Correction DS de SI, MPSI 1, octobre 22

Exo 1

1] $H(p) = \frac{5}{2p+3}$; $E(p) = \frac{1}{p}$; $S(p) = \frac{5}{p(2p+3)}$

$S(p) = \frac{a}{p} + \frac{b}{2p+3}$; $3a + p(2a+b) = 5 \Rightarrow a = \frac{5}{3}$

$b = -\frac{10}{3}$

$S(p) = \frac{5}{3}\left(\frac{1}{p} - \frac{1}{p+3/2}\right) \Rightarrow s(t) = \frac{5}{3}\left(1 - e^{-\frac{3t}{2}}\right).u(t)$

2] $H(p) = \frac{6}{p^2+4p+20}$; $E(p) = 1 \Rightarrow S(p) = \frac{6}{p^2+4p+20}$

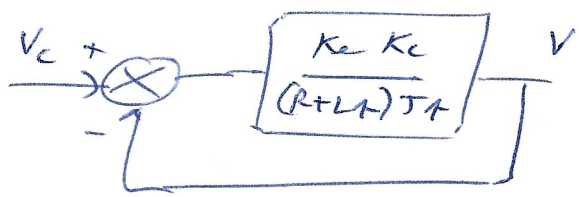
$S(p) = \frac{\frac{6}{4} \times 4}{(p+2)^2+16} \Rightarrow s(t) = \frac{3}{2}.e^{-2t}.\sin(4t).u(t)$

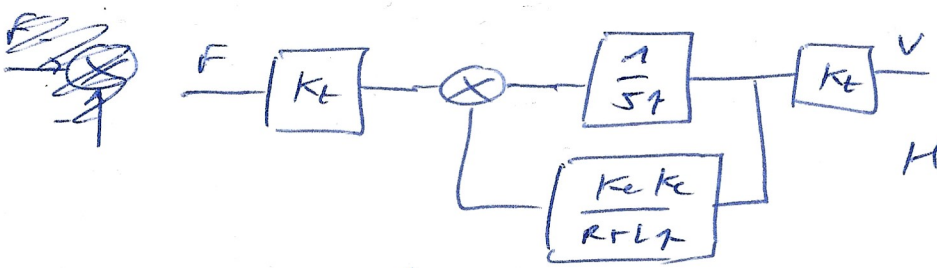
Exo 2 Voir doc rep.

