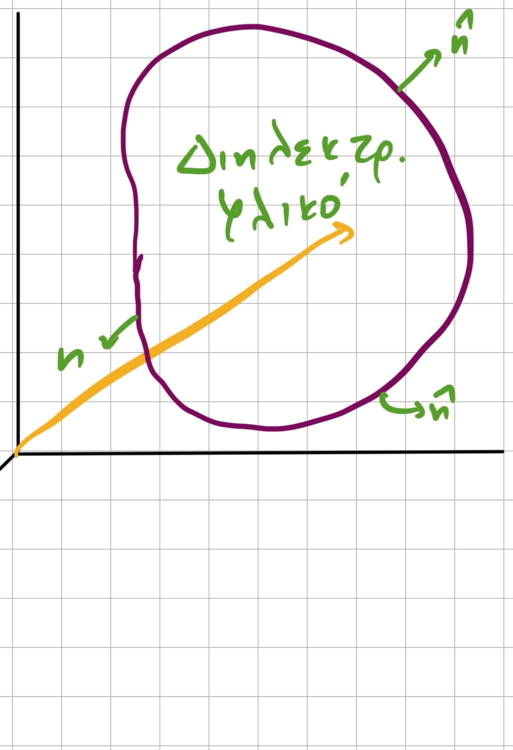
12.04.22 Credits: Ρόζος Μ.

$$\vec{P}(r) = \vec{P} = \frac{d\vec{p}}{d^3 r} \Rightarrow$$



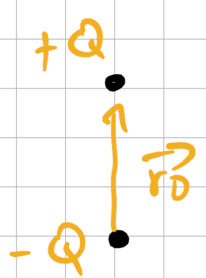
$$V(r) = ?$$

$$\Downarrow$$

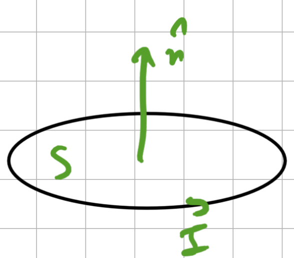
$$\begin{cases} \sigma_b = P_n = \vec{P}\cdot\hat{n} \\ \rho_b = -\vec{\nabla}\cdot\vec{P} \end{cases}$$

$$\varepsilon_0 \vec{\nabla}\cdot\vec{E} = \rho = \rho_f + \rho_b = \rho_f - \vec{\nabla}\cdot\vec{P}$$

$$\vec{\nabla}\cdot\underbrace{(\varepsilon_0\vec{E} + \vec{P})}_{\vec{D}} = \rho_f \Rightarrow \boxed{\vec{\nabla}\cdot\vec{D} = \rho_f}$$



$$\vec{p} = Q\vec{r_0}$$



$\Rightarrow$ Μαγνητική διπολική ροπή:

$$\vec{m} = IS\hat{n}$$

Μαγνήτιση: $\vec{M} = \frac{d\vec{m}}{d^3 r}$

$$\vec{J} = \sigma^* \vec{E}$$

Ν. Ohm: $\sigma^* = \frac{1}{\rho}$

Αγώγιμα vs Διηλεκτρικά

$\frac{\sigma^*}{\omega \varepsilon} \gg 1$ $\qquad$ $\frac{\sigma^*}{\omega \varepsilon} \ll 1$

$\varepsilon = \varepsilon_r \varepsilon_0$

$\mu = \mu_r \mu_0$