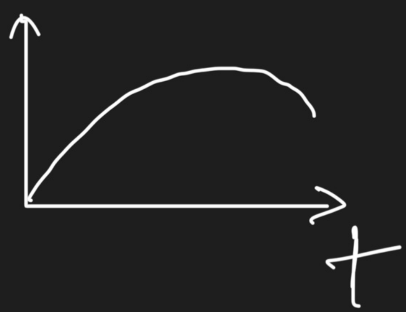
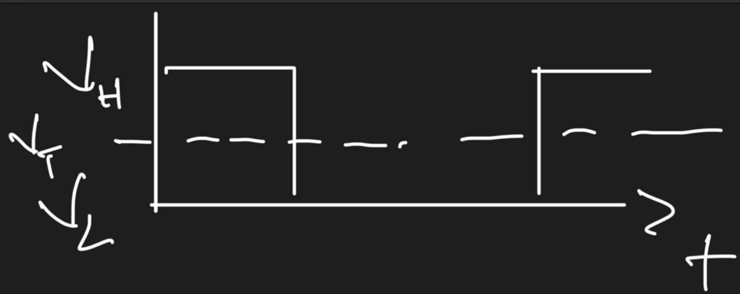
I. Analogică



Electronica Numerică

Impuls IDEAL



V_T threshold (prag)

$$\begin{cases} \text{Voltage High} \in (-u ; +u) \\ \text{Low} \in (-u ; +u) \end{cases}$$

$$\boxed{V_H > V_L}$$

Practica: $V_H = +U$ ex $(+3 ; +5)$

$V_L = 0V$ ✓

$< \text{prag} \rightarrow V_L$ inf.

$> \text{prag} \rightarrow V_H$ sup.

$V_H \rightarrow 1$ logic

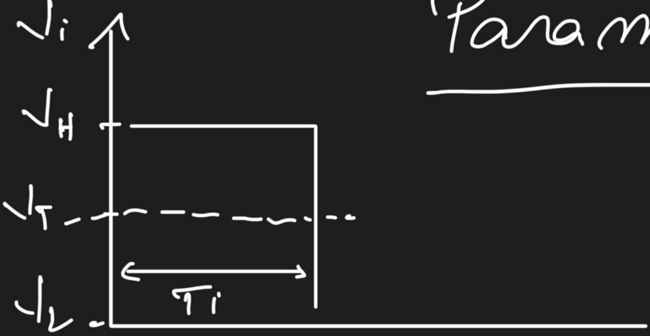
$V_L \rightarrow 0$ logic

Circuitele numerice

Dublă natură

- Electronica (tranzistori, diode, rez.)
- Logică
  - DA
  - NU
  - Si – Si-NU
  - SAU – SAU-NU

Impuls Ideal (semnal numeric ideal)



Parametrii

1) V_H, V_L [V]

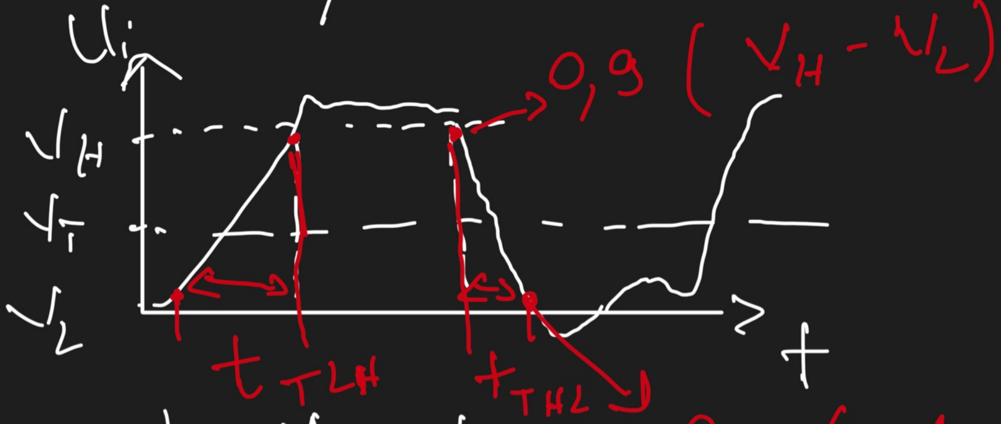
2) V_T ideal $\frac{V_H + V_L}{2} = V_T$ [V]

