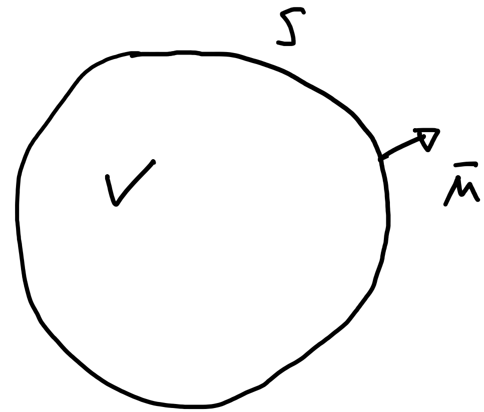
$$\begin{cases} \bar{\nabla} \times \bar{H} = \bar{J} + \dfrac{\partial \bar{D}}{\partial t} \\ \bar{\nabla} \times \bar{E} = - \dfrac{\partial \bar{B}}{\partial t} \end{cases}$$



$$\begin{cases} \bar{E} \cdot (\bar{\nabla} \times \bar{H}) = \bar{E} \cdot \bar{J} + \bar{E} \cdot \dfrac{\partial \bar{D}}{\partial t} \\ \bar{H} \cdot (\bar{\nabla} \times \bar{E}) = - \bar{H} \cdot \dfrac{\partial \bar{B}}{\partial t} \end{cases}$$

Ip: MEZZO LINEARE

$\bar{B} = \mu \bar{H}$, $\bar{D} = \varepsilon \bar{E}$

$\Downarrow$

TEOREMA DI POYNTING

$$\frac{d}{dt} \int_V \left(\frac{1}{2} \varepsilon |\bar{E}|^2 + \frac{1}{2} \mu |\bar{H}|^2 \right) dV = - \int_V \bar{E} \cdot \bar{J} \, dV - \int_S (\bar{E} \times \bar{H}) \cdot \bar{n} \, dS$$

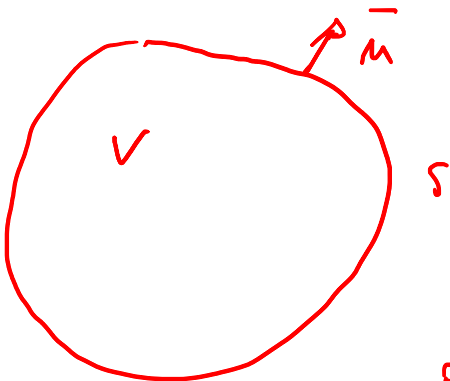
ENERGIA ACCUMULATA NEL CAMPO NEL VOLUME V

POTENZA CEDUTA DA $\bar{E}$ ALLE CARICHE IN MOTO

POTENZA ELETTROMAGN. CHE ESCE DA S

$$\bar{F} = q\left(\bar{E} + \bar{v} \times \bar{B}\right)$$

POTENZA CEDUTA DAL CAMPO ALLA CARICA $= \bar{F} \cdot \bar{v} = q\,\bar{v} \cdot \bar{E}$

