$\boxed{\text{EMP : 1. PISNI IZPIT}}$

$\boxed{1}$ $+\left\{ p_{m1} = N I_1 S \qquad \vec{B} = \frac{\mu_0}{4\pi} \frac{3(\vec{p}_m \cdot \vec{r})\vec{r} - r^2 \vec{p}_m}{r^5} \right\} +$

$$B_2 = -\frac{\mu_0}{4\pi} \frac{p_{m1}}{r^3} \quad \leftarrow \quad \vec{B}(\vec{r} \perp \vec{p}_m) = -\frac{\mu_0}{4\pi} \frac{\vec{p}_m}{r^3} \Big\} +$$

$$+\Big\{ \Phi_2 = N B_2 S = \underbrace{-\frac{\mu_0}{4\pi} \frac{N^2 S^2}{r^3}}_{L_{21}} I_1$$

$$\frac{1}{4}\Big\{ U_2 = -\dot{\Phi}_2 = -L_{21} \dot{I}_1 = -L_{21} \omega I_1 , \quad U_2 = L_2 \dot{I}_2 = L_2 \omega I_2$$

$$\frac{1}{4}\Big\{ \frac{I_2}{I_1} = -\frac{L_{21}}{L_2} = \frac{\frac{\mu_0}{4\pi} \frac{N^2 S^2}{r^3}}{\frac{\mu_0 N^2 S}{l}} = \frac{1}{4\pi} \frac{S l}{r^3} = \boxed{\frac{V}{4\pi r^3}} \qquad \boxed{1}$$

$\boxed{2}$

$$+\Big\{ U(r) = \begin{cases} A r \cos\vartheta & , r < a \\ \frac{B}{r^2} \cos\vartheta - E_0 r \cos\vartheta & , r > a \end{cases}$$

$$\frac{1}{4}\left\{ \begin{array}{l} \text{RP1)} \quad U(a^-) = U(a^+) \Rightarrow A = \frac{B}{a^3} - E_0 \\ \text{RP2)} \quad \varepsilon E_\perp(a^-) = E_\perp(a^+) \Rightarrow \varepsilon A = -\frac{2B}{a^3} - E_0 \end{array} \right\} \Rightarrow \begin{array}{l} A = -\frac{3}{\varepsilon+2} E_0 \\ B = \frac{\varepsilon-1}{\varepsilon+2} a^3 E_0 \end{array}$$

$$+\Big\{ \sigma_v = \varepsilon_0 \left[E(a^+) - E(a^-) \right] = \varepsilon_0 \left(\frac{2B}{a^3} + E_0 + A \right) \cos\vartheta$$

$$\underline{\sigma_v = \varepsilon_0 \frac{3(\varepsilon-1)}{\varepsilon+2} E_0 \cos\vartheta}$$

$$\frac{1}{4}\Big\{ dS = 2\pi a^2 \, d(\cos\vartheta)$$

$$e_v = \int \sigma_v \, dS = \varepsilon_0 \frac{3(\varepsilon-1)}{\varepsilon+2} E_0 \, 2\pi a^2 \int_{\cos\vartheta=0}^{1} \cos\vartheta \, d(\cos\vartheta) = \boxed{\frac{3(\varepsilon-1)}{\varepsilon+2} \varepsilon_0 E_0 \pi a^2}$$

$$\frac{1}{4}\Big\{ U(r>a) = \underbrace{\frac{\varepsilon_0 4\pi B \cos\vartheta}{4\pi \varepsilon_0 r^2}}_{\frac{p_v \cos\vartheta}{4\pi\varepsilon_0 r^2}} - E_0 r \cos\vartheta \qquad \boxed{1}$$

$$\Rightarrow p_v = 4\pi \varepsilon_0 B = \boxed{\frac{\varepsilon-1}{\varepsilon+2} 4\pi \varepsilon_0 a^3 E_0}$$

