ds + Diel $\varepsilon = \varepsilon_0 \varepsilon_r$ NO STAZIONARIO $\frac{\delta q}{\delta t} \neq 0$ $\frac{\delta l}{\delta t} \neq 0$ Carica varia $q(t) = \frac{\Delta V(t)}{R}$ $\vec{E}(0 \to \infty)$

CARICA campo elementare

Calcolo E $E = \int dE$ $\quad \sigma = \frac{\Delta q}{\Delta s}\left[\frac{C}{m^2}\right]$ $\lambda = \frac{\Delta q}{\Delta l}\left[\frac{C}{m}\right]$ $\rho = \frac{\Delta q}{\Delta V}\left[\frac{C}{m^3}\right]$ $V(\infty) \to 0$

$\vec{F}_{el} = \frac{q_1 q_2}{4\pi\varepsilon_0 r^2}\vec{u}_r$ $\quad \vec{E} = \frac{\vec{F}}{q} = \frac{q}{4\pi\varepsilon_0 r^2}\vec{u}_r \left[\frac{N}{C}\right]$ $\quad$ FILO $\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 r}\vec{u}_r$

GAUSS $\Phi(\vec{E}) = \oint_S \vec{E}\cdot\vec{u}_n\, ds = \frac{Q_{INT}}{\varepsilon_0}$ $\quad$ PIANO $\vec{E} = \pm\frac{\sigma}{2\varepsilon_0}\vec{u}_n$

SFERA $\vec{E} = \frac{q}{4\pi\varepsilon_0 r^2}\vec{u}_r$

q_0 poste in P

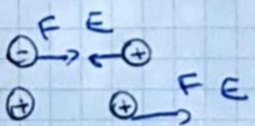
ENERGIA POT EL [J]	$\mathcal{L}_{el} = -\Delta U_{el}$ $\quad U_{el}(r) = \frac{q_0 q}{4\pi\varepsilon_0 r}$ $\quad U_{el} = \int_0^\infty u_{el}\, dV$ $\quad U_m = \int_0^\infty u_m\, dV$
POTENZ carica q [V]	$V = \frac{U_{el}}{q_0}$ $\quad V(r) = \frac{q}{4\pi\varepsilon_0 r}$ $\quad \mathcal{L}_e = -q_0\Delta V = -\Delta U_{el}$ $\quad$ DIST. DI CARICHE $E_{el} = \frac{1}{2}\sum \frac{q_i q_j}{4\pi\varepsilon_0 r_{ij}} = \frac{1}{2}\sum U_{ij}$
$\varepsilon_0 = 8{,}85\ 10^{-12}\left[\frac{C^2}{Nm^2}\right]$	$\Delta V = V_B - V_A = -\int_A^B \vec{E}_{el}\cdot d\vec{l}$ $\quad \vec{E} = -\nabla V$
ENERGIA EL [J]	$E_{el} = \frac{1}{2}\int dq V = \frac{1}{2}\sum U_{ij} = \frac{1}{2}\sum q_i V_i$ $\quad \mathcal{L}_{EXT} \overset{\Delta U_{el}}{=} \Delta E_{el}$
DENSITA' EN EL $\left[\frac{J}{m^3}\right]$	$u_{el} = \frac{1}{2}\varepsilon_0 E^2$
CIRCUITAZIONE FORZA / E	FORZA $\mathcal{E} = \oint_\gamma \vec{E}\cdot d\vec{l} = 0$ (CONSERVATIVO) $\quad$ TEO STOKES (rotore) $\Gamma_E = \int_S \mathrm{rot}\,\vec{E}\cdot\vec{u}_n\, ds = \oint_{\gamma = \partial s} \vec{E}\cdot d\vec{l} = 0$
DIVERGENZA	TEO GAUSS GREEN (divergenza) $\int_\tau \mathrm{div}\,\vec{E}\, d\tau = \int_{S\ chiusa} \vec{E}\cdot\vec{u}_n\, ds$ $\quad \mathrm{div}\,\vec{E} = \frac{dE_x}{dx} + \frac{dE_y}{dy} + \frac{dE_z}{dz}$
1ª EQ M	$\mathrm{div}\,\vec{E} = \frac{\rho}{\varepsilon_0} = \nabla\vec{E}$
3ª EQ M	$\mathrm{rot}\,\vec{E} = 0 = \begin{bmatrix} u_x & u_y & u_z \\ dx & dy & dz \\ E_x & E_y & E_z \end{bmatrix}$ IRROTAZIONALE

