

Bipoli Lineari DINAMICI

Caratteristica del condensatore

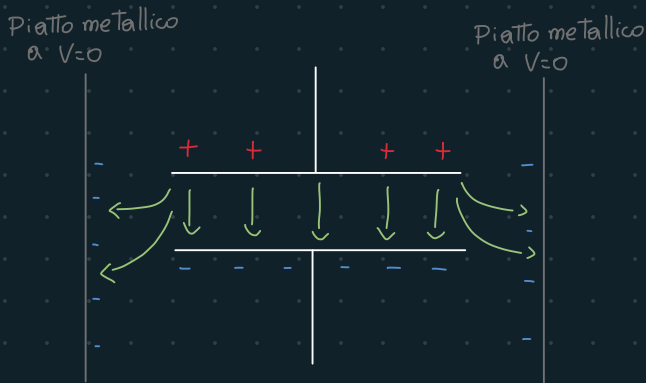
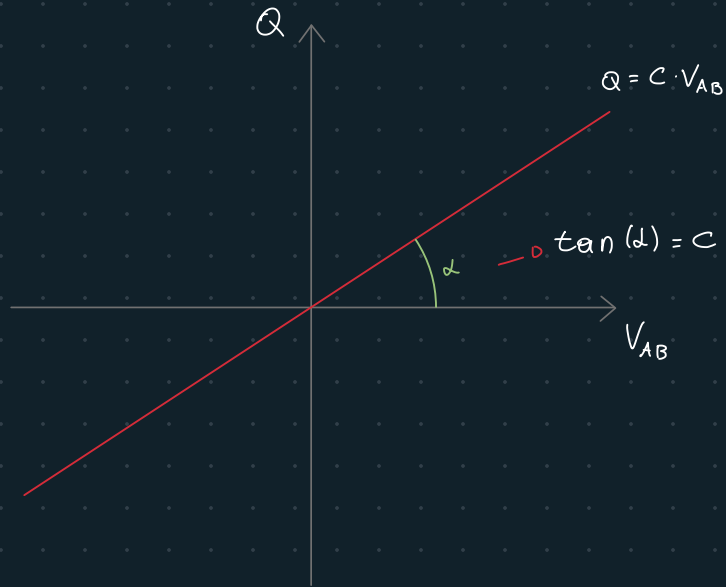
$$Q = \underbrace{C}_{\substack{\text{CARICA} \\ \text{TOT} \\ \text{Capacità}}} \cdot \underbrace{V_{AB}}_{\text{Potenziale}} \quad (1)$$

$$[C] = \frac{Q}{V} \xrightarrow{\text{"E' definito da"}} \frac{A}{V} \text{ Farad}$$

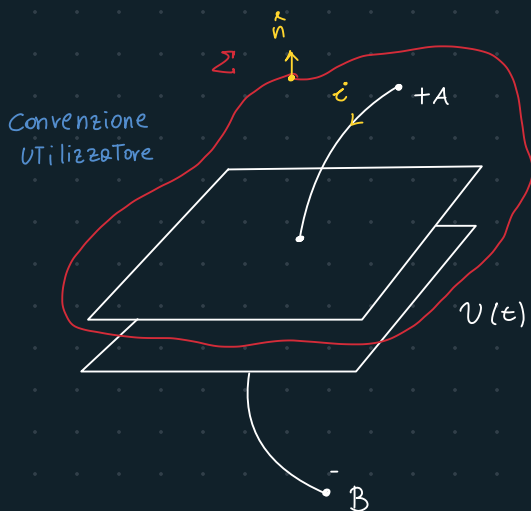
Se $d \ll S$

$$C = \epsilon \frac{S}{d}$$

ϵ : costante dielettrica del mezzo
 S : Superficie
 d : distanza tra le piastre



Ricaricare la caratteristica



Conservazione della carica

$$i_{\Sigma}(t) = - \frac{dq_{\Sigma}}{dt}$$

$$\boxed{-i(t)} = - \frac{dq_{\Sigma}}{dt} \quad (2)$$

Con il verso scelto (n)
 $i_{\Sigma} = -i(t)$ perché "entra" nella superficie

$$C = \frac{Q}{V_A V_B} \rightarrow Q = C \cdot (V_A - V_B) \quad (1)$$

$$\text{ma } i(t) = \frac{dQ}{dt} \rightarrow i(t) = \overset{\text{cost}}{C} \frac{dV_{AB}}{dt}$$

$$\Rightarrow i(t) = C \cdot \frac{dV_{AB}}{dt} \quad \text{Caratteristica Condensatore}$$

$$i(t) = -C \cdot \frac{dV_{AB}}{dt} \quad \begin{array}{l} \text{Caratteristica} \\ \text{Condensatore} \\ \text{Convenzione} \\ \text{Generatore} \end{array}$$

SE C dipende da t

$$\rightarrow i(t) = \frac{d}{dt} [C \cdot V_{AB}] = \left(\frac{dC}{dt} \right) V_{AB} + C \cdot \frac{dV_{AB}}{dt}$$



