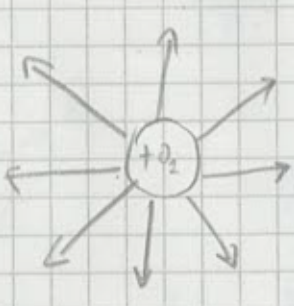
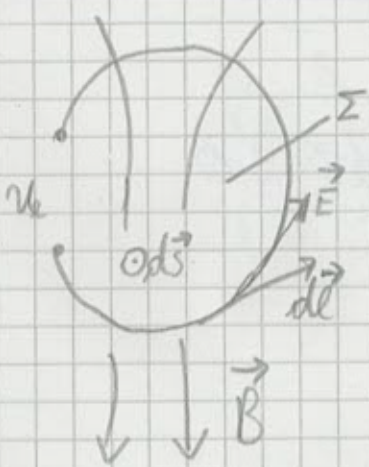
ET_03_S_2024_02_28 28.02.2024



Mărimi. Câmp Electromagnetic

Flux	Φ_E [C]	Φ_B [Wb]
Dens Flux	$\vec{D}$ [C/m²]	$\vec{B}$ [Wb/m²] [T]
Inducție		
Intensități	$\vec{E}$ [V/m]	$\vec{H}$ [A/m]

1. Legea inducției electromagnetice Faraday



$u_e = -\frac{\partial \Phi_B}{\partial t}$

R. Lenz

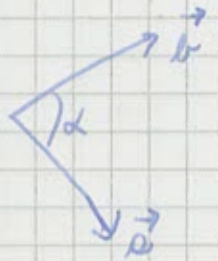
$f(x,y,z) = 3x^2 z^3 y$

$\frac{\partial f}{\partial y} = 3x^2 z^3$

$\frac{\partial f}{\partial x} = z^3 y\, 6x$

B = constant $\Rightarrow$ $\Phi_B = B \cdot S$

$d\Phi_B = \vec{B} \cdot d\vec{S}$



$\vec{a} \cdot \vec{b} = ab \cdot \cos(\alpha)$

$\vec{a} \times \vec{b} = \vec{c}$

$|\vec{c}| = ab \cdot \sin(\alpha)$

$$\Phi_B = \int_\Sigma \vec{B} \cdot d\vec{S}$$

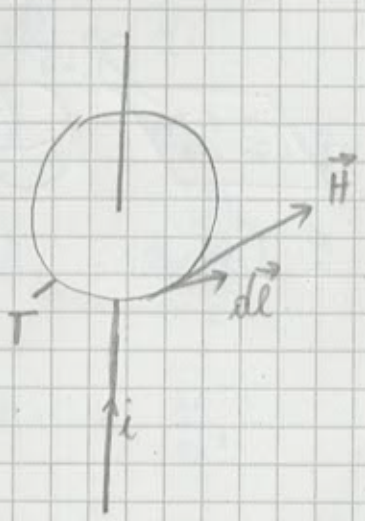
$$\mathcal{U}_i = \int_\Gamma \vec{E} \cdot d\vec{e}$$

$$\int_\Gamma \vec{E} \cdot d\vec{e} = -\int_\Sigma \frac{\partial \vec{B}}{\partial t} \cdot d\vec{S}$$

2.

$\Phi_E = 2\pi$ $\qquad \int_\Sigma \vec{D} \cdot d\vec{S} = \ell$

$\Phi_B = 0$ $\qquad \int_\Sigma \vec{B} \cdot d\vec{S} = 0$



Legea Ampere & Maxwell

L. or. mg.

$$\oint_T \vec{H} \cdot d\vec{l} = i + \frac{\partial \Phi_E}{\partial t}$$

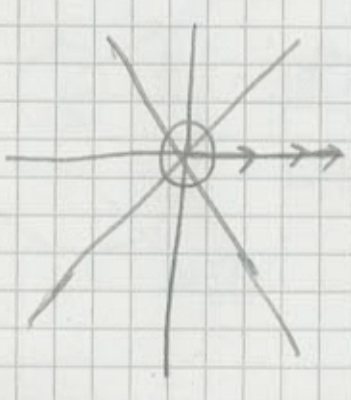
$$v_f = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} = 3 \cdot 10^8 \frac{m}{s} = c$$

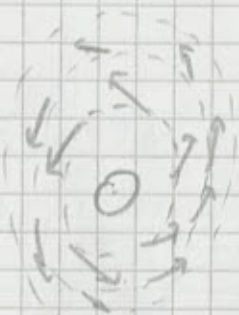
v'

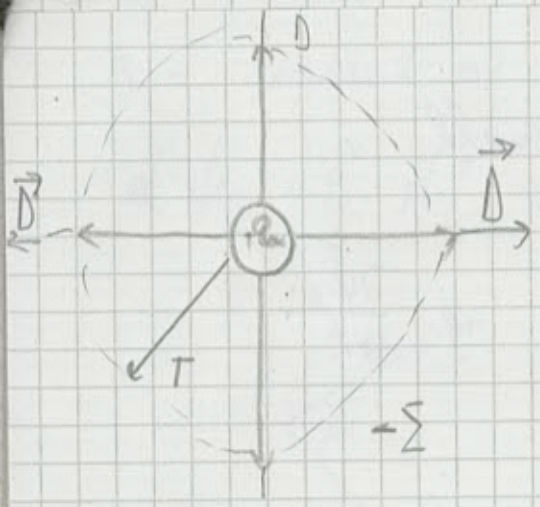
[redacted]