CONDUTTORI

All'interno di un conduttore $\begin{cases} \vec{E} = 0 \\ V = cost \end{cases}$ Da (+) a (−), Da (−) a (+) $\quad$ carica può distribuirsi solo su sup $Q_{INT} = 0$

TEO DI COULOMB $\vec{E} = \frac{\sigma}{\varepsilon_0}\vec{u}_n\ (\vec{u}_x)$ $\quad \vec{E} \perp d\vec{e}$

CAPACITA' [F] $\quad C = \frac{q}{V}$ $\quad$ CONDIZ. AL CONTORNO PER E



ENERGIA EL $\quad E_{el} = \frac{1}{2}qV = \frac{1}{2}CV^2 = \frac{1}{2}\frac{q^2}{C}$ $\quad [E_n] = \frac{\sigma}{\varepsilon_0}$ $\quad [E_t] = 0$

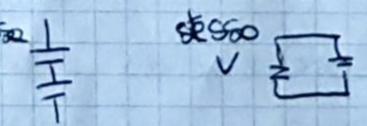
CONDENSATORI $\quad$ LEGGE COSTITUTIVA $i = \frac{dV}{dt}C(t)$

CAMPO $\vec{E} = \frac{\sigma}{\varepsilon_0}\vec{u}_x$ $\quad$ CAPACITA' $C = \frac{q}{\Delta V} = \varepsilon_0\frac{S}{d}$ $\quad$ ENERGIA $E_{el} = \frac{1}{2}q\Delta V = \frac{1}{2}C\Delta V^2 = \frac{1}{2}\frac{q^2}{C} = \frac{1}{2}\varepsilon_0 E^2 \cdot Sd$

DIFF POT $\Delta V = \frac{\sigma}{\varepsilon_0}d$ $\quad$ FORZA $F_{el} = \frac{1}{2}\frac{\sigma^2}{\varepsilon_0}A\vec{u}_x$

POT $\quad \rho = \frac{|\vec{F}_{el}|}{A} = \frac{1}{2}\frac{\sigma^2}{\varepsilon_0} = \frac{1}{2}\varepsilon_0 E^2$ $\quad u_{el} = \frac{1}{2}\varepsilon_0 E^2$

stesso Q $\quad$ stesso V



RESISTENZE $\quad$ LEGGE COSTITUTIVA $\Delta V = Ri$

SERIE: stesso I $R_{eq} = R_1 + R_2$ $\quad$ //: stesso V $R_{eq} = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$

SERIE: $C_{eq} = \left(\frac{1}{C_1} + \frac{1}{C_2}\right)^{-1}$ $\quad$ //: $C_{eq} = C_1 + C_2$

DIELETTRICI

$\Delta V' = \frac{\Delta V}{\varepsilon_r}$ $\varepsilon_r > 1$ COST DIEL RELATIVA

$C' = \varepsilon_r C = \frac{\varepsilon_0 \varepsilon_r S}{d} = \varepsilon \frac{S}{d}$ ε PERMITTIVITA' da ⊖ a ⊕ dipende da $\vec{E}$

VETTORE POL $\left[\frac{C}{m^2}\right]$ | $\vec{P} = \frac{\Delta \vec{p}}{\Delta \tau} = \frac{\Delta N \vec{p}}{\Delta \tau} = n \vec{p}$ n° di atomi

$\vec{P} = \varepsilon_0 (\varepsilon_r - 1) \vec{E}_{TOT}$ $\chi = \varepsilon_r - 1$ SUSCETTIVITA' Come E va a perturbare mat