3) T_i (durata impuls) [s]

4) T (durata de repetiție) [s] $F = \frac{1}{T}$ [Hz]

Circuit numeric ideal $U_e \in [V_H; V_L]$

Impuls Real



1) V_H, V_L

2) V_T

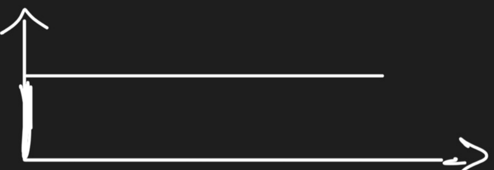
3) T_i $\left(\frac{V_H + V_L}{2}\right)$

4) T

5) t_{TLH} ; t_{THL}

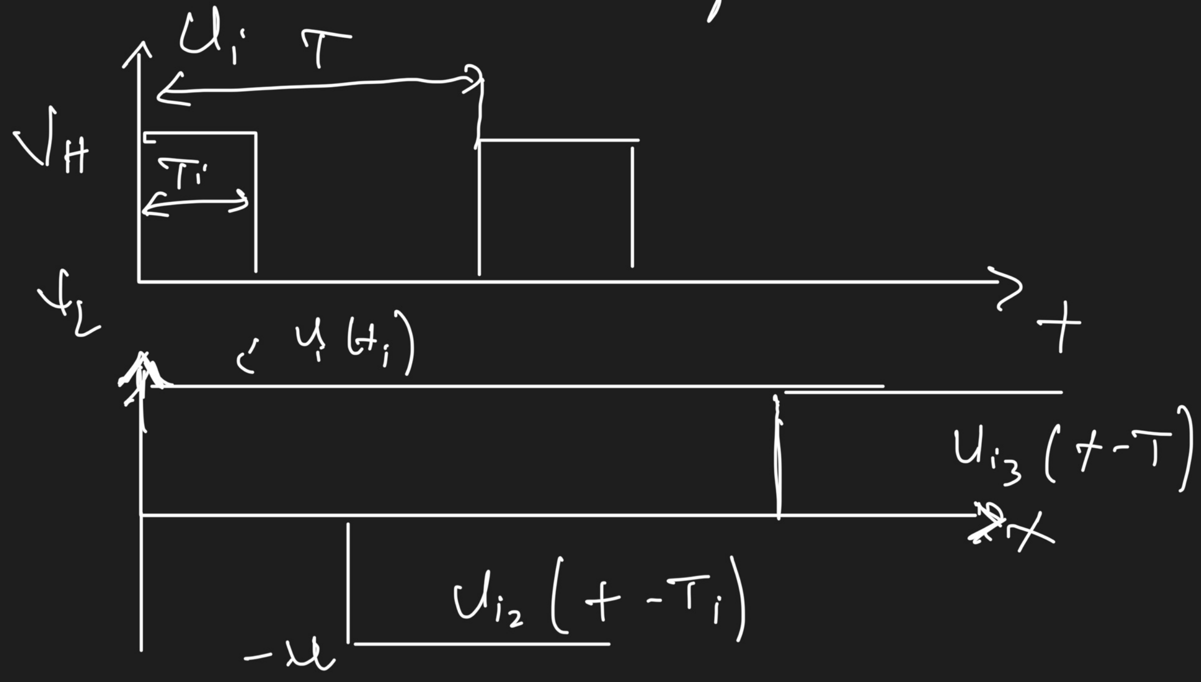
Semnale de bază

A) sem. treaptă

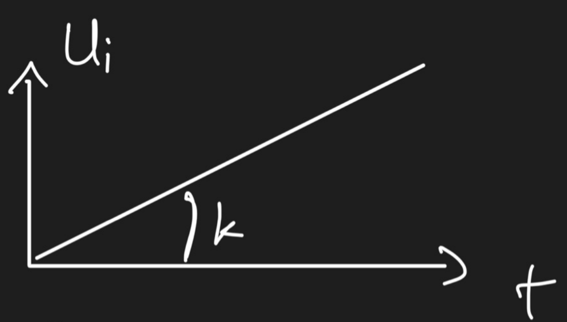


$$U_i \in \begin{cases} 0^V, & t<0 \\ u_1, & t \geq 0 \end{cases}$$

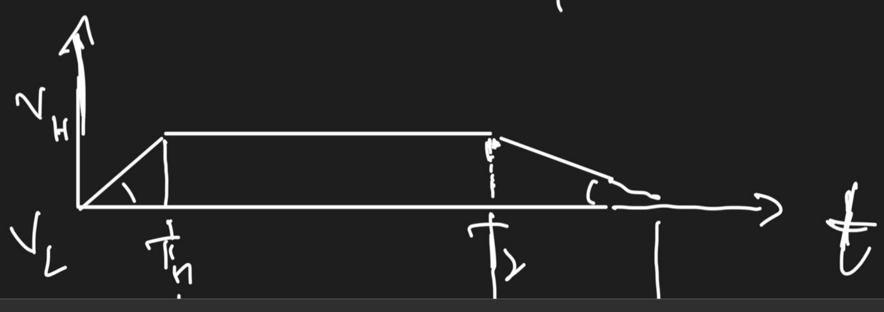
ex. impulsul este format din sume de sem. treaptă

