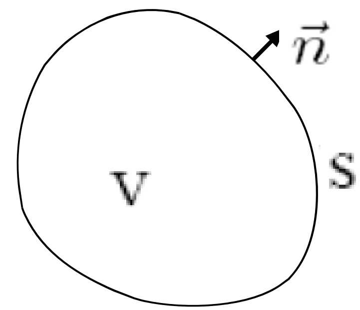
teorema di Poynting

$$-\int_V \boldsymbol{\mathcal{E}} \cdot \boldsymbol{\mathcal{J}}_0 \, dV = \int_V \left[\boldsymbol{\mathcal{E}} \cdot \left(\frac{\partial \boldsymbol{\mathcal{D}}}{\partial t} + \boldsymbol{\mathcal{J}}_c \right) + \boldsymbol{\mathcal{H}} \cdot \frac{\partial \boldsymbol{\mathcal{B}}}{\partial t} \right] dV + \int_{S_V} \boldsymbol{\mathcal{S}} \cdot \hat{\boldsymbol{n}} \, dS_V$$

$$\boldsymbol{\mathcal{S}} = \boldsymbol{\mathcal{E}} \times \boldsymbol{\mathcal{H}} \qquad (vettore\ di\ Poynting)$$

Bilanci energetici



$$-\frac{1}{2}\int_V \vec{E}\cdot\vec{J}_o^*\,dV = \frac{1}{2}\,j\omega\int_V\left(\mu\,|\,\vec{H}\,|^2 - \epsilon^*\,|\,\vec{E}\,|^2\right)dV + \int_S \vec{S}\cdot\vec{n}\,dS$$

(*bilancio delle potenze apparenti*)

$$\underbrace{-\mathrm{Re}\left(\frac{1}{2}\int_V \vec{E}\cdot\vec{J}_o^*\,dV\right)}_{P_o} = \underbrace{\omega\int_V\left(\frac{1}{2}\,\mu_o\mu''\,|\,\vec{H}\,|^2 + \frac{1}{2}\,\epsilon_o\epsilon''\,|\,\vec{E}\,|^2\right)dV}_{P_{\mathrm{diss}}} + \underbrace{\mathrm{Re}\left(\int_S \vec{S}\cdot\vec{n}\,dS\right)}_{P_{\mathrm{out}}}$$

(bilancio delle potenze attive)

$$-\mathrm{Im}\left(\frac{1}{2}\int_V \vec{E}\cdot\vec{J}_o^*\,dV\right) = 2\,\omega\int_V\left(\underbrace{\frac{1}{4}\,\mu_o\mu'\,|\,\vec{H}\,|^2}_{U_m} - \underbrace{\frac{1}{4}\,\epsilon_o\epsilon'\,|\,\vec{E}\,|^2}_{U_e}\right)dV + \mathrm{Im}\left(\int_S \vec{S}\cdot\vec{n}\,dS\right)$$

(*bilancio delle potenze reattive*)