

TD2 Canaux

15.02.12

TD2: Canaux de tr. lg en régime transitoire

Exercice 1: Stub

$$R_c = 100 \Omega$$

$$l = 85 \text{ cm}$$

$$\lambda = 20 \text{ cm}$$

$$Y_L = (100 + 180j) \times 10^{-4}$$

1)

$$y_L = Y_L \times R_c = (100 + 180j) \cdot 10^{-2} = 1 + 1,8j$$

$$\Rightarrow z_L = 0,235 + 0,42j$$

D'où

$$Z_L = 23 + 42j$$

$$\rho = 0,66$$

2) Déterminer l'imp. d'entrée

$$\frac{l}{\lambda} = \frac{85}{20} = 4,25$$

D'où : 8 tours + 0,25, vers la source.

$$0,25 + 0,435 = 0,685 \text{ modulo } 0,5 = 0,185$$

$$z_e = 1 + 1,8j$$

$$\hookrightarrow Z_e = 100 + 180j$$

La lg n'est pas adaptée.

3)



Non-adaptée car $\text{Im} \neq 0$. Partie réelle adaptée car $\text{Re}(Z_e) = R_c$.

Donc la distance d sera nul, on va positionner le stub directement sur la charge puisque $\text{Re}(Z_e) = R_c$.

4) Déterminer s .

Il faut annuler la partie Im cad 1,8.

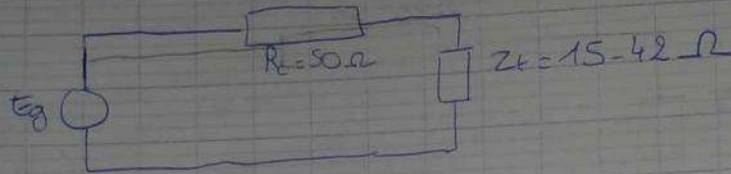
$$\text{cf Abaque : } 0,17 \rightarrow \frac{s}{\lambda} = 0,25 - 0,17 = 0,08$$

$$s = 1,6 + k \frac{\lambda}{2}$$

$$\Rightarrow s = 1,6 + 10 \lambda$$

14.03.12

Exercice 2: Adaptation à l'aide d'un stub



1) $Z_L = 15 - j42,5 \Rightarrow Y_L = 0,3 - j0,85$

$Y_L = 0,4 + j$
 $\rho = 0,65 = |\Gamma|$

Adaptation en // $\Rightarrow$ Admittance

2) $\lambda = \frac{c}{f} = \frac{3 \cdot 10^8}{10^9} = 0,3 \text{ m} = 30 \text{ cm}$

point D: $y = 1 + j1,3$ point D': $y = 1 - j1,3$

$\frac{d}{\lambda} = 0,052 \Rightarrow d = 1,56 \text{ cm} + k 15 \text{ cm} + \frac{\lambda}{8}$

$\frac{d'}{\lambda} = 0,183 \Rightarrow d' = 5,49 \text{ cm} + k 15 \text{ cm}$

3) On a adapté la partie réelle, maintenant adapter l'imaginaire
 $L \rightarrow D = 1 + j1,3$. Il faut ajouter en // $-j1,3$
 $\Rightarrow \frac{1}{\lambda} = 0,327$ d'abaque $\Rightarrow \boxed{\lambda = 9,8 \text{ cm}}$

$L \rightarrow D' = 1 - j1,3$. $\dots + j1,3$
 $\Rightarrow \frac{\lambda'}{\lambda} = 0,173 \Rightarrow \boxed{\lambda' = 4,2 \text{ cm}}$

passage en impédance
 4) $y = -j1,3 = \frac{1}{x} \Rightarrow x = \frac{j}{1,3}$

$y = -j1,3 = \frac{1}{x} \Rightarrow x = \frac{1}{j1,3}$

bobine
 $\cos > 0$
 $\frac{j}{1,3} = jL\omega \Rightarrow \boxed{L = 84 \text{ pF}}$
 $\omega = 2\pi f$

