

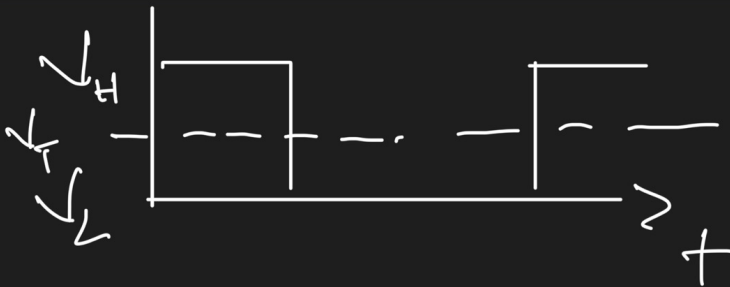
E. Analogică



Electronica Numerică



Impuls IDEAL



threshold
(prog)

Voltage High $\in (-u; +u)$
Low $\in (-u; +u)$

$$V_H > V_L$$

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

$V_L = 0$

$$\begin{cases} < \text{prog} \rightarrow V_L \text{ inf.} \\ > \text{prog} \rightarrow V_H \text{ sup.} \end{cases}$$

$$\begin{cases} V_H \rightarrow 1 \text{ logic} \\ V_L \rightarrow 0 \text{ logic} \end{cases}$$

Circuitele numerice

Dublă natură

Electronica (transistori, diode, rez.)

Logică

SA

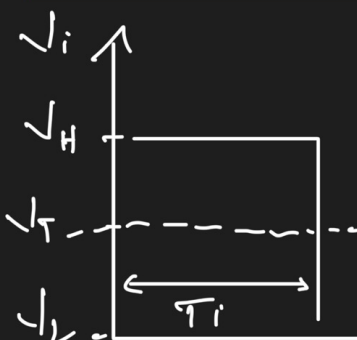
NU

SI - SI-NU

SATU - SATU-NU

Impuls Ideal (semnal numeric ideal)

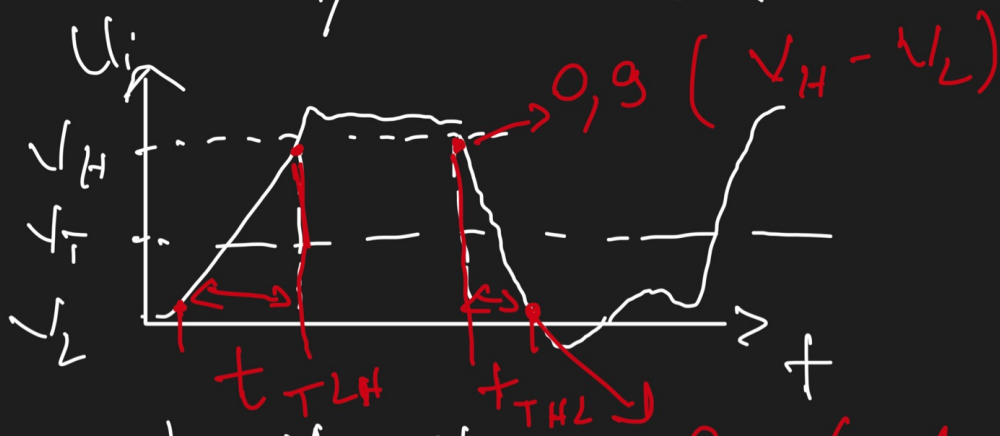
Parametri



- 1) V_H, V_L [V]
- 2) V_T ideal $\frac{V_H + V_L}{2} \approx V_T$ [V]
- 3) T_i (durata impuls) [s]
- 4) T (durata de repetitie) [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

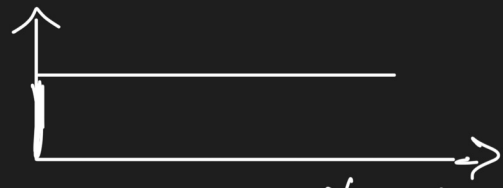
- 3) T_i $\left(\frac{V_H + V_L}{2} \right)$