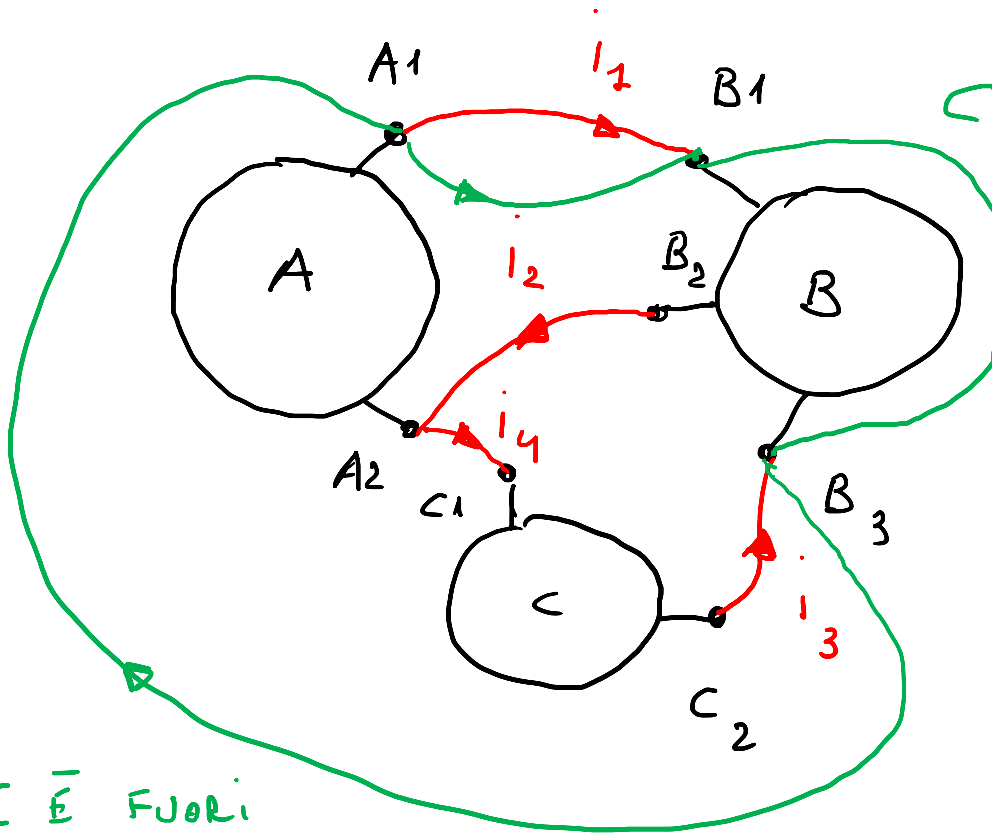


$$\frac{d\,\text{Energia}}{dt} = -P_{CEDUTA}$$

$$P_{CEDUTA} = P_{VOLUME} + P_{ATTRAVERSO\ S}$$

$\frac{1}{2}\varepsilon|\bar{E}|^2 + \frac{1}{2}\mu|\bar{H}|^2$ = DENSITÀ VOLUMETRICA DI ENERGIA ACCUMULATA NEL CAMPO ELETTRO-MAGNETICO

COMPONENTI ELETTRICI CON TERMINALI METALLICI COLLEGATI MEDIANTE FILI CONDUTTORI



IP: FUORI DAI COMPONENTI (REGIONE SEMPLICEMENTE CONNESSA)

$$\frac{\partial \bar{B}}{\partial t} = 0 \ , \ \frac{\partial \bar{D}}{\partial t} = 0$$

$$\bar{\nabla} \times \bar{E} = -\frac{\partial \bar{B}}{\partial t} = 0$$

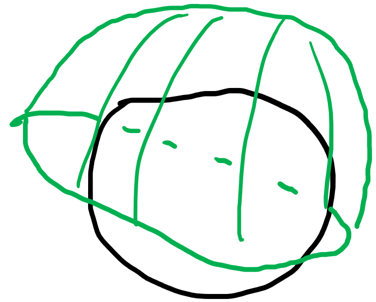
$$\oint_C \bar{E} \cdot d\bar{l} = -\int_S \frac{\partial \bar{B}}{\partial t} \cdot \hat{n}\, ds = 0$$