$-\frac{1}{j1,3} = \frac{1}{jC\omega} \Rightarrow \boxed{C = 302 \text{ pF}}$

$\vec{w}$ sur
 les
 admittances
 ne

Exercice 2(bis): l_g en régime transitoire

Expression tension à la charge:

$$U_t(t) = \frac{Z_c}{Z_g + Z_c} (1 + \Gamma_c) (e^{t-\tau} + \Gamma_c \Gamma_t e^{t-3\tau} + \dots)$$

source:

$$U_e(t) = \frac{Z_c}{Z_g + Z_c} e(t) + \frac{Z_c}{Z_g + Z_c} (1 + \Gamma_c) \Gamma_t (e^{t-2\tau} + \Gamma_c \Gamma_t e^{t-4\tau} + \dots)$$

1) $R_g = \frac{1}{3} R_c$ $R_t = \frac{1}{3} R_c$

$$\Gamma_c = \frac{R_g - R_c}{R_g + R_c} = -\frac{1}{2}$$

$$\Gamma_t = \frac{R_t - R_c}{R_t + R_c} = \frac{\frac{1}{3} R_c - R_c}{\frac{1}{3} R_c + R_c} = -\frac{1}{2}$$

l_g n'importe $\rightarrow \begin{cases} Z_g = R_g \\ Z_c = R_c \end{cases}$

$$\frac{3R_g}{R_g + 3R_g} = \frac{3}{4}$$

$$\Rightarrow U_t(t) = \frac{3}{8} (e^{t-\tau} + \frac{1}{4} e^{t-3\tau} + \dots)$$

$$\Rightarrow U_e(t) = \frac{3}{4} e(t) + \frac{3}{16} (e^{t-2\tau} - \frac{1}{4} e^{t-4\tau} + \dots)$$

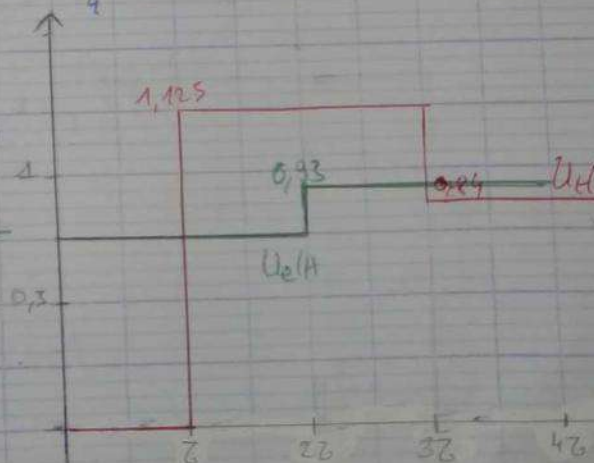
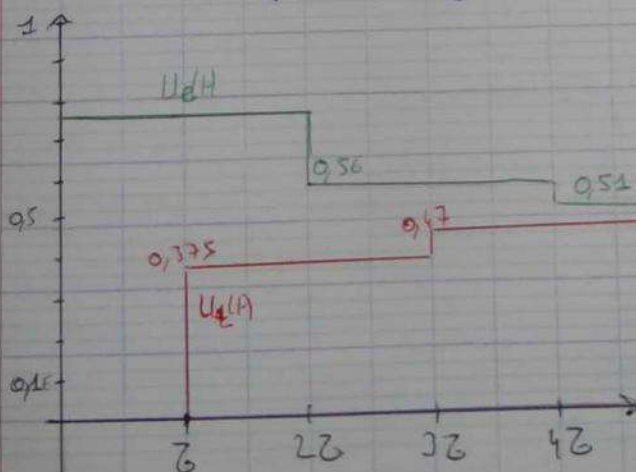
2) $R_g = \frac{1}{3} R_c$ $R_t = 3R_c$