VETTORE SPOST DIEL | $\vec{D} = \varepsilon_0 \vec{E}_{TOT} + \vec{P}$

$\vec{D} = \varepsilon_0 \varepsilon_r \vec{E}_{TOT}$ (lineare) Legame di come polarizz perturba E e viceversa

LEGGE GAUSS PER D | $Q_{lib} = \oint \vec{D} \cdot \vec{u}_n \, dS = \int_{\Sigma} \vec{D} \cdot d\vec{S} = \Phi(\vec{D})$

LEGAME $\vec{P}$ e $\vec{D}$ | $\vec{P} = \frac{\varepsilon_r - 1}{\varepsilon_r} \vec{D}$ PROPRIETA'
a) $\vec{E}, \vec{P}, \vec{D}$ // e concordi
b) $\mathrm{div}\, \vec{D} = \rho_{lib}$

DENSITA' EN | $u_{el} = \frac{1}{2} \vec{D} \vec{E}$ Se $\rho_{lib} = 0 \Rightarrow \rho_{pol} = 0$

ENERGIA TOT | $U_{el} = \int_0^{\infty} \frac{1}{2} \vec{D} \vec{E} \, dV$
c) $\vec{D}, \vec{P}$ solo all'interno del dielett
d) $\oint \vec{D} \cdot d\vec{e} \neq 0$ NO CONSERVATIVO

MOM DIP ELETT | $M = \vec{p} \wedge \vec{E}$

$\sigma_p = \vec{P} \cdot \hat{n}$ $\rho_p = -\mathrm{div}(\vec{P})$ $\begin{cases} -\left(\frac{d}{dx} P_x + \frac{d}{dy} P_y + \frac{d}{dz} P_z\right) \\ -\frac{1}{r^2}\left[\frac{d}{dr}(r^2 P)\right] \end{cases}$

CONDIZIONI AL CONTORNO
$[D_n] = 0$ $[E_t] = 0$
$[E_n] = \frac{\sigma_{pol}}{\varepsilon_0}$

CORRENTI STAZIONARIE

VETTORE DENSITA' DI CORRENTE $\left[\frac{A}{m^2}\right]$ | $\vec{J} = n q \vec{v}$ (densita' di carica) $i = \frac{dq}{dt} \left[\frac{C}{s}\right]$

PRINC CONSERV. CARICA | $i_{TOT} = -\frac{dq_{INT}}{dt}$

COND STAZIONARIETA' | $\frac{dq_{INT}}{dt} = 0$ $\Phi_S(\vec{J}) = 0$ $\frac{d\rho}{dt} = 0$

FLUSSO DI J | $i = \int_{\Sigma} J \cdot \vec{u}_n \, d\vec{S} = \Phi_S(\vec{J})$ $i = JS$ J sempre + a S

EQ CONTINUITA' CORR | $\mathrm{div}\, \vec{J} + \frac{d\rho}{dt} = 0$

1ª LEGGE OHM | $\Delta V = R i$ $R = \left[\frac{V}{A}\right] = [\Omega]$ RESISTENZA

2ª LEGGE | $R = \rho \frac{l}{S}$ $\rho = [\Omega m]$ RESISTIVITA'

1ª LEGGE FORMA LOCALE $\vec{J} = \sigma \vec{E}$ $\eta = \frac{1}{\sigma}$ $[\Omega m]^{-1}$ CONDUC GLOBALE $\Delta V = R i = -\int \vec{E} \cdot d\vec{l}$

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

TENSIONE $\mathcal{E} = \int_B^A \vec{E}^* \cdot d\vec{l}$ elettromot $\vec{E}^* = \frac{\vec{F}^*}{q}$ Tende a separare le cariche

OHM GENERALIZZATA $\mathcal{E} - R i = r_{in} \cdot i$ (generatore ideale)

POTENZA $P = i \Delta V \, [W] = R i^2$ se ohmico

1ª LEGGE KIRCHOFF AI NODI | $\Sigma_k i_k = 0$

2ª LEGGE ALLE MAGLIE | $\Sigma_k \Delta V_k = 0 = \Sigma_k R_k i_k$

CARICA-SCARICA CONDENS.

