DS de SI, MPSI1, novembre 23

Exo 1 $H(p) = \dfrac{9}{p+3}$; $E(p) = \dfrac{1}{p}$; $S(p) = \dfrac{9}{p(p+3)}$

$S(p) = \dfrac{a}{p} + \dfrac{b}{p+3}$ $\quad a = 3$; $b = -3$

$S(p) = 3\left(\dfrac{1}{p} - \dfrac{1}{p+3}\right) \Rightarrow s(t) = 3\left(1 - e^{-3t}\right) u(t)$

Exo 2 $H(p) = \dfrac{7}{p^2 + 10p + 61}$; $E(p) = 1$.

$S(p) = \dfrac{7 \times \frac{1}{6} \times 6}{(p+5)^2 + 36} \Rightarrow s(t) = \dfrac{7}{6} e^{-5t} \sin(6t).u(t)$.

Exo 3 $s(\infty) = 11$ $\quad \left| \begin{array}{l} 1{,}05 \times s(\infty) = 11{,}55 \\ 0{,}95 \times s(\infty) = 10{,}45 \end{array} \right) t_{5\%} = 5{,}5$ s

$\varepsilon(\infty) = 3$; $D = 1{,}5$

Exo 4 Sans doute réponses.

Exo 5 3] $H_1 = \dfrac{R_c}{RJp + R_c k_e}$

$H_2 = \dfrac{a \frac{1}{Jp}}{1 + \frac{1}{Jp}\frac{R_c k_e}{R}} = \dfrac{aR}{RJp + R_c k_e}$

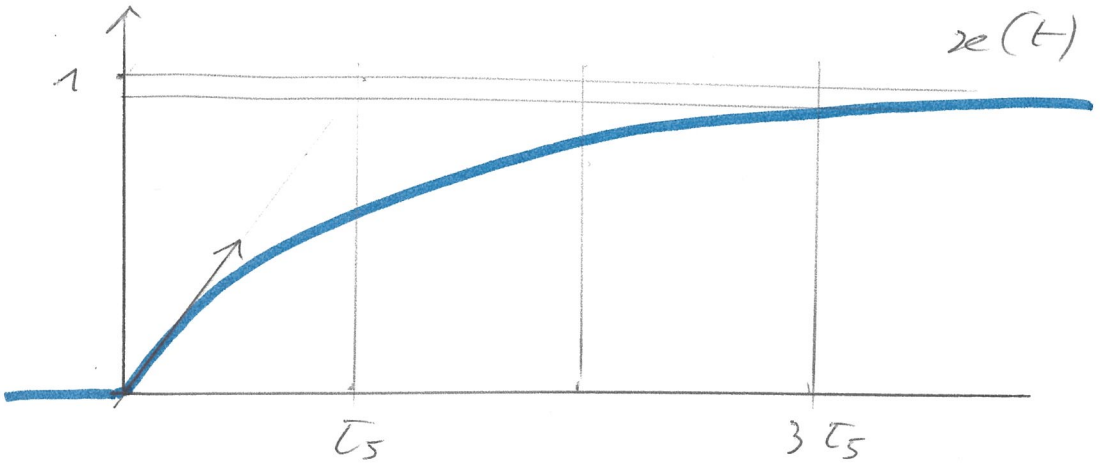
4] $H_4 = \dfrac{1}{p}$; $K_8 = \dfrac{2000}{2\pi} = \dfrac{1000}{\pi}$ inc rad^{-1} ; $K_5 = \dfrac{1}{10}$; $K_6 = 0{,}066$ m

5] $K_1 = \dfrac{K_8}{K_5 K_6} = \dfrac{1000}{\pi} \times \dfrac{10}{0{,}066} = 69233$ inc.m^{-1}

6] $H_5 = \dfrac{Ac}{p + Ac} = \dfrac{1}{1 + \frac{1}{Ac}p} = \dfrac{K_5}{1 + \tau_5 p}$ $\quad \left| \begin{array}{l} K_5 = 1 \\ \tau_5 = \dfrac{1}{Ac} = \dfrac{1}{6700\,c} \end{array} \right.$

$K_5 = 1$ donc passe ; $t_{5\%} = 3\tau_5 = \dfrac{3}{6700\,c}$

(2)



