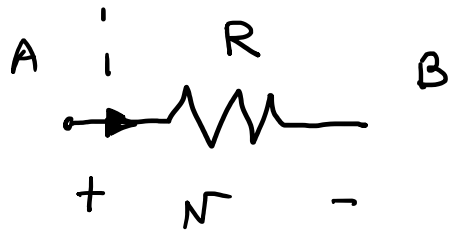


RESISTORE LINEARE TEMPO INVARIANTE

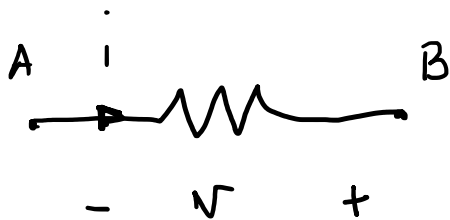


$$R = \text{RESISTENZA } (\Omega)$$

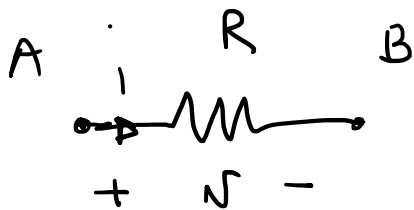
$$V(t) = R i(t)$$

LINEARE \rightarrow R INDIPENDENTE DA i e DA V

TEMPO INVARIANTE \rightarrow R INDIPENDENTE DA t



$$V(t) = -R i(t)$$



$$P_{ASS}(t) = v(t) i(t)$$

$$v(t) = R i(t)$$

CONTROLLATO IN CORRENTE : SE CONOSCO LA CORRENTE ,
 DALLA EQUAZIONE COSTITUTIVA , POSSO CALCOLARE
 LA TENSIONE

$$P_{ASS}(t) = R i(t) \cdot i(t) = R i^2(t)$$

Se $R > 0 \Rightarrow P_{ASS}(t) \geq 0$ $P_{ASS}(t) = 0$ se e solo se $i(t) = 0$

$R < 0 \Rightarrow P_{ASS}(t) \leq 0$ " " "

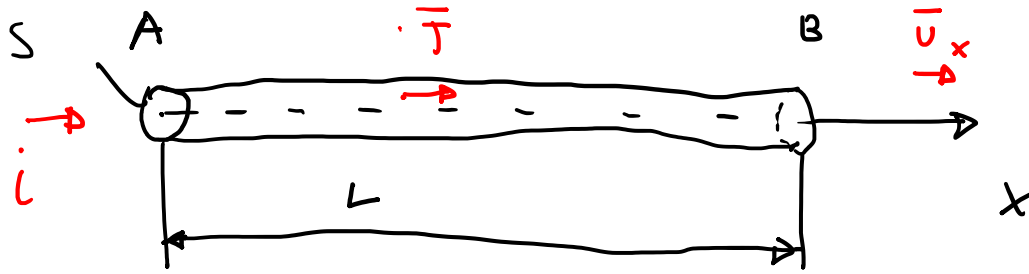
$P_{ASS}(t) \geq 0$

COMPONENTE PASSIVO

$P_{ASS}(t) < 0$

"

ATTIVO



N_{AB}

CORRENTE
UNIFORMEMENTE
DISTRIBUITA NELLA
SEZIONE TRASVERSALE

$$\vec{J} = \frac{i}{S} \vec{u}_x \quad \vec{E} = \frac{N_{AB}}{L} \vec{u}_x$$

ρ = RESISTIVITA' ELETTRICA
DEL MATERIALE ($\Omega \cdot m$)

$$\vec{E} = \rho \vec{J}$$

σ_e = CONDUCEBILITA' ELETTRICA

$$\vec{J} = \sigma_e \vec{E} \quad \left(\frac{S}{m} \right) \quad \sigma_e = \frac{1}{\rho_e} \quad \rho \neq 0$$

$$\frac{N_{AB}}{L} \vec{u}_x = \rho_e \frac{i}{S} \vec{u}_x \quad \Rightarrow$$

$$N_{AB} = \left(\frac{\rho_e L}{S} \right) i$$

T = TEMPERATURA
(K)

$$R = \rho_e \frac{L}{S} > 0$$



$$N_{AB} = R i$$

$$\rho_e(T) = \rho_e(T_0) \left[1 + \alpha \cdot (T - T_0) \right]$$

α = COEFF. DI TEMPERATURA
($\frac{\Omega \cdot m}{K}$)

