé DS PCSI 1 Nov 26

Exo 1 (Q1) $H(p) = \frac{7}{p+5}$ $\quad S(p) = \frac{7}{p(p+5)} = \frac{a}{p} + \frac{b}{p+5}$

$a = \quad S(p) = \frac{7}{5}\left[\frac{1}{p} - \frac{1}{p+5}\right] \quad s(t) = \frac{7}{5}\left(1 - e^{-5t}\right) u(t)$

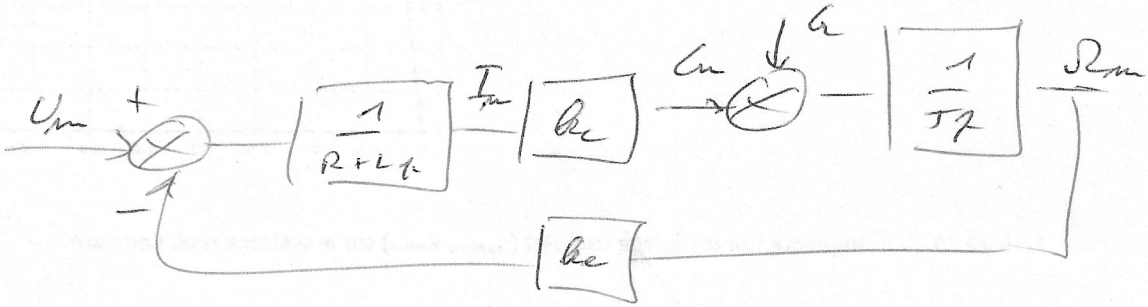
Exo 2 (Q2) $H(p) = \frac{6}{p^2 + 6p + 34} \quad E(p) = 1$

$S(p) = \frac{6/5 \times 5}{(p+3)^2 + 25} \quad s(t) = \frac{6}{5} e^{-3t} \sin(5t) \cdot u(t)$

Exo 2 (Q1) $H_1 = \frac{1}{Jp} \quad H_2 = \frac{1}{p} \quad H_3 = K_\theta$

(Q2) $H_4 = \frac{K_\theta}{Jp^2 + K_\theta} \quad H_5 = \frac{K_c K_\theta}{Jp^2 + K_\theta + K_c K_\theta}$

Exo 3 (Q1)



(Q2) $H_1 = \frac{k_c}{(R+Lp)Jp + k_c k_e}$

$H_2 = \frac{R+Lp}{(R+Lp)Jp + k_c k_e} \quad \Omega_m = H_1 U_m + H_2 C_r$

(Q3) $\Omega_m = H_m \left[U_m + H_{perf} C_r\right] \quad H_m H_{perf} = H_2$

$\Rightarrow H_m = H_1 \quad H_{perf} = \frac{H_2}{H_1} = \frac{R+Lp}{k_c}$

(2)

(Q4) $H_3 = \frac{1}{b} 2 k_t \frac{K_m}{1+\tau_m p} = \frac{2 k_t K_m}{b(1+\tau_m p)}$

(Q5) Non corrigé : $\varepsilon(\infty) = 0$; $D\% = 0$; $t_{5\%} = 0{,}5\ s > 0{,}01$

Corrigé : $\varepsilon(\infty) = 0$; $D\% = 22\% > 10\%$; $t_{5\%} = 0{,}03\ s > 0{,}01$

(Q6) $H_{BO} = \frac{5K_c}{p(1+0{,}05p)}$

$H_{BF} = \frac{5K_c}{0{,}05p^2 + p + 5K_c} = \frac{1}{\frac{p^2}{100K_c} + \frac{1}{5K_c} p + 1}$

$K_{BF} = 1$; $\omega_0 = 10\sqrt{K_c}$

$\frac{2z}{\omega_0} = \frac{1}{5K_c} \Rightarrow z = \frac{1}{\sqrt{K_c}}$

(Q7) $z = 0{,}7 \Rightarrow K_c = \frac{1}{(0{,}7)^2} = 2$

$\omega_0 = 14{,}3\ rad/s$ $\quad t_5 = \frac{3}{\omega_0} = 0{,}21\ s$

Performances : Précis $\varepsilon(\omega) = 0$ car $K_{BF} = 1$

Rapidité $t_{5\%} = 0{,}21\ s < 0{,}01\ s$

Dynamique $D\% = 5\% < 10\%$