Correction DS de SI, PCSI 1, oct 24

Exo 1 $H(p) = \frac{5}{p+3}$ $\quad E(p) = \frac{1}{p}$ $\quad S(p) = \frac{5}{p(p+3)}$

$S(p) = \frac{a}{p} + \frac{b}{p+3}$ $\quad 5 = a(p+3) + bp = (a+b)p + 3a$

$\Rightarrow a = \frac{5}{3} \quad b = -\frac{5}{3} \Rightarrow S(p) = \frac{5}{3}\left(\frac{1}{p} - \frac{1}{p+3}\right)$

$s(t) = \frac{5}{3}\left(1 - e^{-3t}\right).u(t)$

Exo 2 $H(p) = \frac{5}{p^2 + 6p + 13}$ $\quad E(p) = 1$ $\quad S(p) = H(p)E(p)$

$S(p) = \frac{5}{p^2+6p+13} = \frac{5}{(p+3)^2+4} = \frac{\frac{5}{2} \times 2}{(p+3)^2+4}$

$s(t) = \frac{5}{2} e^{-3t} \sin(2t) u(t).$

Exo 3 $s(\infty) = 6$ $\left| \begin{array}{l} 1{,}05\, s(\infty) = 6{,}3 \\ 0{,}95\, s(\infty) = 5{,}7 \end{array} \right)$ $\quad t_{5\%} = 11\,s$

$\varepsilon(\infty) = 4 \quad D = 3 \quad D\% = 50\,\%$

Exo 4 Q2 $C_m(p) = k_c \left[\frac{U_m(p) - k_c \Omega_m(p)}{R}\right] = \frac{k_c}{R} U_m(p) - \frac{k_c^2}{R}\Omega_m(p)$

$C_m(p) = \frac{k_c}{R}\left[U_m(p) - k_c \Omega_m(p)\right]$ $\quad H_1(p) = \frac{k_c}{R}$ $\quad H_2(p) = k_c$

Q3 $\Omega_m(p) = \frac{1}{R}\Omega(p)$ $\quad \alpha(p) = \frac{1}{p}\Omega(p)$ $\quad H_4(p) = \frac{1}{p}$ $\quad H_5(p) = \frac{1}{R}$

Q4 $Jp^2\alpha(p) + \mu p \alpha(p) = r C_m(p) - r^2 C(p)$

$p\alpha(p)(Jp + \mu) = \cancel{r C_m(p)}\ r^2\left(\frac{1}{R} C_m(p) - C(p)\right)$

$p\alpha(p) = \frac{r^2}{Jp + \mu}\left[\frac{1}{r} C_m(p) - C(p)\right]$

$H_3(p) = \frac{r^2}{Jp + \mu}$ $\quad H_2(p) = \frac{1}{r}$

Document réponses, DS PCSI1, octobre 2024

Exercice 3.