$$V(t) = R(T) i(t)$$

1) $T(t)$ È NOTA $\Rightarrow R(T(t))$

T COSTANTE
NOTA

2) $T(t)$ È INCOGNITA \Rightarrow




R = COSTANTE

$C(T)$ CAPACITÀ TERMICA DEL FILO

$$C(T) \frac{dT}{dt} = R(T) i^2(t) - h S_L (T(t) - T_{AMB})$$

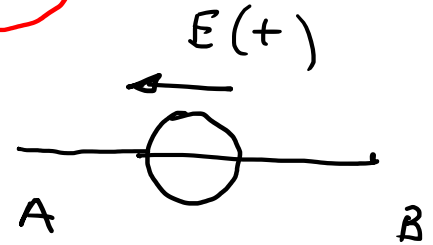
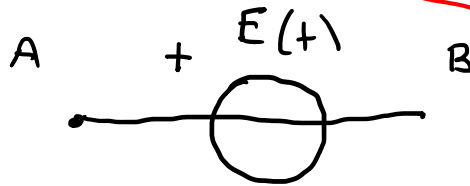
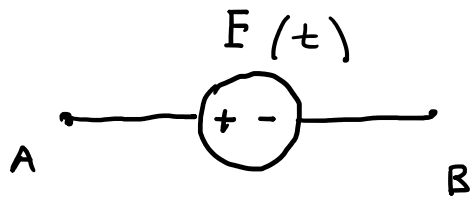
T_{AMB} = TEMPERATURA AMBIENTE (K)

 S_L = SUPERFICIE LATERALE DEL FILO

$R i^2$ = POTENZA DISSIPATA PER EFFETTO JOULE
(CALORE PRODOTTO NEL FILO)

h = COEFFICIENTE DI SCAMBIO TERMICO

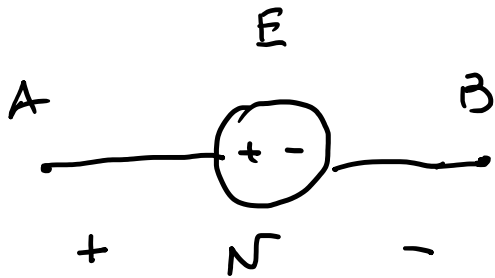
GENERATORE DI TENSIONE INDIPENDENTE



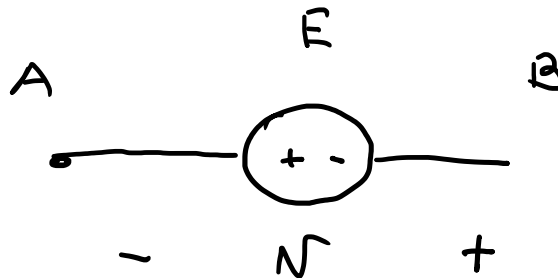
$E(t) =$ TENSIONE IMPRESSA (V) = FUNZIONE QUALSIASI DEL TEMPO NOTA