$$\Gamma_c = -\frac{1}{2}$$

$$\Gamma_t = \frac{3R_c - R_c}{3R_c + R_c} = \frac{1}{2}$$

$$\Rightarrow U_t'(t) = \frac{3}{8} (e^{t-\tau} - \frac{1}{4} e^{t-3\tau} + \dots)$$

$$\Rightarrow U_e'(t) = \frac{3}{4} e(t) + \frac{3}{16} (e^{t-2\tau} - \frac{1}{4} e^{t-4\tau} + \dots)$$



a) C
pour
b) '
 $\lambda_1 =$
c)
d)
ir

Une
gain

1.3
de

C

$$U_t = \frac{Z_c}{Z_g + Z_c} (1 + \Gamma_t) (e^{t-2\tau} + \Gamma_e \Gamma_t e^{t-4\tau} + \dots)$$

$$U_e = \frac{Z_c}{Z_g + Z_c} e(t) + \frac{Z_c}{Z_g + Z_c} (1 + \Gamma_e) \Gamma_t (e^{t-2\tau} + \Gamma_e \Gamma_t e^{t-4\tau} + \dots)$$

Exercice 3 : Lg en régime transitoire

$R_g = R_c$ - T tps de propagation source-charge sur la lg

Extrémité
court-circuit

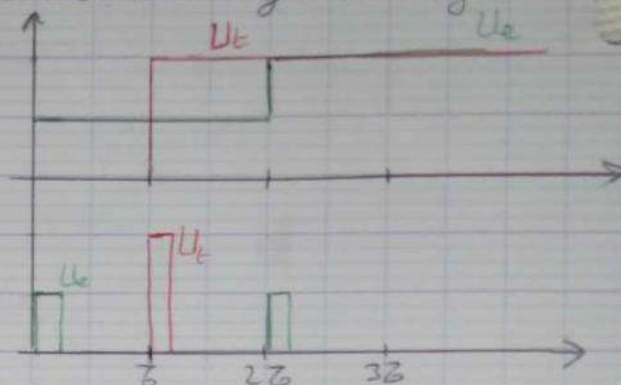
1) $R_t = \infty$

$\Gamma_e = 0$

$\Gamma_t = 1$

$U_t(t) = e(t - \tau)$

$U_e(t) = \frac{1}{2} e(t) + \frac{1}{2} e(t - 2\tau)$



Extrémité
court-circuit

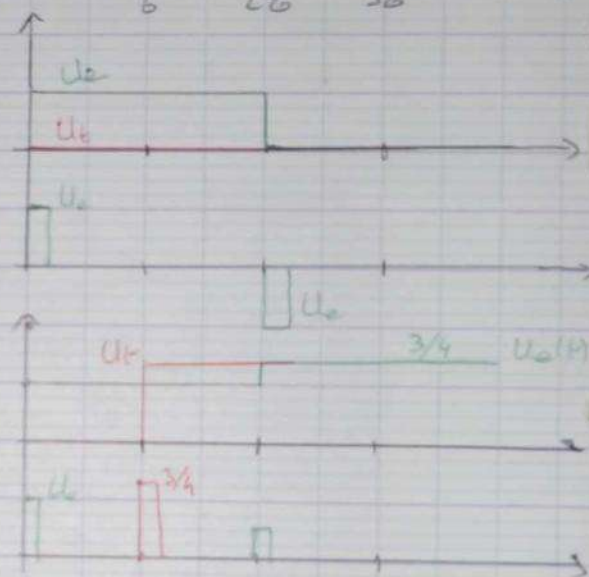
2) $R_t = 0$

$\Gamma_e = 0$

$\Gamma_t = -1$

$U_t(t) = 0$

$U_e(t) = \frac{1}{2} e(t) - \frac{1}{2} e(t - 2\tau)$



3) $R_t = 3 R_c$

$\Gamma_e = 0$

$\Gamma_t = 1/2$

$U_e(t) = 1/2 e(t) + 1/4 e(t - 2\tau)$