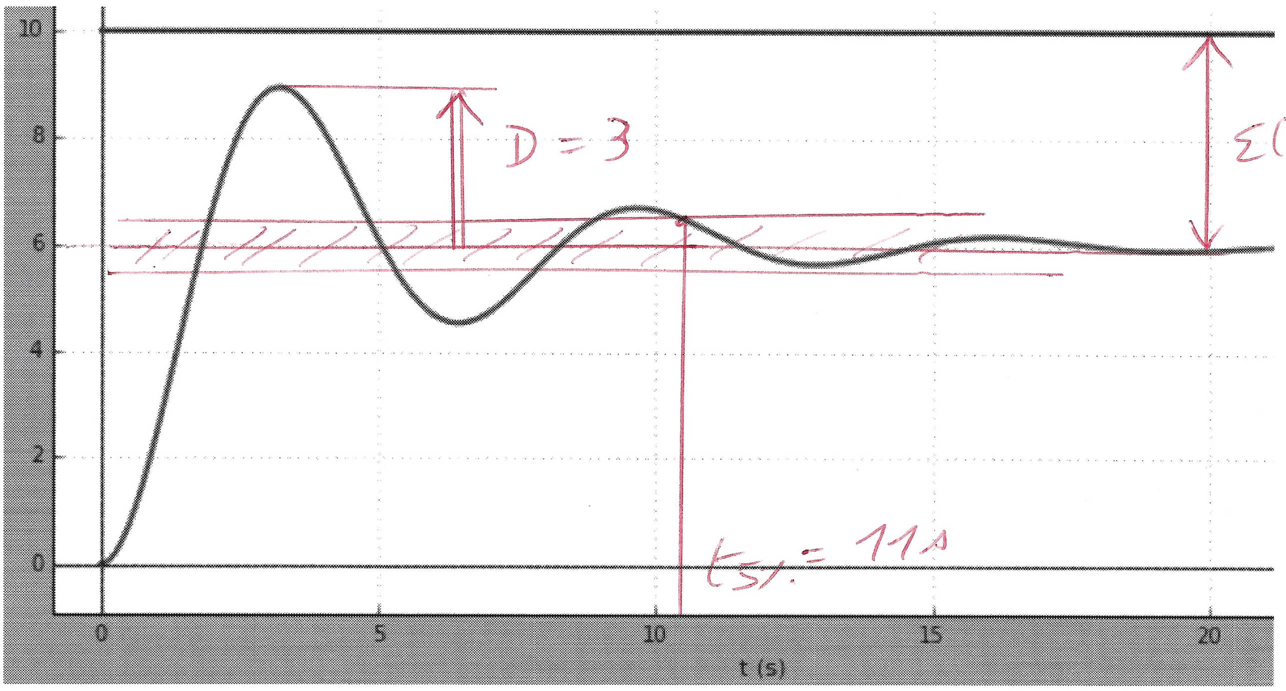
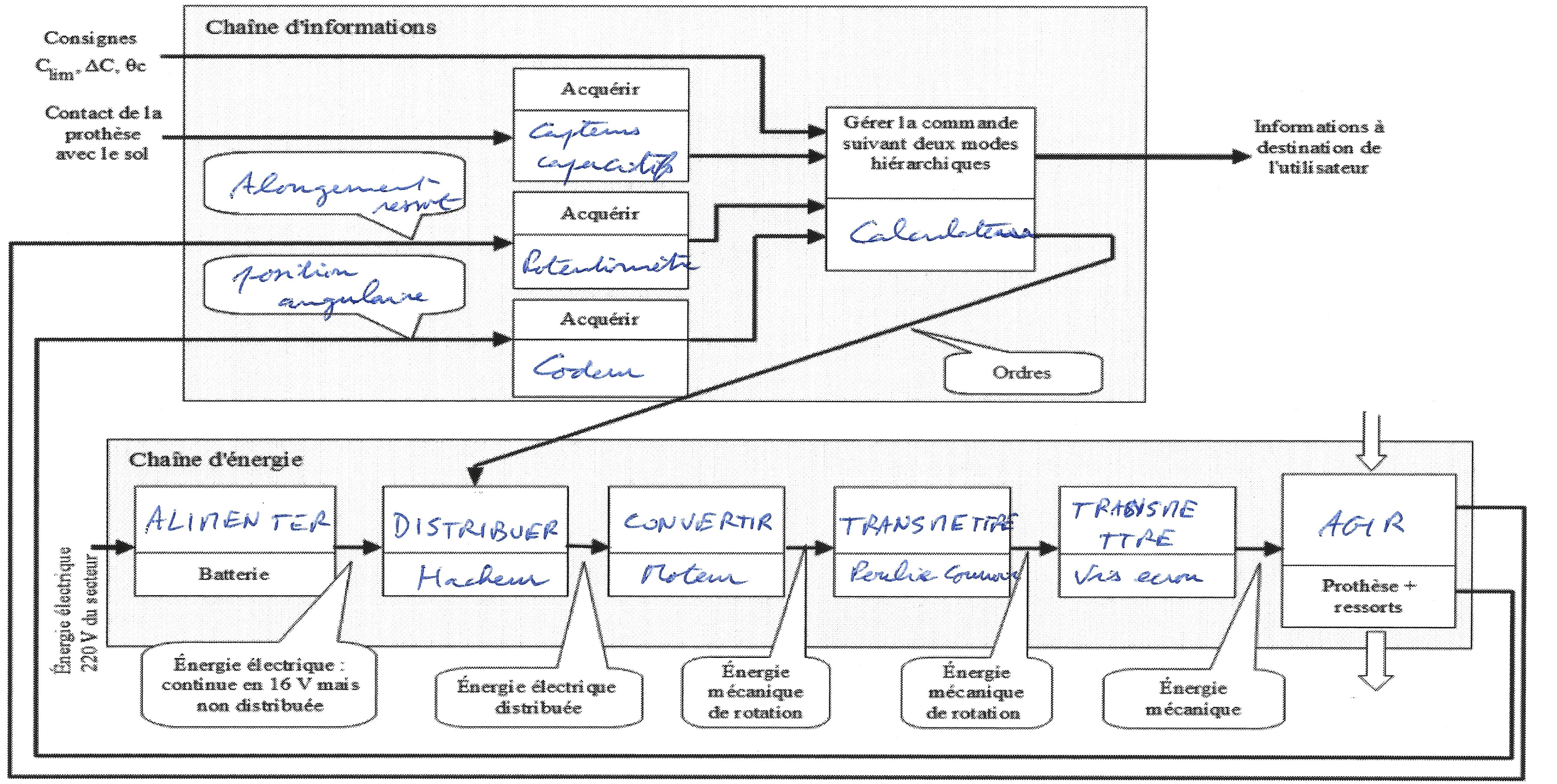


Tableau des Transformées de Laplace usuelles.

Domaine temporel	*Domaine de Laplace*	*Domaine temporel*	*Domaine de Laplace*
$\delta(t)$	1	$\sin \omega t$	$\dfrac{\omega}{p^2+\omega^2}$
K	$\dfrac{K}{p}$	$\cos \omega t$	$\dfrac{p}{p^2+\omega^2}$

Exercice 4,
question 1.



Exercice 4, question 5.