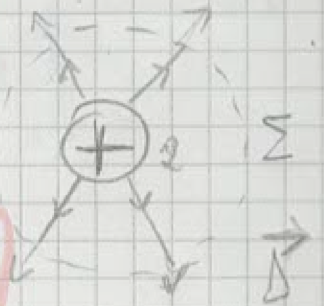
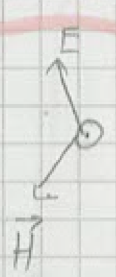
ET_06_S_2024-03-06 06.03.2024

Câmp elemg — Ec Maxwell

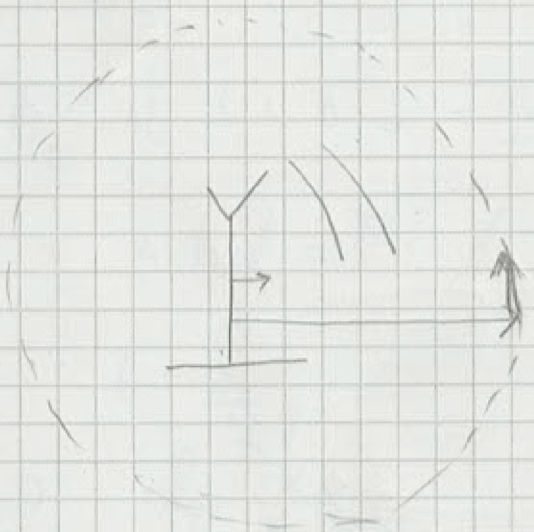
	El	Mg
Flux	ϕ_E [C]	ϕ_B [Wb]
Den. Flux Inducții	$\vec{D}$ [C/m²]	$\vec{B}$ [Wb/m²] [T]
Intensități	$\vec{E}$ [V/m]	$\vec{H}$ [A/m]





$$\vec{\pi} = \vec{E} \times \vec{H} \qquad |\vec{\pi}| = E \cdot H \sin\alpha = E \cdot H$$

$$\left[\frac{V}{m} \cdot \frac{A}{m}\right] = \left[\frac{W}{m^2}\right] \Sigma$$



$\Phi_E = \int \vec{D}\cdot d\vec{s} =$

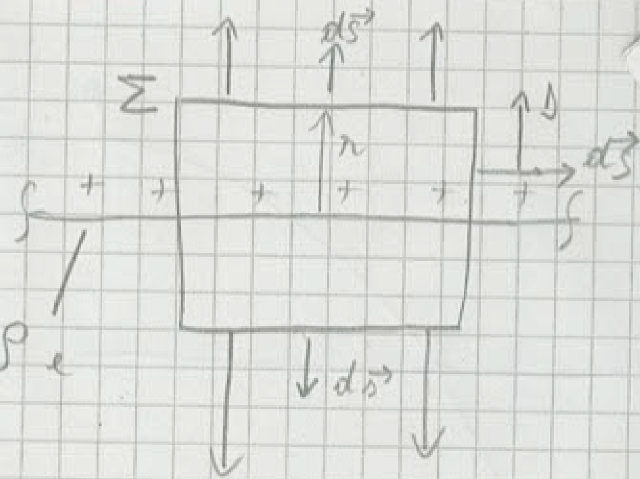
$= D\int ds =$

Σ

Aria lat. cilindrului

$= D\cdot 2\pi r\cdot \cancel{l} = \rho_e \cdot \cancel{l}$

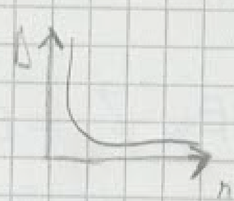
$D = \frac{\rho_e}{2\pi r} =$



$\vec{D}\cdot d\vec{s} = D\cdot ds\cdot\cos\alpha = D\cdot ds$

$\oint_\Sigma \vec{D}\cdot d\vec{s} = Q$

$D = \frac{\rho_e}{2\pi r} = \frac{k}{r} = k\cdot\frac{1}{r}$



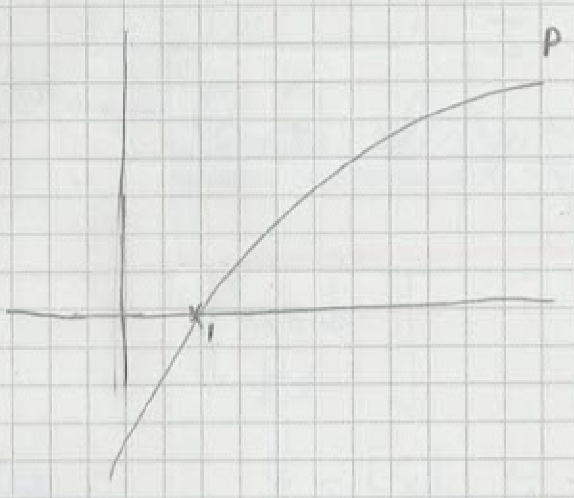
Aer : $D = \varepsilon_0 E$

$E = \frac{\rho_e}{2\pi\varepsilon_0\cdot r}$

$V_P = V_{P_0} + \int_P^{P_0} \vec{E}\cdot d\vec{r}$

$V_P = 0 + \int_P^{P_0} \vec{E}\cdot d\vec{r} = \frac{\rho_e}{2\pi\varepsilon_0}\int_r^{r_0}\frac{dr}{r} = \frac{\rho_e}{2\pi\varepsilon_0}\ln r\Big|_r^{r_0} = \rho_e(\ln r_0 - \ln r)$