- 4) T

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

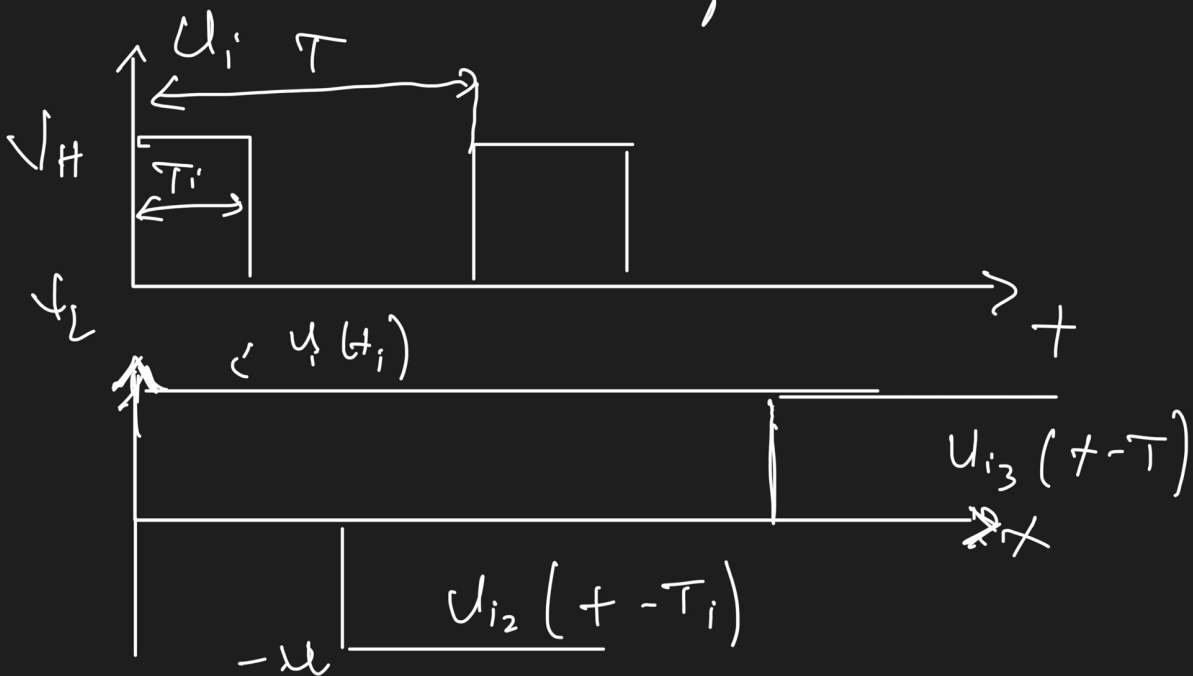
Semnale de bază

A) sem. treaptă

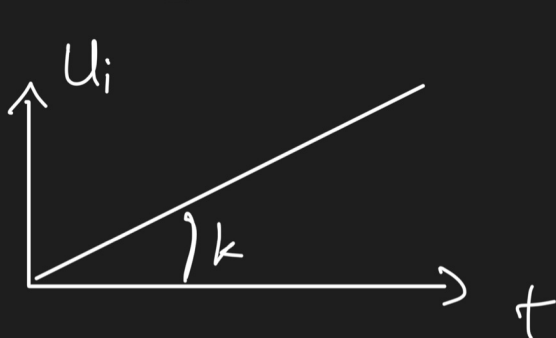


$$u_i \in \begin{cases} 0, & t < 0 \\ u_1, & t \geq 0 \end{cases}$$

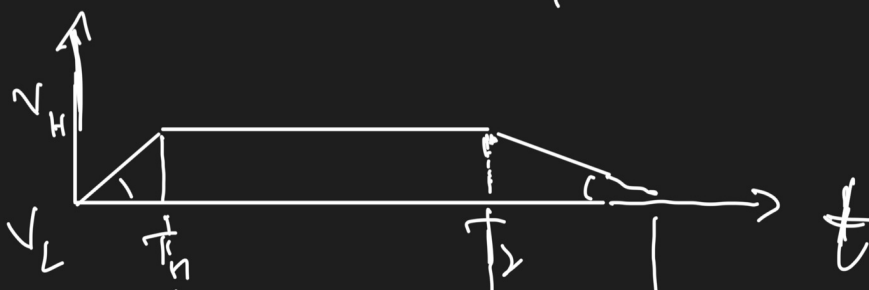
ex. impulsul este format din
sume de sem. treaptă