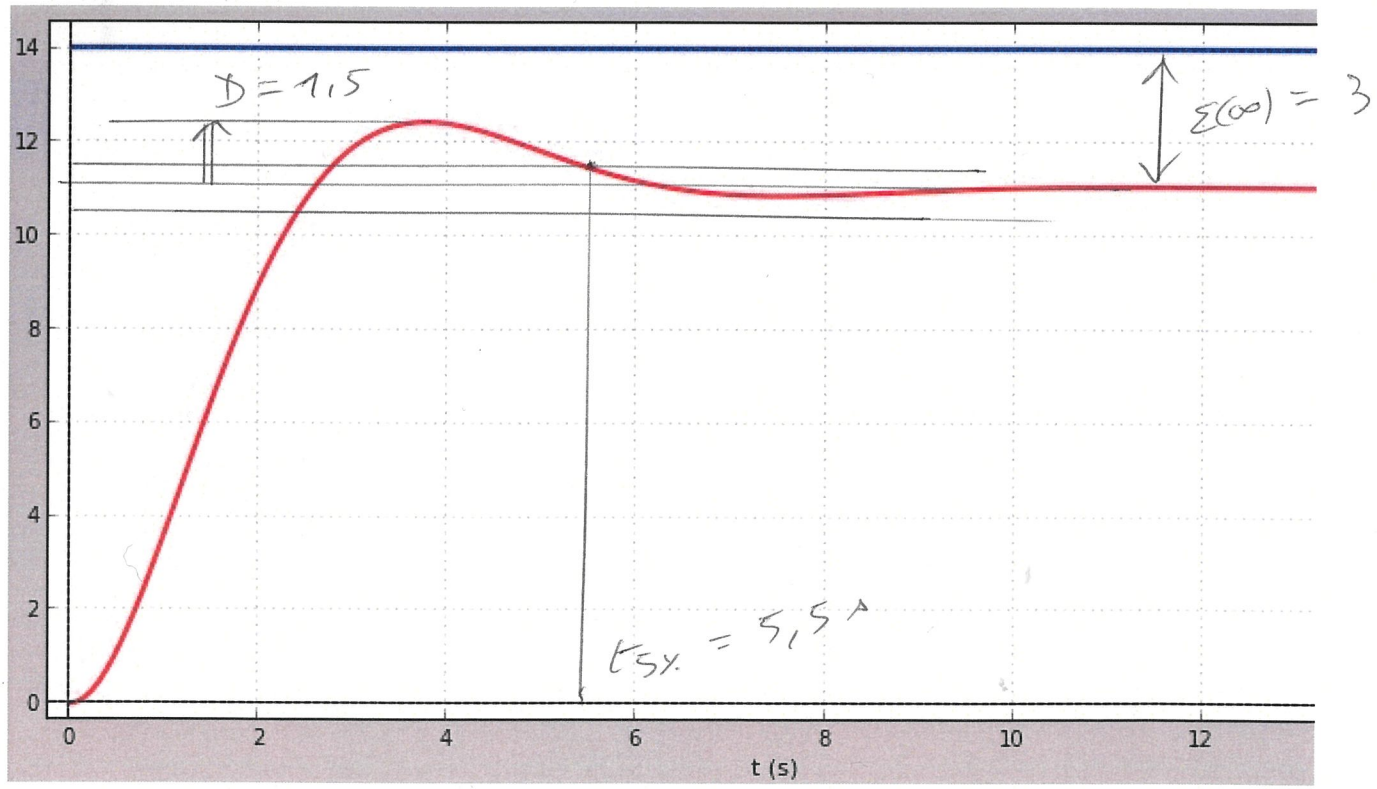
7)

$$H_6 = \frac{D\,\frac{A}{\tau}}{1+\frac{CA}{\tau}} = \frac{AD}{\tau\frac{\tau}{\tau}+AC} = \frac{\frac{D}{C}}{1+\frac{1}{AC}\tau}$$

Erreur due à un echelon unitaire : $\varepsilon(\infty) = \frac{D}{C}$

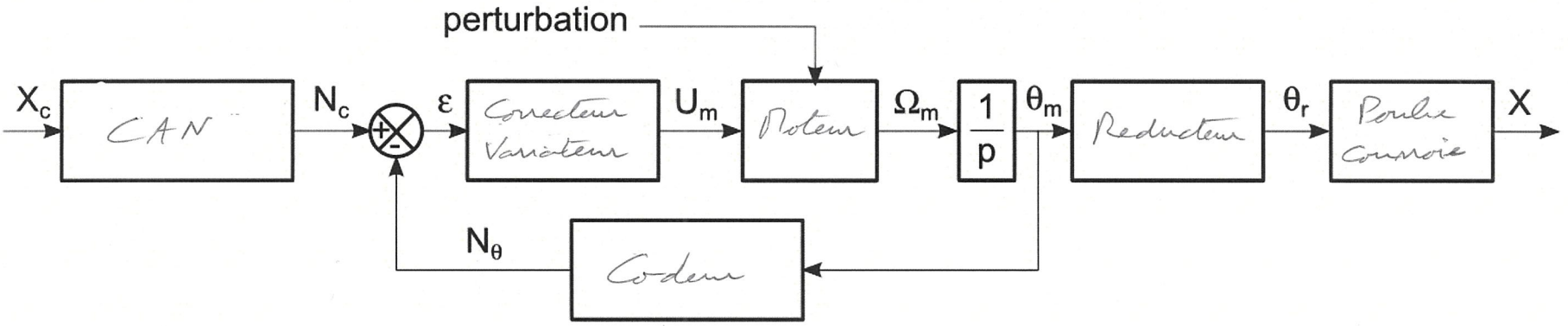
Document réponse

Exercice 3.



Exercice 4

Question 1



Question 2