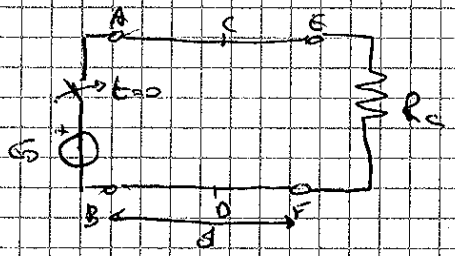
Esercitazione

ricordiamo: $a = \frac{1}{\sqrt{LC}}$ $\quad z_{00} = \sqrt{\frac{L}{C}}$ $\quad \Gamma_c = \frac{\frac{R_c}{z_{00}} - 1}{\frac{R_c}{z_{00}} + 1}$ $\quad \Gamma_g = \frac{\frac{R_g}{z_{00}} - 1}{\frac{R_c}{z_{00}} + 1}$

Linea senza perdite transitorio



$E_0 = 30\ V$ $\quad R_c = 100\ \Omega$ $\quad R_g = 50\ \Omega$ $\quad a = 200\ \frac{m}{\mu s}$

$d = 400\ m$

Dobbiamo trovare V e I per $x = \frac{d}{2}$ per t ~~μs~~

$V_{AB} = E_0 \quad \forall t$

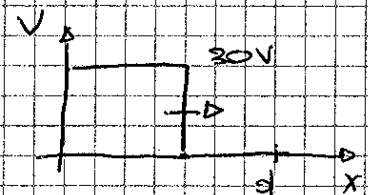
$V_{EF} = RI\ (x = d)$

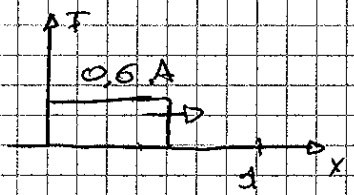
$V_t^+ = z_{00} I^+$ e $V^- = z_{00} I^-$ definiamo $t_0 = \frac{d}{a} = \frac{400\ m}{200\ \frac{m}{\mu s}} = 2\ \mu s$

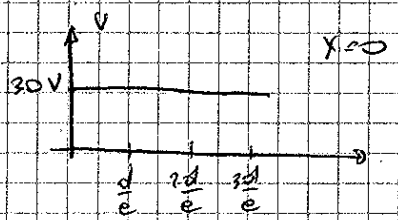
$\Gamma_c = \frac{2-1}{2+1} = 1/3$ $\quad \Gamma_g = \bullet - 1$

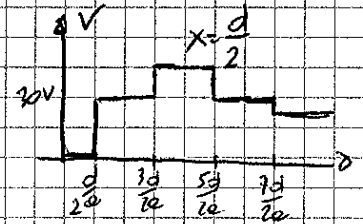
$\ominus \to \frac{d}{a}$ $\quad V = V_0 + V^+$ $\quad V^+ = E_0 = 30V$

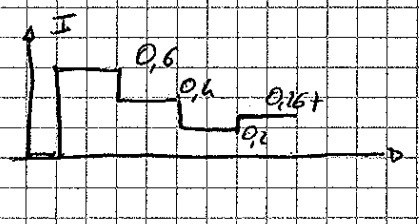
$i = i_0 + i^+$ $\quad i^+ = \frac{E_0}{z_{00}} = 0,6\ A$





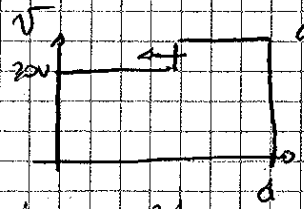


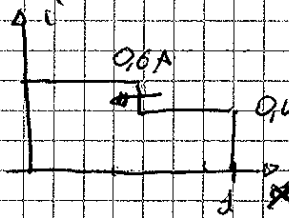




In $x = d$ a $t = \frac{d}{2}$

$\begin{cases} V = E_0 + V_2^- = 40 \\ i = 0,6 - \frac{V_2^-}{z_{00}} = 0,4\ A \end{cases}$ $\quad V_2^- = \frac{1}{3} E_0 = 10V$ $\quad i_2^- = 0,2\ A$



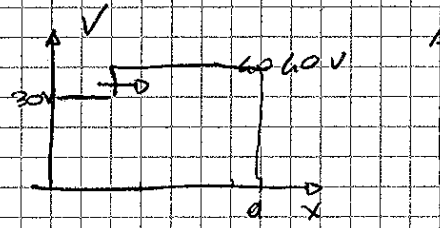


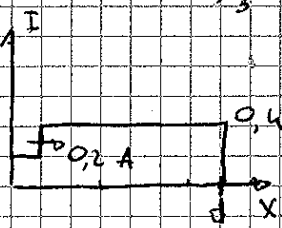
$\frac{d}{a} < t < \frac{2d}{a}$

in $x=0$ e $t=\frac{2d}{a}$

$V_3^+ = -V_2^- = -10\,V$

$i_3^+ = \frac{V_3^+}{z_{00}} = -0,2\,A$

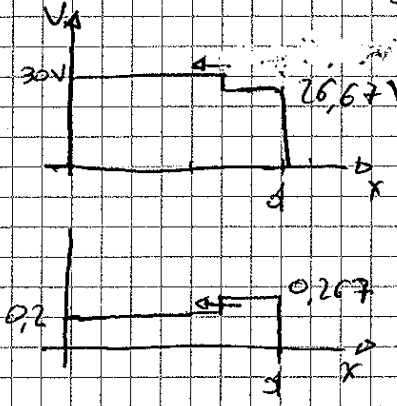




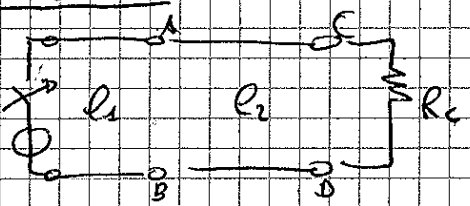
$\begin{cases} V = V_1^+ + V_2^- + V_3^+ = 30V \\ i = i_1 + i_2 + i_3 = 0,2\,A \end{cases}$

in $x=d$ e $t=\frac{3d}{2}$

$\begin{cases} V_4^- = \frac{1}{3} V_3^+ = -3,33\,V \\ i_4^- = -\frac{V_4^-}{z_{00}} = +0,067 \end{cases} \Rightarrow \begin{cases} V = 26,67\,V \\ i = 0,267\,A \end{cases}$



