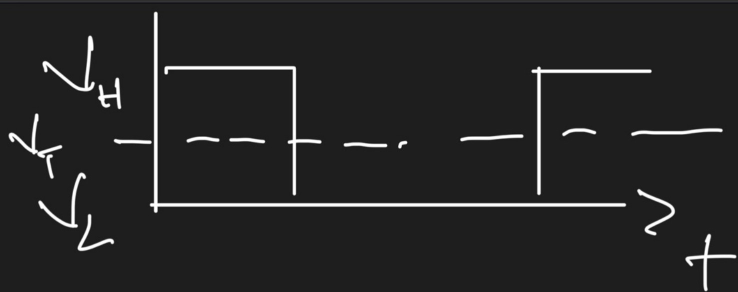
E. Analogică

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 $(+3 ; +5)$

$V_L = 0V$ ✓

< prag → V_L inf.

> prag → V_H sup.

V_H → 1 logic

V_L → 0 logic

Circuitele numerice

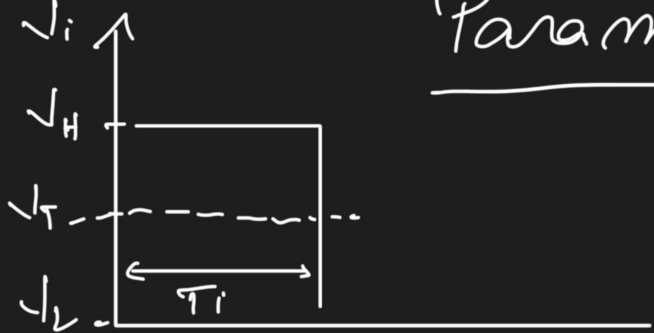
↓

Dublă natură

→ Electronica (tranzistori, diode, rez.)

→ Logică ← DA, NU, Şi – Şi-NU, SAU – SAU-NU

Impuls Ideal (semnal numeric ideal)



Parametrii

1) V_H, V_L [V]

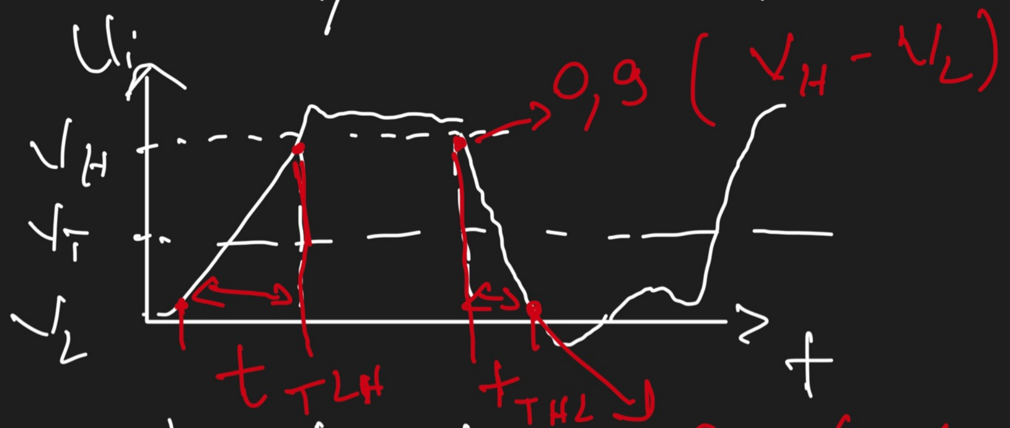
2) V_T ideal $\frac{V_H + V_L}{2} = V_T$ [V]

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



$0,1(V_H - V_L)$

1) V_H, V_L

2) V_T

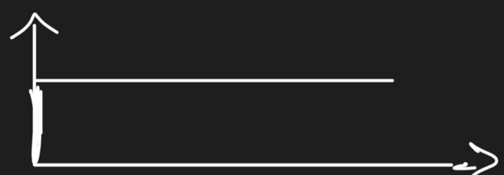
3) T_i $\left(\frac{V_H + V_L}{2}\right)$

