EQ. D'ALEMBERT $$\frac{\partial^2 \xi}{\partial t^2} = v^2 \frac{\partial^2 \xi}{\partial z^2}$$

$$k = \frac{2\pi}{\lambda} \qquad \omega = 2\pi f \qquad v = \frac{\omega}{k}$$

$$\lambda = \frac{v}{f} \qquad T = \frac{1}{f} \qquad \left(k = \frac{\omega}{v}\right)$$

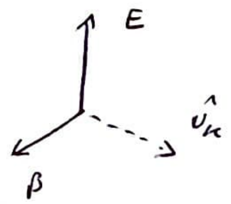
ONDE SONORE $$v_s = \sqrt{\frac{\beta}{\rho}}$$

$$dB = 10 \log_{10} \frac{I}{I_0} \quad I_0 \rightarrow 10^{-12} \quad = (\log_{10} I + 12)\, 10$$

SOVRAPPOSIZIONE $$\xi = 2\xi_0 \cos\left(\frac{\Delta k}{2} z - \frac{\Delta \omega}{2} t\right) \operatorname{sen}\left(k_m z - \omega_m t\right)$$

EFFETTO DOPPLER $$f' = f \left(\frac{v_{onda} \pm v_{oss}}{v_{onda} \mp v_{sorg}}\right)$$ ↑ AVV ↓ ALL

$$kE = \omega B \implies B = \frac{E}{c}$$



$$\bar{E} \times \bar{B} = \frac{E^2}{c} \hat{u}_k = EB\, \hat{u}_k$$

$n = \sqrt{\varepsilon_r \mu_r}$ ma $\mu_r = 1$ quasi sempre

$$n = \frac{c}{v} \geq 1$$

$S = \dfrac{EB}{\mu_0} \hat{u}_k = \dfrac{1}{\mu_0} (\bar{E} \times \bar{B})$ VETTORE DI POYNTING

$p_{rad} = \dfrac{I}{c} (1 + \eta)$ con η idx di riflessione

$$I = \frac{P}{\Sigma} \qquad I = \frac{1}{2} c\, \varepsilon_0 E^2 \quad (\varepsilon_0 \to 8.85 \cdot 10^{-12})$$

$$P = \frac{U}{\Delta t} \quad \left(= \frac{\partial U}{\partial t} \right)$$

POLARIZZ. ↗ NON POLARIZZ. ↗

POLARIZZAZIONE $\underbrace{I' = I \cos^2 \theta}_{\text{legge di Malus}}$ $\qquad I' = \frac{I}{2}$

SNELL $n_1 \sin \theta_1 = n_2 \sin \theta_2$

COEFF FRESNEL $r_\sigma = \frac{1 - \eta \chi}{1 + \eta \chi} \qquad r_\pi = \frac{\chi - \eta}{\chi + \eta}$

$\chi = \frac{\cos \theta_t}{\cos \theta_i}, \quad \eta = \frac{n_2}{n_1} \qquad t_\sigma = \frac{2}{1 + \eta \chi} \qquad t_\pi = \frac{2}{\chi + \eta}$

ANGOLO LIMITE $\theta_0 = \arcsin \frac{n_2}{n_1} = \arcsin \eta$ TOT. RIFLESS.

ANGOLO DI BREWSTER $\theta_B = \operatorname{arctg} \eta$ TOT. TRASM.

ANGOLO DI DEVIAZIONE $\delta = i_1 + i_2 - \alpha$

SPECCHIO $\frac{1}{p} - \frac{1}{q} = -\frac{2}{R} \qquad I = -\frac{q}{p}$

DIOTTRO $\frac{n_1}{p} + \frac{n_2}{q} = \frac{n_2 - n_1}{R} \qquad I = \frac{n_1}{n_2} \frac{q}{p}$

LENTI $\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \qquad I = \frac{q}{p}$

$$\delta = k (r_1 - r_2) = \frac{2\pi}{\lambda} d \sin \theta$$

$$I_p(\theta) = I_0 \left[\frac{\sin\left(\frac{N\delta}{2}\right)}{\sin\left(\frac{\delta}{2}\right)} \right]^2 \xrightarrow{N=2} I_p(\theta) = 4 I_0 \cos^2\left(\frac{\delta}{2}\right)$$

$\sin \theta = m \frac{\lambda}{d}$ MAX PRINC $\qquad \sin \theta = m' \frac{\lambda}{Nd}$ MIN $\qquad \sin \theta = \left(m'' + \frac{1}{2}\right) \frac{\lambda}{Nd}$ MAX SEC.

DIFFRAZIONE $\quad I_p = I_{max} \left[\frac{\operatorname{sen}\left(\frac{\pi}{\lambda} a \operatorname{sen}\theta\right)}{\frac{\pi}{\lambda} a \sin\theta} \right]^2$

MASSIMO VISIBILE $\quad \operatorname{sen}\theta = 1 \quad \left(\theta = \frac{\pi}{2}\right)$

INT + DIFF $\quad I_p = I_{max} \underbrace{\left(\frac{\operatorname{sen}\left(\frac{\pi}{\lambda} a \operatorname{sen}\theta\right)}{\frac{\pi}{\lambda} a \operatorname{sen}\theta} \right)^2}_{\text{DIFF.}} \underbrace{\left(\frac{\operatorname{sen} \frac{\pi}{\lambda} N d \operatorname{sen}\theta}{\operatorname{sen} \frac{\pi}{\lambda} d \operatorname{sen}\theta} \right)^2}_{\text{INT.}}$

$\operatorname{sen}\theta = m \frac{\lambda}{d} < \frac{\lambda}{a}$

$\Rightarrow m < \frac{d}{a}$ (per essere visibile)