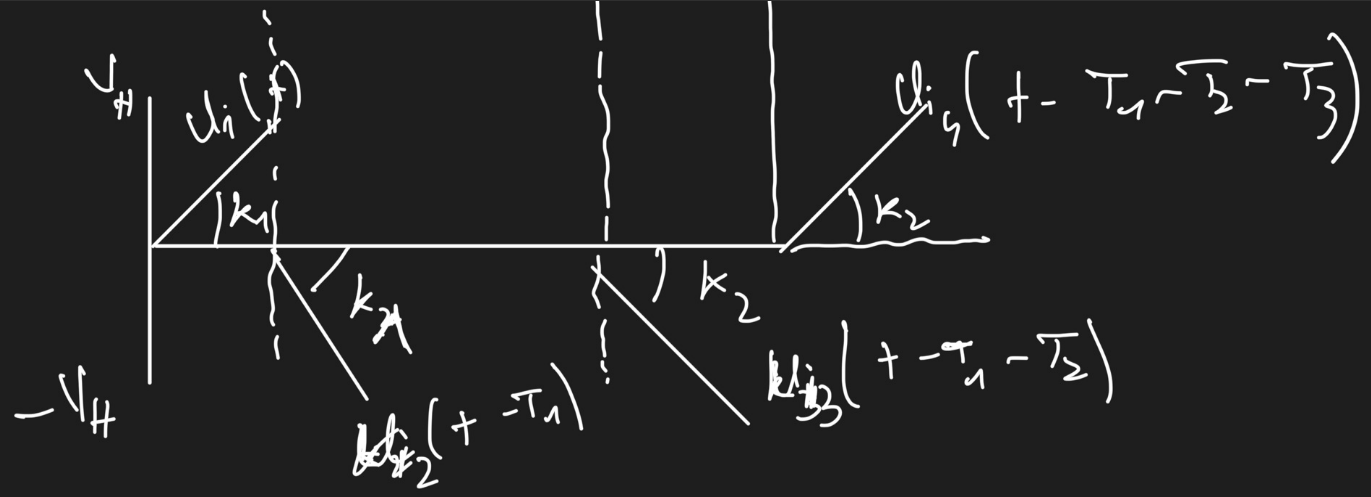


Sem. liniare variabile

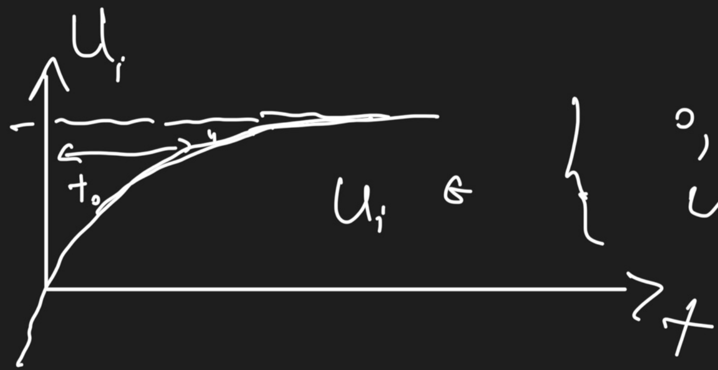


$$U_i = \begin{cases} 0^V, & t<0 \\ kt, & t \geq 0 \end{cases}$$





Sem. exp.



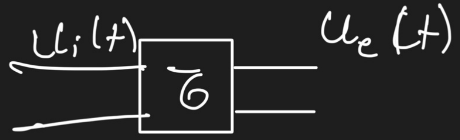
$$U_i = \begin{cases} 0, & t<0 \\ u\left(1-e^{-\frac{t}{\tau}}\right) \end{cases}$$

τ - const. timp

$$\boxed{\text{Analiza circ. numerice}}$$

a) Metoda integro-diferentiala
$\rightarrow$ o singura τ

b) met. suprapunerii sem



$$\frac{d\,u_e(t)}{dt}\tau + u_e(t) = u_i(t)$$

$$u_e(t) = u_{e1}(t) + u_{e2}(t)$$

$u_{e1}(t)$ = răsp. ec. dif.

$$\frac{d\,u_{e1}(t)}{dt}\tau = 0$$

$$u_{e1}(t) = A\,e^{-\frac{t}{\tau}}$$

$$u_e(t) = u_{e2}(t) + A e^{-\frac{t}{\tau}}$$

a) pt $t \to \infty$

$$u_e(\infty) = u_{e2}(\infty)$$

$$u_e(t) = u_e(\infty) + A\cdot e^{-\frac{t}{\tau}}$$