Exo 3 Voir doc rep

Exo 4 (Q1) Voir doc rep (Q2) Idem (Q3) $K_{adu} = \frac{K_e}{K_t}$

(Q4) $H_1(p) = \frac{K_e K_c}{(R+Lp)Jp + K_e K_c}$

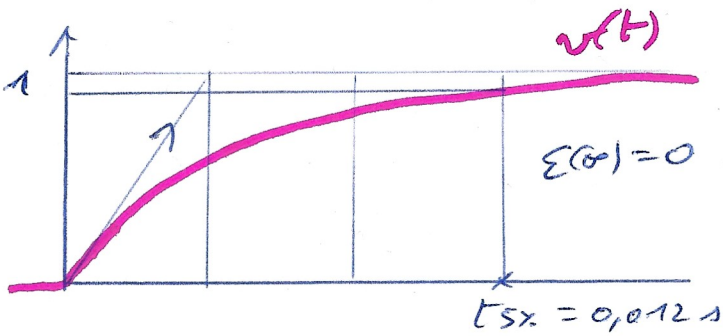




$H_2(p) = \frac{K_t^2(R+Lp)}{(R+Lp)Jp + K_e K_e}$

(Q5) $H_1(p) = \frac{1}{1+0,004p}$

(Q6) $H_2(p) = \frac{1,7.10^{-5}}{1+0,004p}$



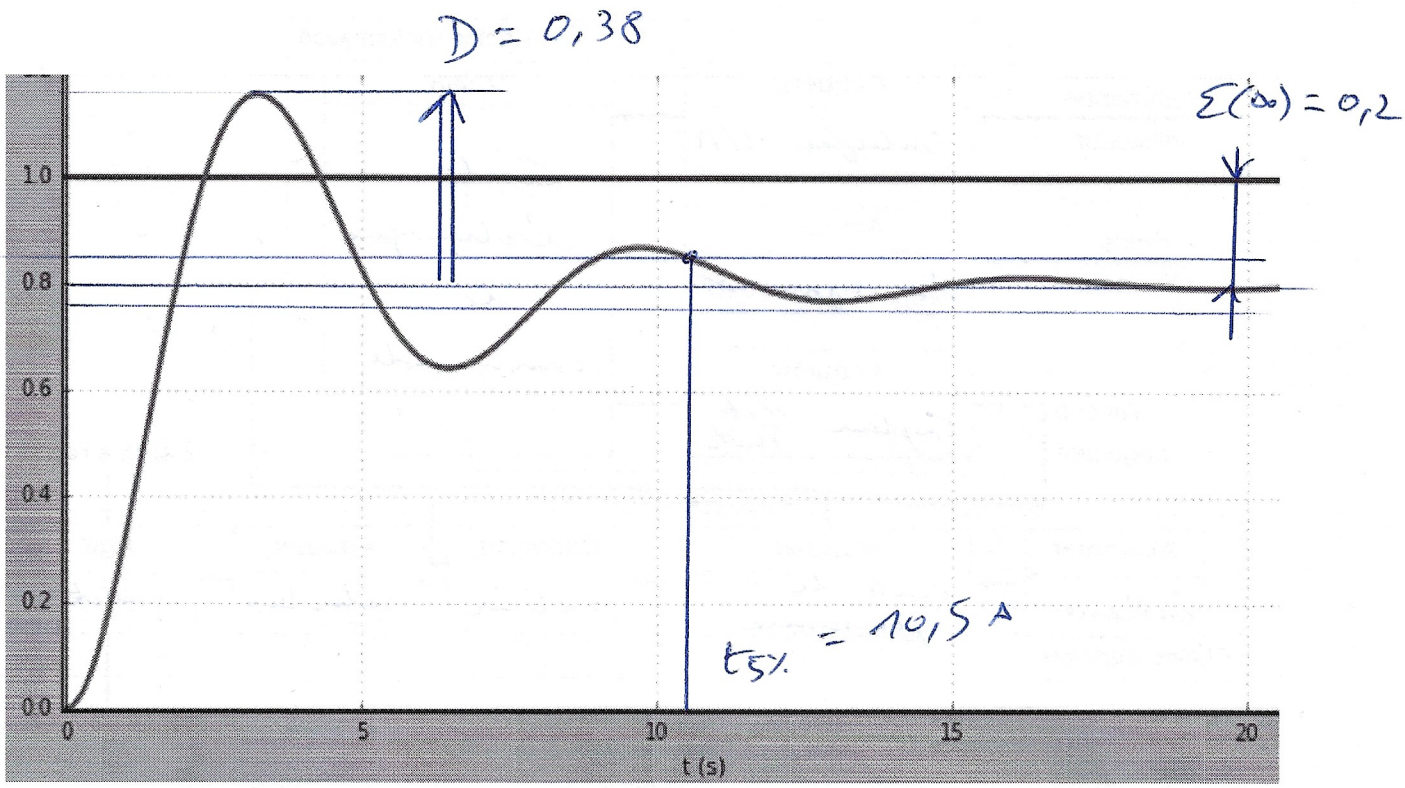
$a(p) = \frac{1}{p}$ $V(p) = \frac{1,7.10^{-5}}{p(1+0,004p)}$

$\lim_{t \to \infty} v(t) = \lim_{p \to 0} pV(p) = 1,7.10^{-5}$

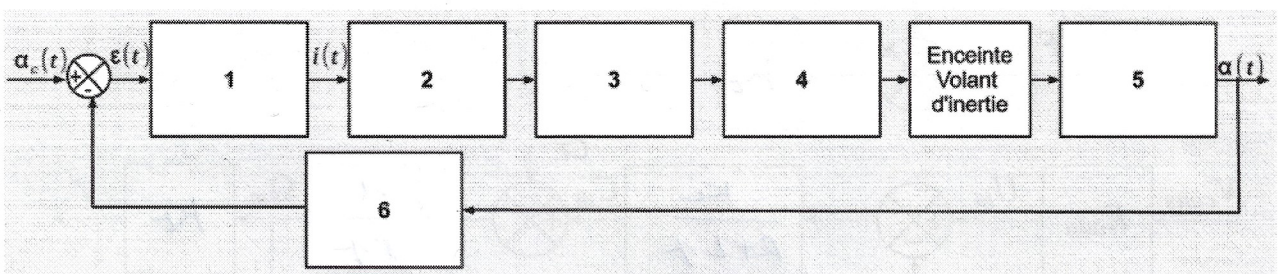
Documents réponses, DS MPSI1, octobre 2022

Exercice 2.