$V_P = \frac{\rho_e}{2\pi\varepsilon_0}\cdot\ln\frac{r_0}{r}$



$f(x) = \ln x$ $\lim_{x \to \infty} \ln x = 1$

$\ln r = 0$

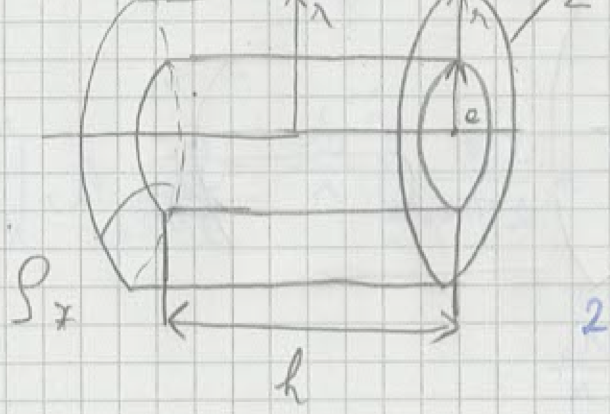
$\lim_{x \to 0} \ln x =$

$\frac{r_0}{r} > 1 \Rightarrow V_P > 0$

$\frac{r_0}{r} < 1 \Rightarrow V_P < 0$

$$\vec{E} = E_x \vec{i} + E_y \vec{j} + E_z \vec{k} = -\text{grad } V$$

$$= -\left(\frac{\partial V}{\partial x} \cdot \vec{i} + \frac{\partial V}{\partial y} \vec{j} + \frac{\partial V}{\partial z} \vec{k}\right) V$$

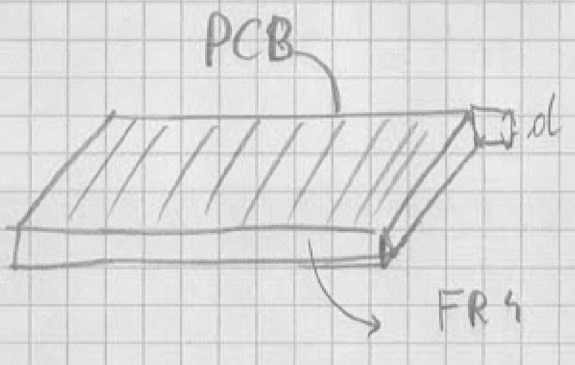


$$\phi_E = \int_\Sigma D \cdot d\vec{s} = D \cdot 2\pi r \cdot l$$

$$q = \rho_v \cdot V = \rho_v \cdot \pi e^2 \cdot l$$

$$2\cancel{\pi} r \cancel{l} \cdot D = \rho_{v_2} \cancel{\pi} e^2$$

$$D = \frac{\rho_v \cdot e^2}{2} \; ; \; E = \frac{\rho_v \cdot e^2}{2 \varepsilon_0}$$



$$V_d = V_c(a) - V_c(b)$$

$$V_d = \pi a^2 \cdot h - \pi b^2 \cdot h$$
$$V_d = \pi h (a^2 - b^2)$$

$$Q_t = Q_r + Q_d$$
$$Q_d = \rho_v \cdot \pi \cdot h (a^2 - b^2)$$
$$Q_r = \rho_s \cdot 2\pi a \cdot h$$

$$2\cancel{\pi} r \cdot \cancel{h} \cdot D = \rho_s \cdot 2\cancel{\pi} a \cancel{h} + \rho_v \cancel{\pi} \cancel{h} (a^2 - b)$$

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

$$D = \frac{\rho_l}{2\pi r} \qquad D = k \frac{1}{r}$$

$$\rho_l = 1 \mu C / cm$$

$r = 1$ mm
$r = 10^{-3}$ m
$\rho_l = 1 \cdot 10^{-6} \cdot 10^2$
$\rho_l = 1 \cdot 10^{-4}$ C/m
$= \frac{1 \cdot 10^{-4}}{2\pi \cdot 10^{-3}} = \frac{1}{2\pi} \cdot 10^{-1}$

$r = 30$ cm
$r = 0.3$ m
$\rho_l = 1 \cdot 10^{-6} \cdot 10^2$ C/m
$\rho_l = 1 \cdot 10^{-4}$ C/m
$D_2 = \frac{1 \cdot 10^{-4}}{2\pi \cdot 0{,}3} = \frac{1 \cdot 10^{-4}}{0.6\pi}$

$$\frac{D_1}{D_2} = \frac{\frac{1}{2\pi} \cdot 10^{-1}}{\frac{1}{0.6\pi} \cdot 10^{-4}} = 0{,}3 \cdot 10^{3} = 300$$