$q(t) = q_0 e^{-\frac{t}{RC}}$ $i(t) = i_0 e^{-\frac{t}{\tau}}$ Dopo 5τ cond e' carico/scarico $i_0 = \frac{q_0}{RC}$

ENERGIA DISSIPATA $E_R = \frac{1}{2} C \Delta V_R^2 = \frac{1}{2} C \Delta V_C^2 = E_{el}$

GENERATORE ε vo — RESISTORE ΔV

MAGNETISMO

$\Phi(\vec{B}) = \oint \vec{B}\cdot \vec{u}_m\, ds = 0 \quad B \perp u_m$

I INTERAZIONE q CON B ESTERNI — Pollice v, indice B, Medio F

FORZA DI LORENTZ	$\vec{F} = q(\vec{v}\wedge\vec{B})$ — Dita i, Pollice M
MOMENTO MAGNETICO DELLE F	$\vec{M} = \vec{\mu}\wedge\vec{B}_{EXT}$ — $\mu // m$
2ª LEGGE LAPLACE	$d\vec{F} = i\,d\vec{\ell}\wedge\vec{B}$ — F agente su tratto filo percorso da i, a causa B EXT
EFFETTO HALL	$\vec{E}_H = \frac{JB}{nq}\vec{u}_z$ Elettromotore — $\vec{E}_H + \vec{E}_{el} = 0 \quad \varepsilon_H = \frac{iB}{nqa} = \Delta V_a$
2ª EQ	$div\,\vec{B} = 0$ — $M = i s\vec{n}\wedge\vec{B} \quad \vec{m} = i s \vec{n}\ [A\,m^2]$
4ª EQ	$rot\,\vec{B} = \mu_0\vec{J}$ — $M = \begin{bmatrix} u_x & u_y & u_z \\ \mu_x & \mu_y & \mu_z \\ B_x & B_y & B_z \end{bmatrix}$
MOM DI DIPOLO μ	$\vec{m} = i s\vec{n}$
LAVORO	$\mathcal{L} = \int \vec{F}\cdot d\vec{\ell} \quad \vec{F}\perp\vec{v}, d\vec{\ell} \Rightarrow \mathcal{L} = 0 \quad \mathcal{L}_{INT} = -\Delta U_p$
PULSAZIONE	$\omega = \frac{2\pi}{T} = \frac{qB}{m} \quad \mathcal{L}_{EXT} = -\mathcal{L}_{INT} = \Delta U_p$
ENERGIA POT	$U_p = -\vec{m}\cdot\vec{B}$

II LEGAME TRA SORGENTI E B

LEGGE BIOT-SAVART	$\vec{B} = \frac{\mu_0 i}{2\pi r}\vec{u}_t$ Prodotto a d=r da filo lungo percorso da corr
1ª LEGGE LAPLACE	$d\vec{B} = \frac{\mu_0}{4\pi} i \frac{d\vec{\ell}\wedge\vec{u}_r}{r^2} \quad d\vec{B}\perp d\vec{\ell}, \vec{u}_r$ Tratto di filo ds in pnt P a d=r dall'elem di filo
LEGGE AMPERE LAPLACE	$\vec{B} = \oint \frac{\mu_0 i}{4\pi}\frac{d\ell\wedge u_r}{r^2}$
LEGGE DI AMPERE	$\Gamma_\gamma(B) = \oint_\gamma \vec{B}\cdot d\vec{\ell} = \mu_0(i_c)$ concatenate
F 2 fili //	$F_{1,2} = \frac{\mu_0 i_1 i_2}{2\pi r}$

$\mu_0 = 4\pi\, 10^{-7}\ \left[\frac{N}{A^2}\right] = \left[\frac{\Omega s}{m}\right] = \left[\frac{H}{m}\right]$