Cp vectoriale : ∇, $\vec{\nabla}$, ∇

Del. Nabla

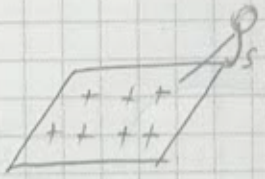






$$Q = \rho_l \cdot l$$

$$\rho_l = \frac{Q}{l}$$



$$Q = \rho_S S$$

$$Q = \rho_V \cdot V$$

$$S = 4\pi r^2$$

$$V = \frac{4}{3}\pi r^3$$

$$\Phi_{E_\Sigma} = Q$$

$$\int_\Sigma \vec{D} \cdot d\vec{S} = Q$$

$$\vec{D} \cdot d\vec{S} = D \cdot dS$$

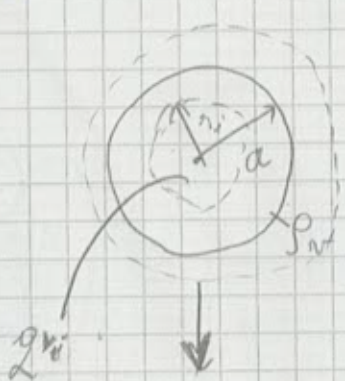
$$V = \frac{4}{3}\pi r^3$$

$$\int_\Sigma \vec{D} \cdot d\vec{S} = Q$$

$$D = \frac{Q}{4\pi r^2}$$

$$\vec{D} \cdot d\vec{S} = D \cdot dS$$

$$D = \varepsilon_0 E$$



$$Q_V = \rho_V \cdot V$$

$$Q_V = \rho_V \cdot \frac{4}{3}\pi a^3$$

$$D = \frac{\rho_V}{4\pi r^2} = \frac{\rho_V \cdot \frac{4}{3}\pi a^3}{4\pi r^2}$$

$$D = \frac{K}{r^2}$$

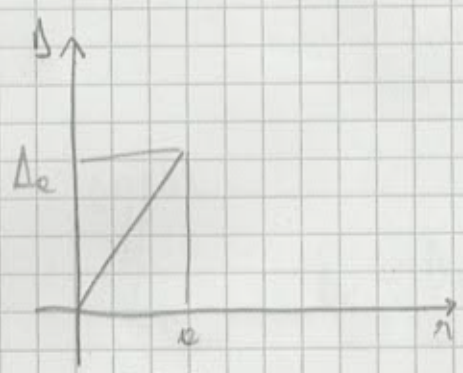
$$\Phi_{Zi} = Q_i$$

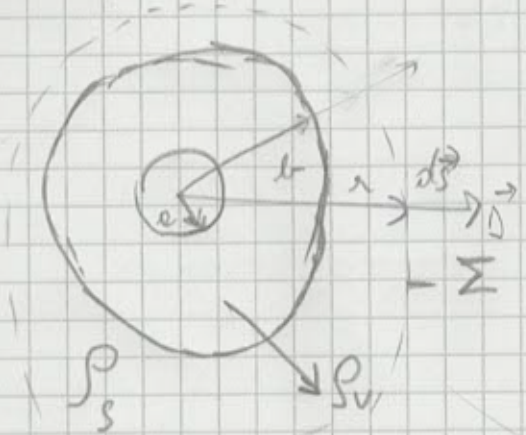
$$D_i \cdot 4\pi r_i^2 = Q_v \cdot \frac{r_i^3}{a^3} = \frac{r_i^3}{a^3} \cdot \frac{4}{3}\pi a^3 \cdot Q_v$$

$$D_i = \frac{Q_v \cdot r_i}{4\pi a^3}$$

$$D_e = \frac{Q_v}{4\pi r^2} \qquad D_i = K \cdot r$$

$$D_e = \frac{Kr}{r^2}$$





$$\Phi_\Sigma = Q_\Sigma = Q_v + Q_s$$

$$Q_s = \rho_s \cdot 4\pi b^2$$

$$Q_v = \rho_v$$

$$Q_v = \rho_v \cdot \frac{4}{3}\pi (b^3 - a^3)$$

$$\Phi_\Sigma = D \cdot 4\pi r^2$$

$$D \cdot 4\pi r^2 = \rho_s 4\pi b^2 + \rho_v \frac{4}{3}\pi (b^3 - a^3)$$

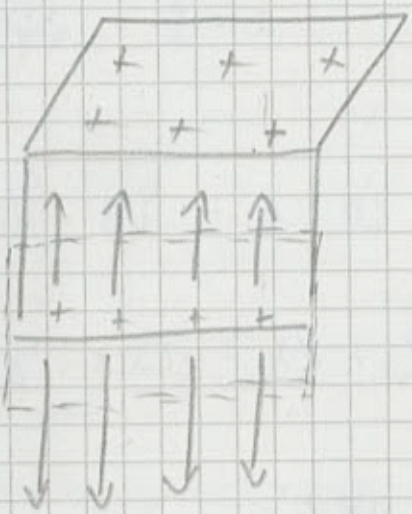
$$D = \frac{\rho_s b^2 + \rho_v \frac{1}{3}(b^3 - a^3)}{r^3}$$