4) T

5) $t_{TLH}; t_{THL}$

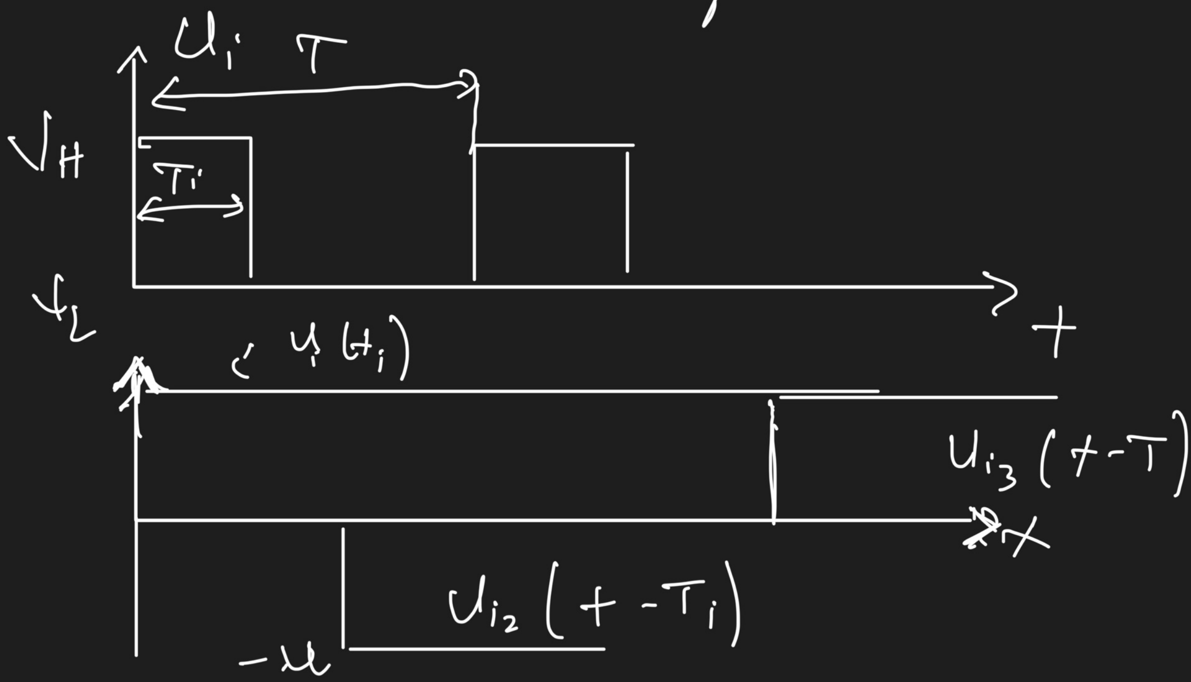
Semnale de bază

A) sem. treaptă

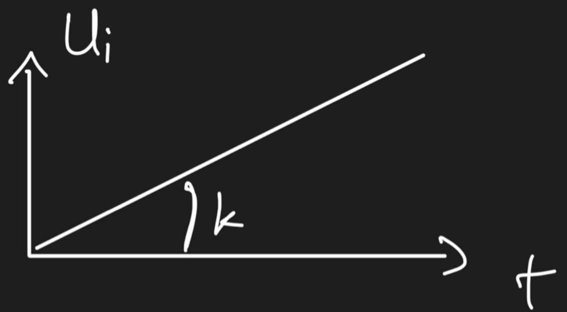


$$U_i \in \begin{cases} 0^V, & t<0 \\ u_1, & t\geq 0 \end{cases}$$

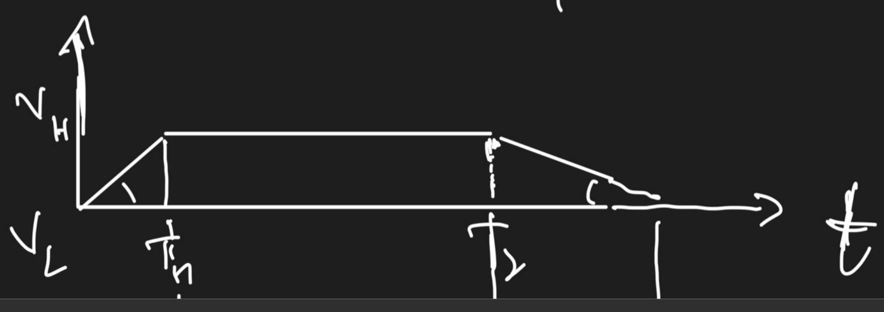
ex. impulsul este format din sume de sem. treaptă