	CAMPO E	CAMPO B
FILO	$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 r}\vec{u}_r$	$\vec{B} = \frac{\mu_0 i}{2\pi r}\vec{u}_\sigma$
SPIRA	$\vec{E} = \frac{\lambda_y R}{2\varepsilon_0(y^2+R^2)^{\frac{3}{2}}}\vec{u}_y$	$\vec{B} = \frac{\mu_0 i R^2}{2(y^2+R^2)^{\frac{3}{2}}}\vec{u}_y$ BOBINA

SOLENOIDE $L \gg R$

$\vec{B} = \frac{\mu_0 N I}{2\pi r}$ SOL = $\int$ SPIRA

$L \simeq R = d$ — LASTRA = $\int$ FILI

$\vec{B} = \mu_0 \frac{I N}{L} \rightarrow n$

CARICA IN MOTO

$r = \frac{mv}{qB} \quad F_L = q\vec{v}\wedge\vec{B} = qvB = m\frac{v^2}{R} \quad \omega = -\frac{q}{m}B \quad \vec{B} = \mu_0\varepsilon_0\vec{v}\wedge\vec{E} = \frac{1}{c^2}\vec{v}\wedge\vec{E}$

V ANGOLARE

MOTO ELICOIDALE $T = \frac{2\pi}{\omega = \frac{v}{R}} \quad p = v_z T$ direzione

$i_{vm} \to J_{vm} \to rot(\vec{M}) = \vec{J}_{vm}$

$i_c \to J_c \to rot(\vec{H}) = \vec{J}_c$

$i_{sm} \to J_{sm} \to M \wedge n = \vec{J}_{sm}$

quasi sempre $= 0$

MATERIALI CON PROP MAGNETICHE

M UNIF. $|\vec{M}| = \frac{1}{S} = J \quad \vec{J} = \vec{M}\wedge\vec{n}$

M NON UNIF $J_m = rot\,\vec{M} \quad \vec{J}_s = \vec{M}\wedge\vec{n}$

MAGNETIZZAZIONE [A/m]	$\vec{M} = \frac{\vec{m}}{\tau} = \frac{d\vec{m}}{d\tau}$
CAMPO MAGNETIZZANTE	$\vec{H} = \frac{\vec{B}}{\mu_0} - \vec{M}$
LEGGE AMPERE	$\oint \vec{B}\cdot d\vec{\ell} = \mu_0(i_c + i_{sm} + i_{vm})$ — PER H $\oint \vec{H}\cdot d\vec{\ell} = i_c$
MAGNETIZZAZIONE	$\vec{M} = \chi_m\vec{H}$
CAMPO B	$\vec{B} = \mu_0(\vec{H}+\vec{M})$

CORRENTE DI SPOSTAMENTO — All'interno conduttori $i = i_C$ poi $\delta = \delta_C$ Condensatore $i = i_S$

DENSITÀ — $\vec{J}_S = \varepsilon_0 \underset{\varepsilon_r}{\wedge} \dfrac{d\vec{E}(t)}{dt} \left[\dfrac{A}{m^2}\right]$ $\quad i_S = \varepsilon_0 \underset{\varepsilon_r}{\wedge} \dfrac{d\Phi(\vec{E})}{dt}$ AMPERE $\oint \vec{B}\cdot d\vec{l} = \mu_0 (i_C + i_{S} + i_{m} + \dots)$

→ CORRENTI

$$\begin{cases} 2^a & \operatorname{div} \vec{B} = 0 \\ 4^a & \operatorname{rot} \vec{B} = \mu_0 \vec{J} \end{cases} \quad \begin{array}{l} \operatorname{rot} \vec{A} = \vec{B} \\ \Delta \vec{A} = -\mu_0 \vec{J} \end{array}$$