C È FUORI DAI COMPONENTI

⇓

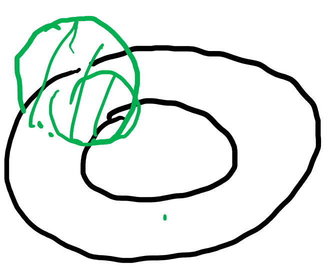
S È TUTTA FUORI DAI COMPONENTI

TUTTO LO SPAZIO MENO UNA SFERA



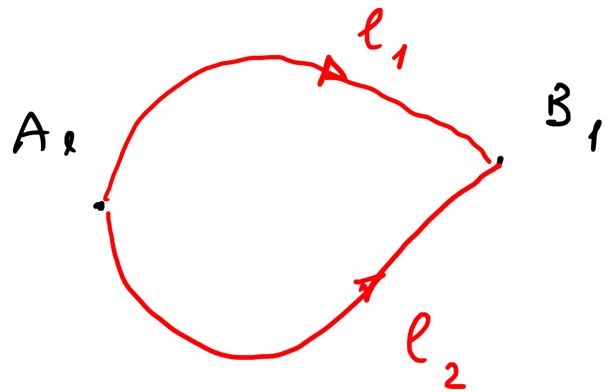
SEMPLICEMENTE CONNESSA

TUTTO LO SPAZIO MENO UNA REGIONE TOROIDALE



NON SEMPLICEMENTE CONNESSA

$$\oint_C \overline{E}\cdot\overline{dl} = 0$$



$$\Rightarrow \overline{E} = -\overline{\nabla} V$$

$$\int_{A_1,\,l_1}^{B_1} \overline{E}\cdot\overline{dl} = \int_{A_1,\,l_2}^{B_1} \overline{E}\cdot\overline{dl} = V(A_1) - V(B_1)$$

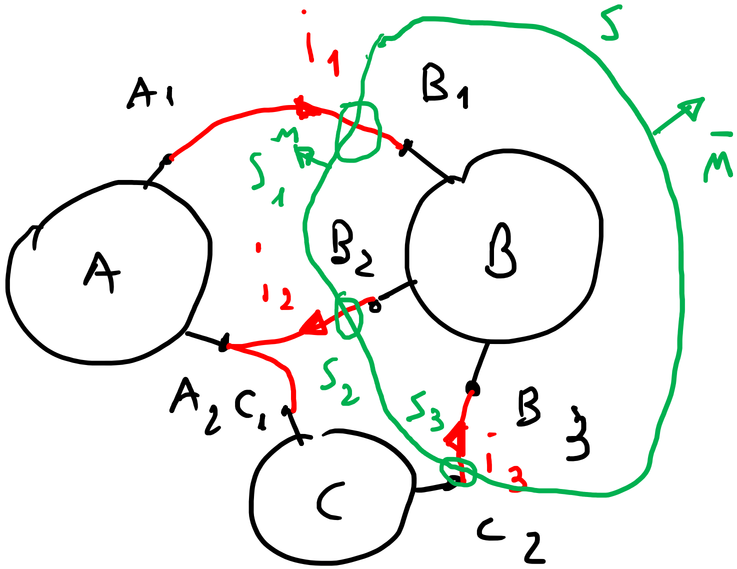
$$\oint_C \overline{E}\cdot\overline{dl} = \int_{A_1}^{B_1} \overline{E}\cdot\overline{dl} + \int_{B_1}^{B_3} \overline{E}\cdot\overline{dl} + \int_{B_3}^{A_1} \overline{E}\cdot\overline{dl} = 0$$

$$\left[V(A_1) - V(B_1)\right] + \left[V(B_1) - V(B_3)\right] + \left[V(B_3) - V(A_1)\right] = 0$$

L.K.T.

$$\frac{\partial \bar{B}}{\partial t} = 0$$

$$\frac{\partial \bar{D}}{\partial t} = 0$$



$$\oint_C \bar{H} \cdot \bar{dl} = \int_S \left(\bar{J} + \frac{\partial \bar{D}}{\partial t} \right) \cdot \bar{n}\, ds$$

$$\Downarrow$$

$$\oint_S \left(\bar{J} + \underbrace{\frac{\partial \bar{D}}{\partial t}}_{= 0} \right) \cdot \bar{n}\, ds = 0$$

$$\oint_S \bar{J} \cdot \bar{n}\, ds = 0$$

$$\int_{S_1} \bar{J} \cdot \bar{n}\, ds + \int_{S_2} \bar{J} \cdot \bar{n}\, ds + \int_{S_3} \bar{J} \cdot \bar{n}\, ds = 0$$