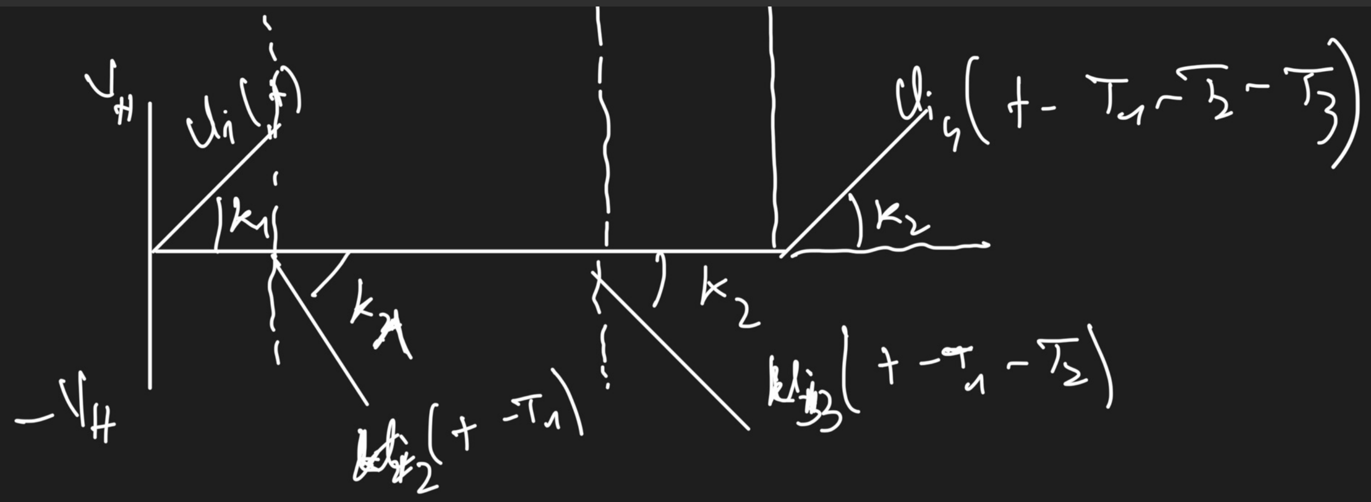


Sem. liniare variabile

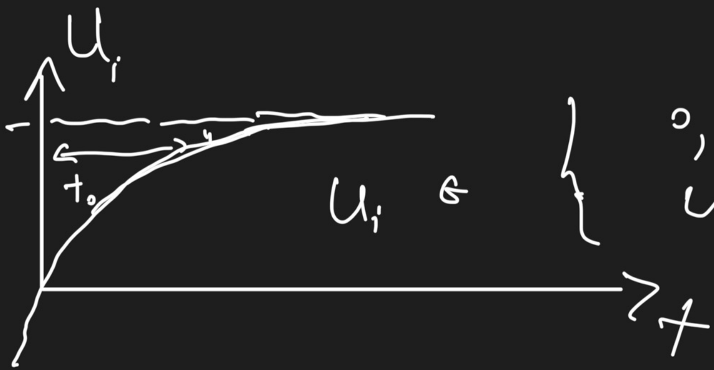


$$U_i = \begin{cases} 0^V, & t<0 \\ kt, & t\geq 0 \end{cases}$$





Sem. exp.



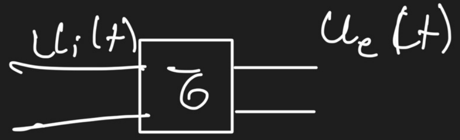
$$U_i = \begin{cases} 0, & t<0 \\ u\left(1-e^{-\frac{t}{\tau}}\right) \end{cases}$$

τ - const. timp

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

a) Metoda integro-diferentiala
→ 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 $t \to \infty$

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

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

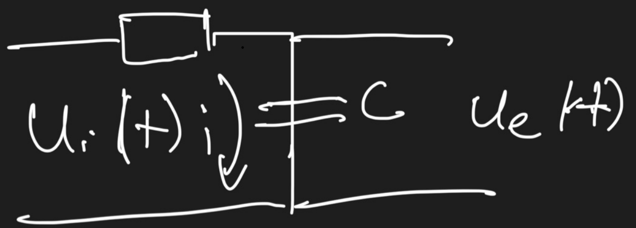
b) pt $t = 0$

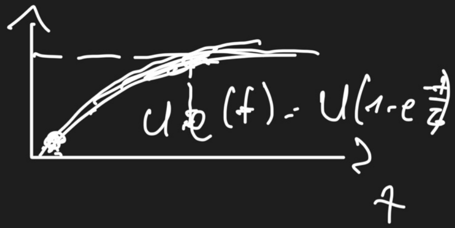
$$u_e(0) = u_e(\infty) + A$$

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

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

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 $t=\infty$ $F=0$
$X_C = \infty$, $i=0$
$U_e(\infty) = U$

$$t_r = t_2 - t_1$$

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

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

$t_1 =$ —ll—

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

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

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