→ CAMPI E VAR NEL T

$$\begin{cases} 2^a & \operatorname{div} \vec{B} = 0 \\ 4^a & \operatorname{rot} \vec{B} = \mu_0 \underbrace{\varepsilon_0 \dfrac{d\vec{E}}{dt}}_{J_S} + \mu_0 \vec{J} \end{cases}$$

$$\begin{cases} \vec{P} = \varepsilon_0 \chi \vec{E}_{tot} \\ \vec{D} = \varepsilon_0 \varepsilon_r \vec{E}_{tot} \\ \vec{P} = \dfrac{\varepsilon_r - 1}{\varepsilon_r} \vec{D} \end{cases}$$

→ CARICHE

$$\begin{cases} 1^a & \operatorname{div} \vec{E} = \dfrac{\rho}{\varepsilon_0} \\ 3^a & \operatorname{rot} \vec{E} = 0 \end{cases} \quad \begin{array}{l} \vec{E} = -\nabla V \\ \Delta V = -\dfrac{\rho}{\varepsilon_0} \end{array}$$

→ CAMPI B VAR NEL T

$$\begin{cases} 1^a & \operatorname{div} \vec{E} = 0 \\ 3^a & \operatorname{rot} \vec{E} = -\dfrac{d\vec{B}}{dt} \end{cases}$$

$$\begin{cases} \vec{B} = \mu_0 (\vec{H} + \vec{M}) \\ \vec{M} = \chi_m \vec{H} \quad \chi_m \to \text{SUSCETTIVITÀ} \\ \vec{B} = \mu_0 (1 + \chi_m) \vec{H} = \mu_0 \mu_r \vec{H} \end{cases}$$

PER MAGNET. REL ←

INDUZIONE

LEGGE DI FARADAY NEUMANN-LENZ $\quad i = \dfrac{\varepsilon}{R} = -\dfrac{\Phi(\vec{B})}{R\,dt} \quad \Phi(\vec{B}) = \int_S \vec{B}\cdot \hat{u}_n\, ds$ ($B(t)$, $u_n(t)$, $S(t)$)

I $\quad \varepsilon = -\dfrac{d\Phi(\vec{B})}{dt} = -\dfrac{d}{dt}\left(\int_\Sigma \vec{B}\cdot\hat{u}_n\, ds\right)$

II se $\vec{B} = \vec{B}(t)$

$\varepsilon = \oint \vec{E}^* \cdot d\vec{l}$ $\quad E$ indotto $\quad n \parallel B$

↳ pos se concorde a B

AUTOINDUZIONE

$\Phi(\vec{B}) = L i \quad \varepsilon = -L \dfrac{di}{dt}$

$L > 0 \quad L = [H]$

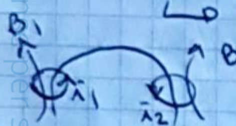
INDUTTORE ε_L

MUTUAINDUZIONE

$\Phi_{1\to 2}(\vec{B}_1) = M_{12}\, i_1$

$\Phi_{2\to 1}(\vec{B}_2)\, M_{21}\, i_2$ $\quad M = M_{12} = M_{21}$

$\varepsilon_1 = -\dfrac{d\Phi_{2\to 1}(\vec{B}_2)}{dt} = -M\dfrac{di_2}{dt}$

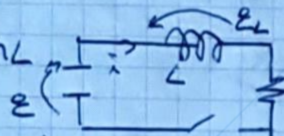


$\Phi_1 = \Phi_1(\vec{B}_1) + \Phi_{2\to 1}(\vec{B}_2) = L_1 i_1 + M i_2$

$\Phi_2 = \Phi_2(\vec{B}_2) + \Phi_{1\to 2}(\vec{B}_1) = L_2 i_2 + M i_1$

$U = \dfrac{1}{2} L_1 i_1^2 + \dfrac{1}{2} L_2 i_2^2 + M i_1 i_2$ $\quad (< 0,\ > 0,\ </>0)$

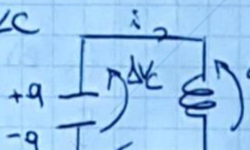
CIRCUITO RL



$i(t) = \dfrac{\varepsilon}{R}\left(1 - e^{-\frac{t}{L/R}}\right) \quad i_\infty = \dfrac{\varepsilon}{R} \quad \mathcal{L} = \dfrac{1}{2} L i_\infty^2$ $\quad U_m = \underbrace{\dfrac{B^2}{2\mu_0}}_{\text{m}}$