$$V_{AB}(t) = E(t)$$

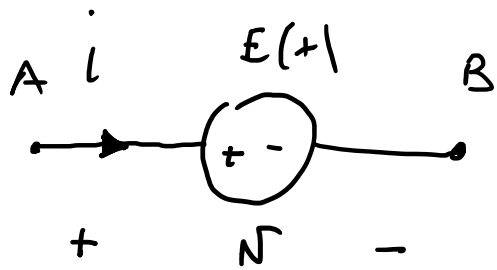
→ IL GENERATORE DI TENSIONE IMPONE LA TENSIONE DI RANGO



$$V(t) = E(t)$$



$$V(t) = -E(t)$$

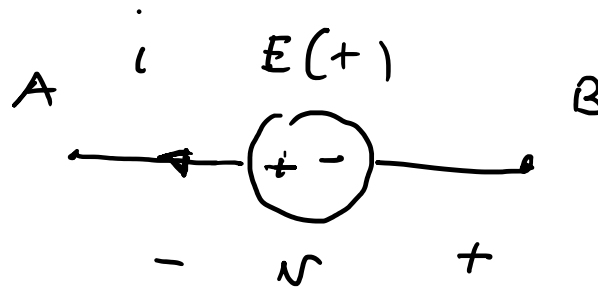


$$N(t) = N_{AB}(t) = E(t)$$

$$P_{ASS}(t) = N(t) i(t)$$

$$P_{ASS}(+) = E(t) i(t)$$

$$P_{GEN}(+) = -E(t) i(t)$$



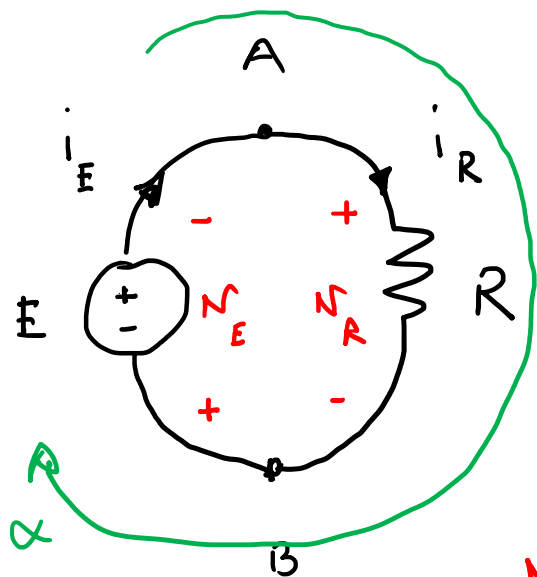
$$N(t) = N_{BA}(t) = -E(t)$$

$$P_{ASS}(+) = N(t) i(t)$$

$$P_{ASS}(t) = -E(t) i(t)$$

$$P_{GEN}(+) = E(t) i(t) \stackrel{!}{\geq} 0$$

COMPONENTE ATTIVO \Rightarrow PUO' GENERARE POTENZA



VERS. POSITIVI DELLE TENSIONI DI
 RAO N_E, N_R COLLEGATI A QUELLI
 DELLE CORRENTI MEDIANTE REGOLA
 UTILIZZATORE

$$\begin{array}{l}
 N = 2 \quad \text{NOBI} \\
 N_{\text{RAOI}} = 2
 \end{array}
 \left\{
 \begin{array}{l}
 \text{L.K.C. } (N-1) = 1 \\
 \text{L.K.T. } (N_{\text{RAOI}} - N + 1) = 1 \\
 \text{EQ. COSTITUTIVE : } N_{\text{RAOI}} = 2
 \end{array}
 \right.$$

$$E = 10 \text{ V}$$

$$R = 5 \Omega$$

$$i_R = i_E = i = \frac{E}{R} = \frac{10}{5} = 2 \text{ A}$$

$$P_R = R i^2 = 5 \times 2^2 = 20 \text{ W}$$

$$P_E = E i = 10 \times 2 = 20 \text{ W}$$

$$P_E = P_R$$

$P_R = \text{POT. ASSORBITA DA } R$, $P_E = \text{POT. GENERATA DA } E$

$$\text{L.K.C. A) } -i_E + i_R = 0 \Rightarrow i_R = i_E = i$$

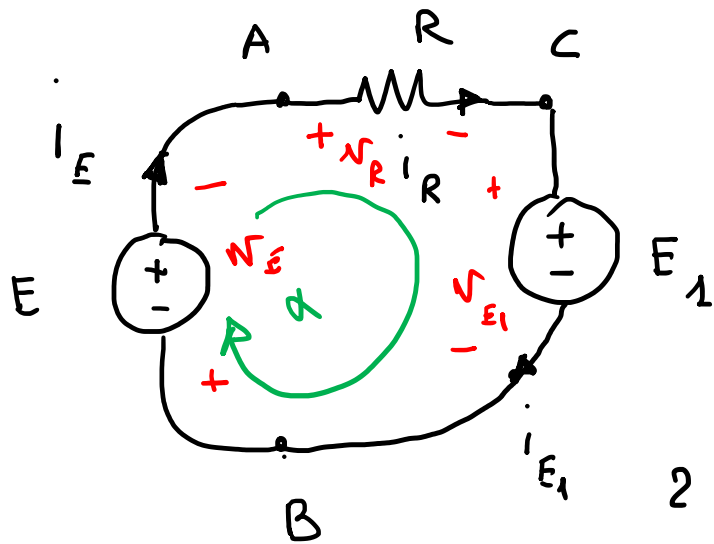
$$\text{L.K.T. } \alpha) N_R + N_E = 0 \Rightarrow R i - E = 0 \Rightarrow i = \frac{E}{R}$$

EQ. RES.

$$N_R = R i_R \Rightarrow N_R = R i$$

" GEN.

$$N_E = -E$$



$$E = 10 \text{ V} , R = 5 \Omega , E_1 = 20 \text{ V}$$

$$N_{\text{NOBI}} = 3$$

$$N_{\text{RAFLI}} = 3$$

$$N_R = R \cdot i_R$$

$$N_{E_1} = E_1$$

$$N_E = -E$$

2 LKC A) , C)

$$\begin{aligned} \text{A) } -i_E + i_R &= 0 \Rightarrow i_R = i_E \\ \text{C) } -i_R + i_{E_1} &= 0 \Rightarrow i_R = i_{E_1} \end{aligned} \Rightarrow i_R = i_E = i_{E_1} = i$$

$$\text{LKT } (N_{\text{RAFLI}} - N_{\text{NOBI}} + 1) = 1 \quad \checkmark) \quad R i + E_1 - E = 0$$

$$i = \frac{E - E_1}{R} = \frac{10 - 20}{5} = \frac{-10}{5} = -2 \text{ A}$$

$$P_R = R i^2 = 5 \times (-2)^2 = 20 \text{ W}$$

$$P_E = E i = 10 \times (-2) = -20 \text{ W}$$

$$P_{E_1} = -E_1 i = -20 \times (-2) = 40 \text{ W}$$