Condensatore
Tempo-Variante

MICROFONO

$$\int_{t_0}^t i(\tau) d\tau = C \int_{t_0}^t \frac{dV}{d\tau} d\tau$$

$$\Rightarrow \int_{t_0}^t i(\tau) d\tau = C \cdot [V(t) - V(t_0)]$$

$$\Rightarrow V(t) = V(t_0) + \frac{1}{C} \int_{t_0}^t i(\tau) d\tau$$

Tensione in funzione della corrente

STORE

$$P_a(t) = v(t) \cdot i(t) = v \cdot C \frac{dv}{dt} = \frac{1}{2} C \frac{dv^2}{dt} = \frac{d}{dt} \left(\frac{1}{2} C v^2 \right)$$

$\frac{dv^2(t)}{dt} = 2v(t) \frac{dv}{dt}$

Potenza
Assorbita

$$P_a(t) = \frac{dU_a}{dt} \Rightarrow U_a \approx \frac{1}{2} C v^2 \quad \text{Energia immagazzinata}$$

$$U_a(t, t_0) = \int_{t_0}^t \frac{d}{dt} \left(\frac{1}{2} C v^2(\tau) \right) dt = \frac{1}{2} C v^2(t) - \frac{1}{2} C v^2(t_0)$$

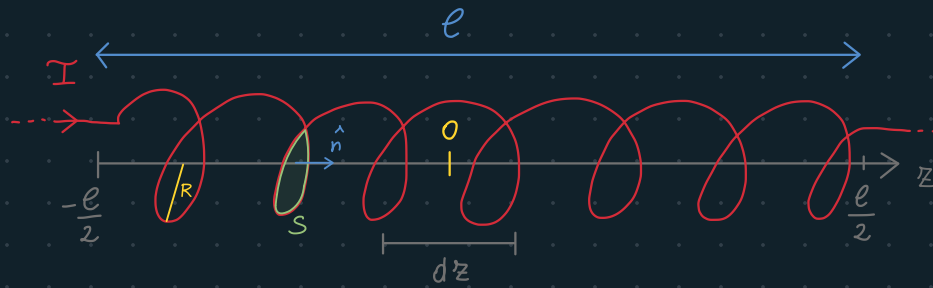
Intervallo
di tempo

$$t_0 \rightarrow v(t_0) = 0 \Rightarrow U_a = 0 \quad \text{Condizione iniziale} \quad (1)$$

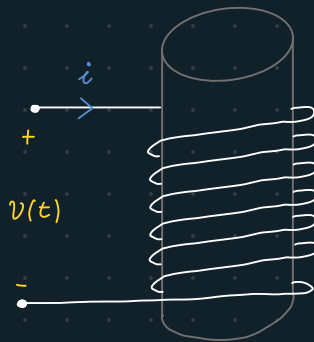
$$t_1 > t_0 \rightarrow v(t_1) > v(t_0) \Rightarrow U_a(t_1, t_0) > 0 \quad \text{Carica} \quad (2)$$

$$t_2 > t_1 \rightarrow v(t_2) < v(t_1) \Rightarrow U_a(t_2, t_1) < 0 \quad \text{Scarica} \quad (3)$$

II Solenoide



Caratteristica
del Solenoide



$$\phi = L \cdot i(t)$$

↑
Autoinduzione
Induttanza

$$[L] = \frac{V}{A} \cdot s = \Omega \cdot s$$

Ohm
↑
Secondi

$$v \propto \frac{d\phi}{dt} \rightarrow [\phi] = V \cdot s \triangleq \text{Weber}$$

$$[\phi] = T \cdot m^2$$

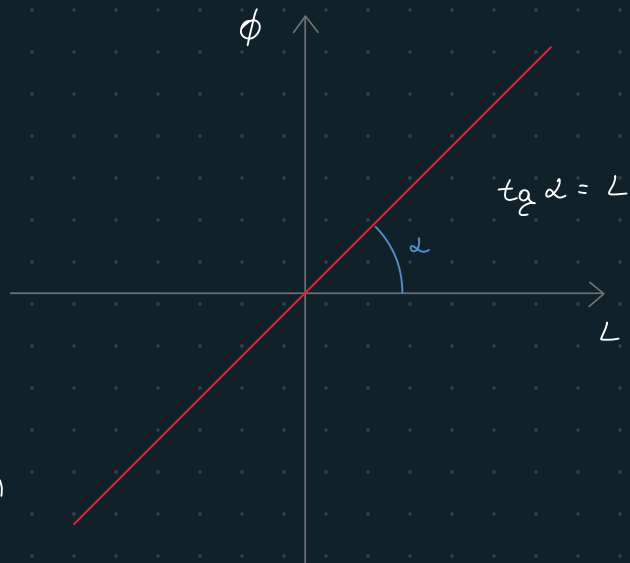
$$[B] = T \leftarrow \text{Tesla}$$

$$[L] = \frac{[\phi]}{[i]} = \frac{V}{A} \cdot s = \Omega \cdot s = \text{Henry}$$

Calcolare l'induttanza

per un Solenoide molto "Lungo"
H.p. $l \gg R$

$$L = \mu N^2 \frac{S}{l} \quad \text{con} \quad L > 0$$



Caratt
Faraday

$$\begin{cases} \phi = L \cdot i(t) \\ v = \frac{d\phi}{dt} \end{cases} \Rightarrow v(t) = L \frac{di(t)}{dt}$$

Convenzione
Utilizzatore