E INTRINSECA CORR

CIRCUITO LC



$\dfrac{d^2 q}{dt^2} + \dfrac{1}{LC} q = 0$

$i(t) = -q_0 w \operatorname{sen}(wt + \varphi)$

ENERGIA MAG

DENSITÀ EN MAG $\quad U_m = \dfrac{1}{2} H \cdot B$

ENERGIA ELETTR $\quad E_{EM} = \underbrace{\dfrac{1}{2}\dfrac{q^2}{C}}_{E_{el}} + \underbrace{\dfrac{1}{2} L i^2}_{} = \text{cost}$

$U_m = \dfrac{1}{2}\int^{\infty} H\cdot B\, dV \quad H = \dfrac{B}{\mu_0} - M$

Tel [Em intrinseca corr = E magnetica]

ONDE

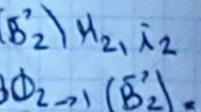
REGRESSIVA $x = x_0 - v(t) \quad + k_x \hat{u}_x$

PROGRESSIVA $x = x_0 + v(t) \quad - k_x \hat{u}_x$ → polarizz.

Direz propagaz

$\nu = \dfrac{1}{T}\left[\dfrac{1}{s}\right] \quad w = \dfrac{2\pi}{T}\left[\dfrac{1}{s}\right]$

$\lambda \nu = v \quad k = \dfrac{2\pi}{\lambda}\left[\dfrac{1}{m}\right]$



PROPRIETÀ

1) $\vec{E}\ \vec{B}$ si propag con $c = \dfrac{1}{\sqrt{\mu_0 \varepsilon_0}}$ $\quad v = \dfrac{c}{n}$ mezzo, n indice rifraz

2) $E = vB$ $\quad n = \sqrt{\varepsilon_r}$

3) $\vec{E} \perp \vec{B} \quad \vec{E}\cdot\vec{B} = 0 \quad \vec{E} \times \vec{B} = EB\,\hat{u}_n$

POLARIZZAZIONE $\quad E = E_y + E_z = E_{0y} \cos(wt - kx + \varphi_y)\hat{u}_y + E_{0z} \cos(wt - kx + \varphi_z)\hat{u}_z$

$\Delta\varphi = \varphi_z - \varphi_y$
- random no polarizz
- $k\pi$ pol lin $\theta = \arctan\left(\dfrac{E_{0z}}{E_{0y}}\right)$
- $\dfrac{\pi}{2}(2k+1)$ pol ellittica

pol circolare se $E_{0z} = E_{0y}$

ASSORBIMENTO $\quad \alpha(w) = \dfrac{w\, n_i(w)}{c}$

INDICE RIF COMPLESSO $\quad n(w) = n_R(w) - i\, n_i(w)$

$\vec{E} = E_0 e^{iwt} e^{-\frac{i w n_R x}{c}} e^{-\frac{w n_i x}{c}}$

• INTERF 2 SORGENTI

$I(P) = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos(\Delta\varphi) \quad \Delta\varphi = \varphi_2 - \varphi_1 + k(r_2 - r_1)$

RIFL TOT $n_2 < n_1 \quad \theta_t > \theta_i$ $\quad y_{max} = m\dfrac{\lambda L}{d} \quad y_{min} = (2m' + 1)\dfrac{\lambda L}{2d}$

RIFL - TRASMISSIONE < INCID. NORM $k \perp$ piano i

• N SORGENTI • DIFFRAZIONE

$n_1 > n_2 \ \{ t_a > 0 \quad n_1 < n_2 \ \{ t_a > 0 \quad I(\theta) = I \left[\dfrac{\operatorname{sen}\frac{N\Delta\varphi}{2}}{\dots}\right]^2 \quad \left[\dfrac{\operatorname{sen}\left(\frac{N\beta}{2}\right)}{\dots}\right]$