$$\Phi_{\Sigma_i} = Q_i$$

$$Q_i = \rho_V \cdot \frac{4\pi}{3}(r^3 - a^3)$$

$$D_i \cdot 4\pi r^2 = \rho_V \cdot \frac{4}{3}\pi (r^3 - a^3)$$

$$D_i = \frac{\rho_V \frac{(r^3 - a^3)}{3}}{r^2}$$

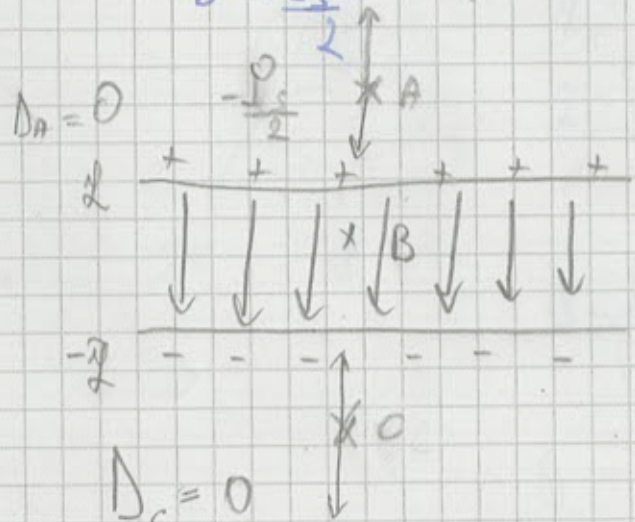


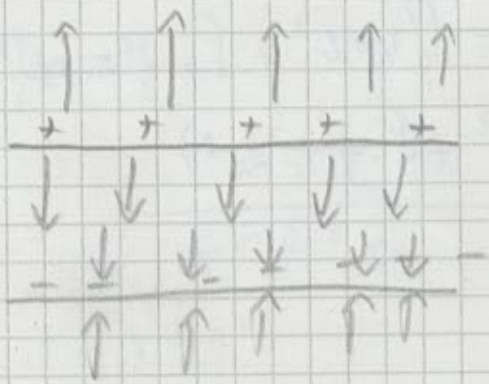
$$Q = \rho_S \cdot S$$

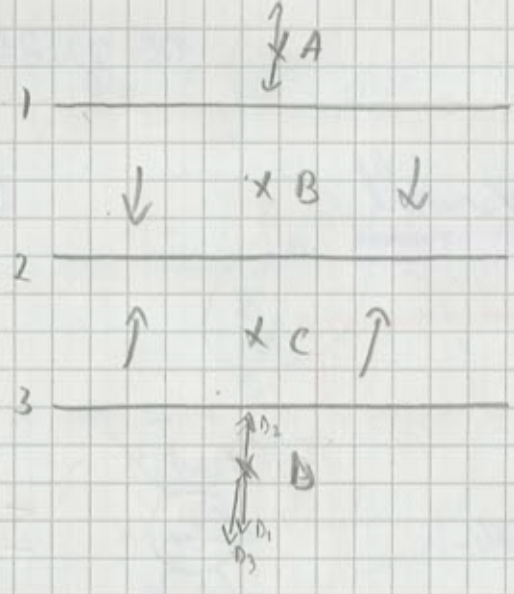
$$\Phi_E = D \cdot S + D \cdot S = \rho_S \cdot S$$

$$2 D S = \rho_S \cdot S$$

$$D = \frac{\rho_S}{2}$$





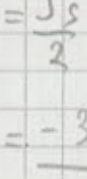


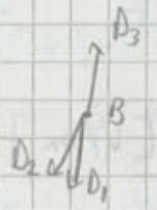
$D_4 = D_1 + D_2 + D_3 = 0$

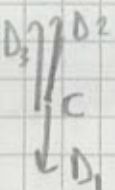
$2\rho_s$ $\quad D_1 = \frac{2\rho_s}{2} = \rho_s$ $\quad D_0 = 0$

$-3\rho_s$ $\quad D_3 = \frac{\rho_s}{2}$

ρ_s $\quad D_2 = \frac{-3\rho_s}{2}$







$D_C = D_3 + D_2 - D_1 = \frac{\rho_s}{2} + \frac{3\rho_s}{2} - \rho_s =$

$= \rho_s$

$D_B = D_1 + D_2 - D_3 =$

$= \rho_s + \frac{3\rho_s}{2} - \frac{\rho_s}{2} =$

$= 2\rho_s$