Esercizio 2



	c		d
Linea 1	1,56 $\frac{\mu H}{m}$	71 $\frac{pF}{m}$	10 km
Linea 2	0,44 $\frac{\mu H}{m}$	100 $\frac{pF}{m}$	500 m

$R_c = 50\,\Omega$

$E_0 = 10\,KV$

$V_{AB}(t) = ?$

$V_{CD}(t) = ?$

$v_1 = \frac{1}{\sqrt{l_1 c_1}} = 300,5 \frac{m}{\mu s}$

$v_2 = \frac{1}{\sqrt{l_2 c_2}} = 150,7 \frac{m}{\mu s}$

$0 \le t \le \frac{d_1}{v_1} + \frac{3d_2}{v_2}$

$0 \le t \le$ ~~30 μs~~ $33,3\,\mu s + 9,9\,\mu s = 43,2\,\mu s$

$z_{00_1} = 468\,\Omega$ $\quad z_{00_2} = 66,3$

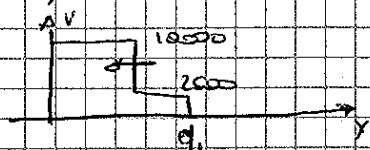
$\Gamma_{cg} = -1$

$\Gamma_{AB_1} = \frac{\frac{z_{00_2}+R_c}{z_{00_1}} + 1}{\frac{z_{00_2}+R_c}{z_{00_1}} + 1} = \frac{\frac{66,3}{468} + 1}{\frac{66,3}{468} + 1} = \frac{-0,7814}{1,2485} = \frac{-0,858}{1,1416} = -0,75$

Linea 1

$\begin{cases} V_1^+ = 10\,KV \\ i_1^+ = 21,36\,A \end{cases}$

$\begin{cases} V_2^- = \Gamma_{AB_1} \cdot V_1^+ = -7500\,V \\ i_2^- = -\frac{V_2^-}{z_{00_1}} = 16,02\,A \end{cases}$



Linea 2

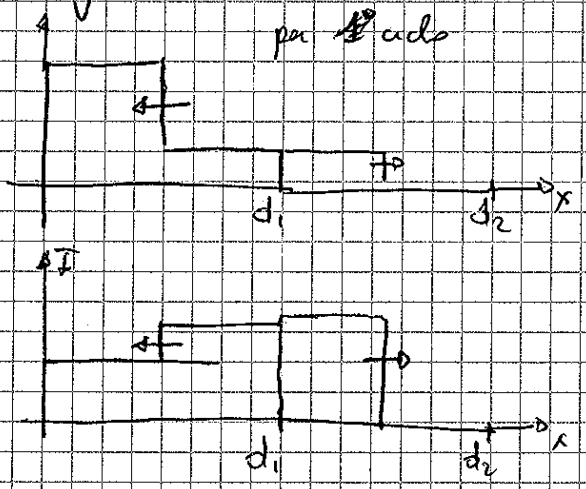
$V_{AB} = 2500\,V$

$\Gamma_{AB_2} = \frac{\frac{z_{00_1}}{z_{00_2}} - 1}{\frac{z_{00_1}}{z_{00_2}} + 1} = \frac{6,0588}{8,0588} = 0,75$

$\Gamma_c = \frac{-0,2458}{1,7541} = -0,14$

$V_1^+ = 2500\ V$

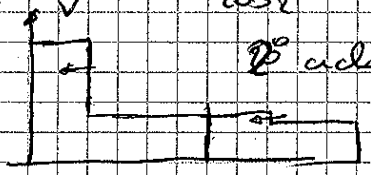
$I_1^+ = \frac{2500}{Z_{00}}\ V = 37,7\ A$

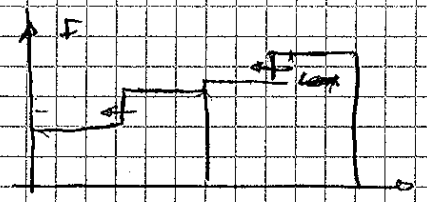


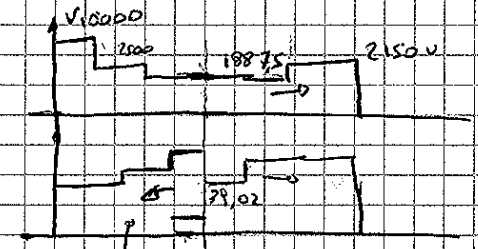
$V_3^+ = \Gamma_{A02}\ V_2^- = -262,5\ V$

$I_3^- = \frac{V_3^+}{Z_{002}} = -3,96\ A$

$\begin{cases} V_2^- = \Gamma_C\ V_1^+ = -350\ V \\ I_2^- = -\frac{V_2^-}{Z_{002}} = 5,28 \end{cases}$







$\frac{1887,5}{Z_{001}} =$