$0,95 \times s(\infty) = 0,76$
$1,05 \times s(\infty) = 0,84$



Exercice 3. Stabilisateur gyroscopique de bateau

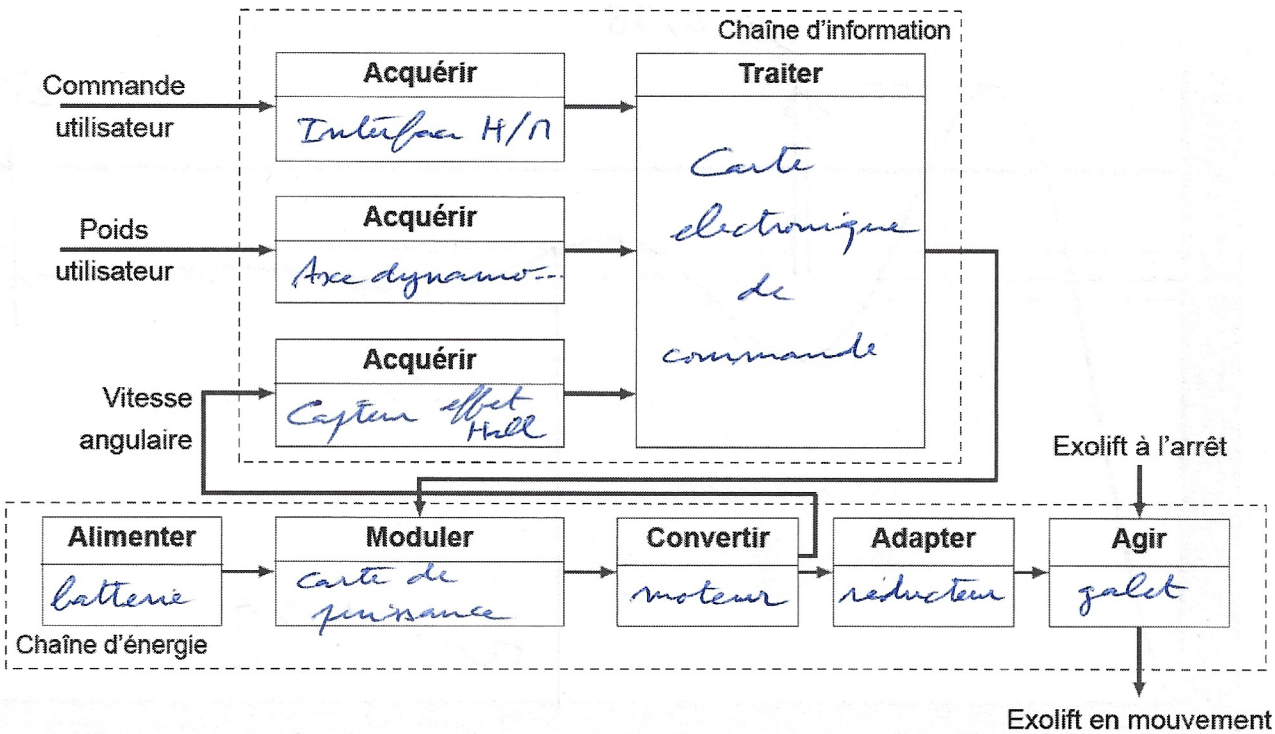


Repères	Constituants du schéma-blocs
1	Controleur électronique
2	Servo-distributeur
3	Vérins

Repères	Constituants du schéma-blocs
4	structure articulée
5	bateau
6	centrale inertielle

Exercice 4 Exolift

Question 1



Question 2