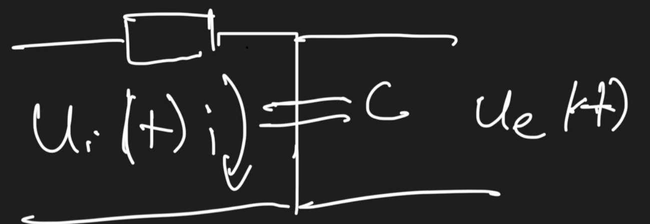
b) pt $t = 0$

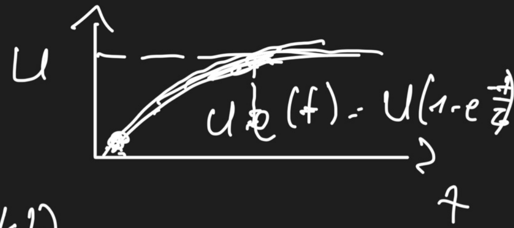
$$u_e(0) = u_e(\infty) + A$$

$$A = u_e(0) - u_e(\infty)$$

$$u_e(t) = u_e(\infty) + \left[u_e(0) - u_e(\infty)\right]\cdot e^{-\frac{t}{\tau}}$$

Fie circuitul





$X_C = \frac{1}{\omega C}$

$\omega = 2\pi F$

pt $t=0$, $F=\infty$

$\rightarrow X_C = 0$

$\rightarrow u_{e_0} = 0$

pt $t=\infty$ $F=0$

$X_C = \infty$, $i=0$

$u_e(\infty) = U$

$t_r = t_2 - t_1$

$$u_e(t_2) = 0,9\,U = u_e(\infty) + [u_e(0) - u_e(\infty)]\, e^{-\frac{t}{\tau}}$$

$$t_2 = \tau \ln \frac{u_e(\infty) - u_e(0)}{u_e(\infty) - u_e(t_2)}$$

$t_1 =$ —||—

$$t_r = \tau \ln \frac{u_e(\infty) - u_e(t_1)}{u_e(\infty) - u_e(t_2)}$$

$$= RC \ln \frac{U - 0,1U}{U - 0,9U}$$

$$= RC \ln 9 \simeq 2,3\, RC$$