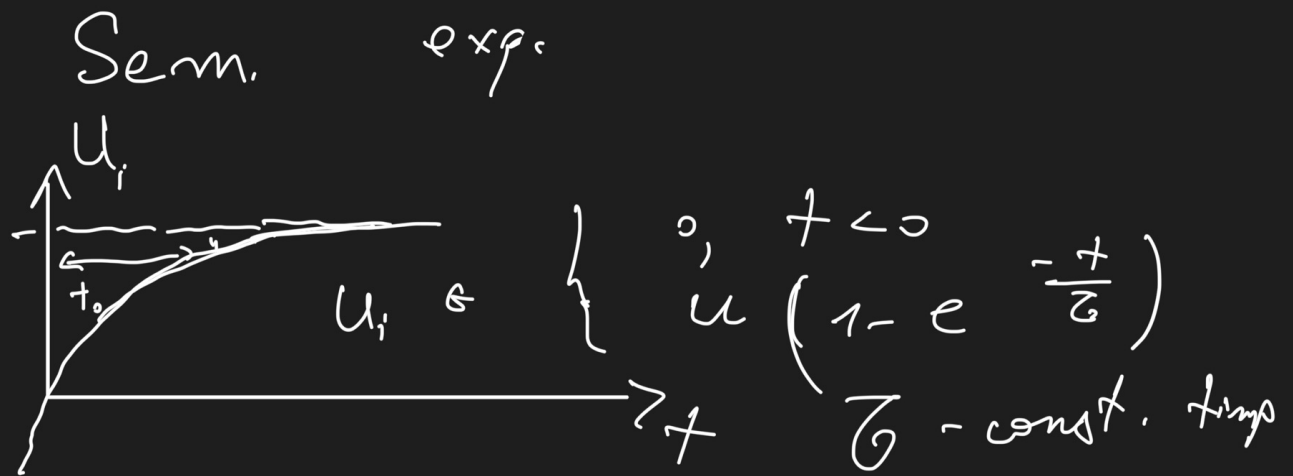
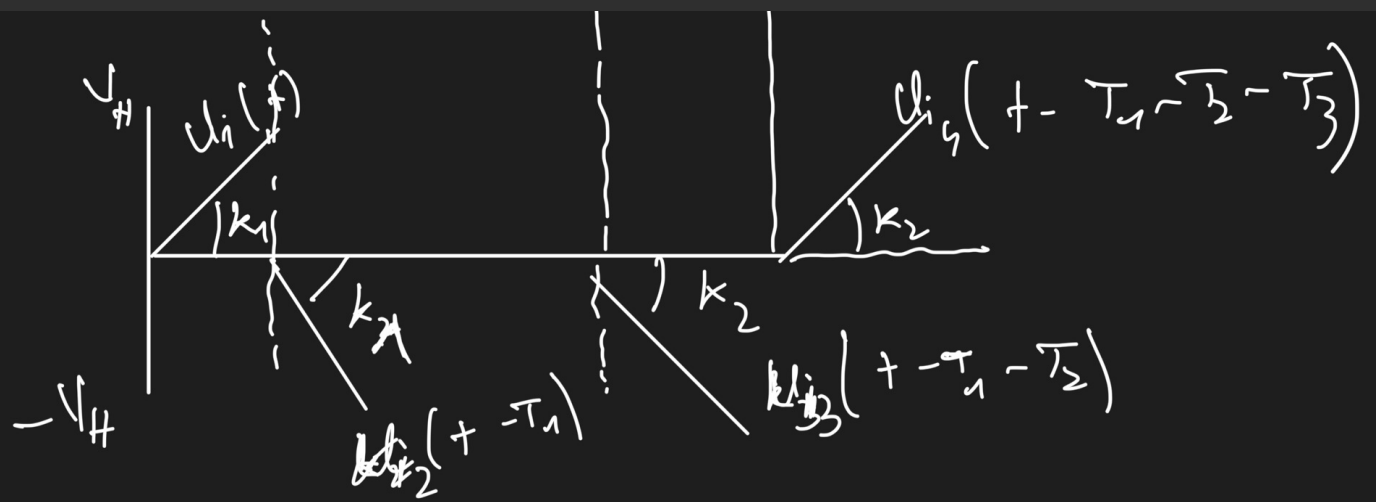


Sem. liniare variabile



$$u_i = \begin{cases} 0, & t < 0 \\ kt, & t \geq 0 \end{cases}$$

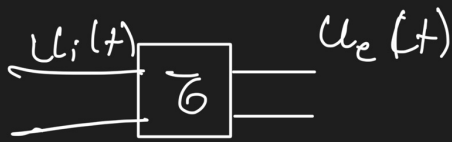




Analiza chc. numerice

a) metode integra - diferențiale
 \rightarrow o singură

b) met. suprapunerii sem



$$\bullet \quad \frac{d U_e(t)}{dt} \tau + U_e(t) = U_i(t)$$

$$U_e(t) = U_{e1}(t) + U_{e2}(t)$$

$$U_{e1}(t) = \text{imp. - ec. dif.}$$

$$\bullet \quad \frac{d U_{e1}(t)}{dt} \tau = 0$$

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

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

$$a) \quad t \rightarrow \infty$$

$$U_e(\infty) = U_{e2}(\infty)$$

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

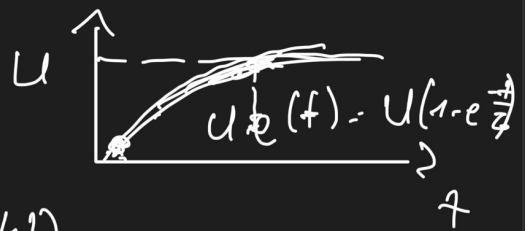
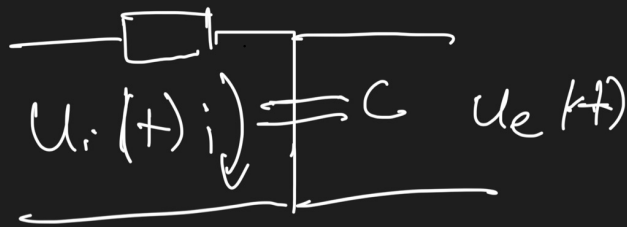
$$b) \quad t = 0$$

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

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

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

Free circuit



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

$$\omega = 2\pi F$$

$$\left\{ \begin{array}{l} \text{at } t=0, F=\infty \\ \rightarrow X_C = 0 \\ \rightarrow U_{e0} = 0 \\ \text{at } t=\infty, F=0 \\ X_C = \infty, i=0 \\ U_e(\infty) = U \end{array} \right.$$

$$t_2 = \frac{1}{2} t_1$$

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

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

$$t_1 = -\tau$$

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

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

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