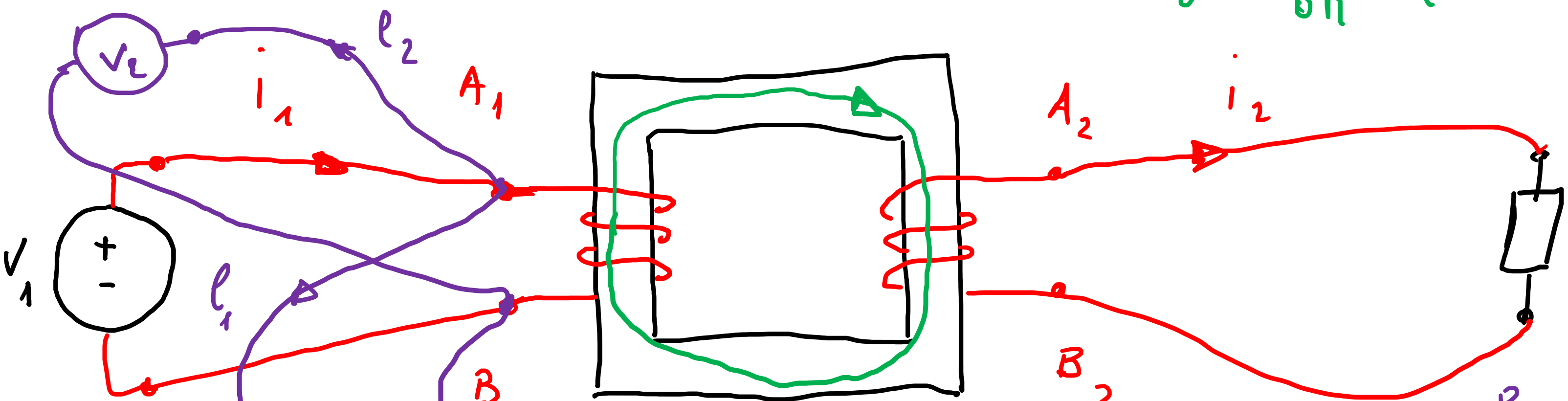
$$-i_1 + i_2 - i_3 = 0$$

L.K.C.

$B_{sn} \simeq 10^{-5}\ \mathrm{T}$. $B_s = B_{sn} \cos(\omega t + \alpha_s)$

$B_{0n} \simeq 1\ \mathrm{T}$

$B_0 = B_{0n} \cos(\omega t + \alpha_0)$



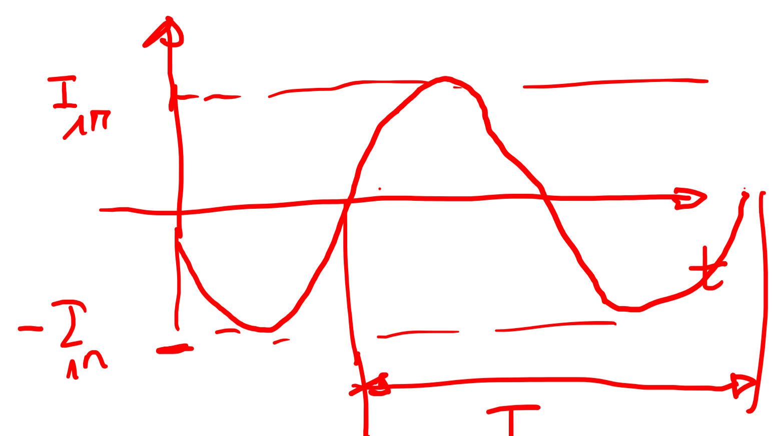
$$V_1 = \int_{A_1, l_1}^{B_1} \bar{E} \cdot d\bar{l} \qquad V_2 = \int_{A_1, l_2}^{B_1} \bar{E} \cdot d\bar{l}$$

$$i_1(t) = I_{1n} \cos(\omega t + \alpha_1)$$

$\omega = 2\pi f$ $\quad f = 50\ \mathrm{Hz}$

$f = \frac{1}{T}$ $\quad T = 20\ \mathrm{ms}$

t = TEMPO (s)



$$B_s = B_{sm} \cos(\omega t + \alpha_s)$$

$$B_o = B_{om} \cos(\omega t + \alpha_o)$$

$$\frac{\partial B_s}{\partial t} = -\omega B_{sm} \sin(\omega t + \alpha_s)$$

$$\frac{dB_o}{dt} = -\omega B_{om} \sin(\omega t + \alpha_o)$$