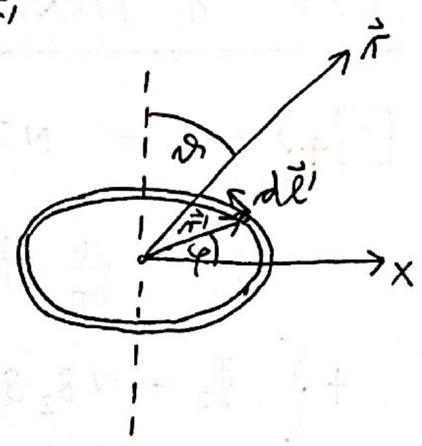
$\boxed{3}$

+

$$\vec{B} = -\frac{\mu_0}{4\pi c_0 r}\,\hat{e}_r \times \int \frac{\partial}{\partial t}\vec{j}\left(\vec{r}\,',\ t_r + \frac{\vec{r}\cdot\vec{r}\,'}{r c_0}\right) d^3\vec{r}\,'$$

$$\vec{j}\, d^3\vec{r}\,' = I\, d\vec{l}\,'$$

$$I = I_0 \sin\omega t$$



$$\vec{r} = r\begin{bmatrix}\sin\vartheta\\ 0\\ \cos\vartheta\end{bmatrix}$$

$$\vec{r}\,' = a\begin{bmatrix}\cos\varphi\\ \sin\varphi\\ 0\end{bmatrix} \Rightarrow d\vec{l}\,' = a\,d\varphi\begin{bmatrix}-\sin\varphi\\ \cos\varphi\\ 0\end{bmatrix}$$

1/4

$$\frac{\vec{r}\cdot\vec{r}\,'}{r c_0} = \frac{a}{c_0}\cos\varphi\sin\vartheta \Rightarrow \vec{j}\,d^3\vec{r}\,' = a I_0 \sin\left(\omega t_r + \frac{\omega a}{c_0}\cos\varphi\sin\vartheta\right)\begin{bmatrix}-\sin\varphi\\ \cos\varphi\\ 0\end{bmatrix} d\varphi$$

$$\frac{\partial}{\partial t}\vec{j}\,d^3\vec{r}\,' = a I_0 \omega \underbrace{\cos\left(\omega t_r + \frac{\omega a}{c_0}\cos\varphi\sin\vartheta\right)}\begin{bmatrix}-\sin\varphi\\ \cos\varphi\\ 0\end{bmatrix} d\varphi$$

$$\cos\omega t_r \underbrace{\cos\left(\frac{\omega a}{c_0}\sin\vartheta\cdot\cos\varphi\right)} - \sin\omega t_r \underbrace{\sin\left(\frac{\omega a}{c_0}\sin\vartheta\cdot\cos\varphi\right)}$$

1/4

$$\int_0^{2\pi}\frac{\partial}{\partial t}\vec{j}\,d^3\vec{r}\,' \rightarrow \underline{\text{preživi le}}\ \int_0^{2\pi}\cos\varphi\sin\left(\frac{\omega a}{c_0}\sin\vartheta\cdot\cos\varphi\right)d\varphi = \underline{2\pi J_1\left(\frac{\omega a}{c_0}\sin\vartheta\right)}$$

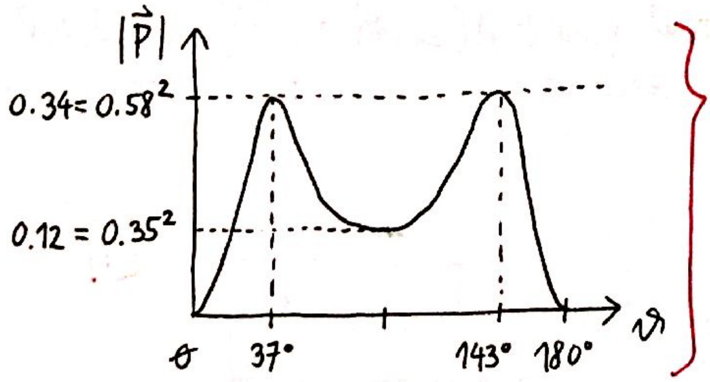
+

$$\vec{B} = -\frac{\mu_0}{4\pi c_0 r}\,a I_0\omega\left(-\sin\omega t_r\right)\underbrace{\hat{e}_r\times\hat{e}_\varphi}_{-\hat{e}_\vartheta}\ 2\pi J_1\left(\frac{\omega a}{c_0}\sin\vartheta\right)$$

$$\vec{B} = -\frac{\mu_0 I_0}{2r}\overbrace{\frac{\omega a}{c_0}}^{3}\sin\omega t_r\ \hat{e}_\vartheta\ J_1\left(\overbrace{\frac{\omega a}{c_0}}^{3}\sin\vartheta\right), \qquad 2\pi a = 3\lambda, \quad \frac{\omega a}{c_0} = a\frac{2\pi}{\lambda} = a\frac{3}{a} = \underline{3}$$

$$\underline{|\vec{P}| \propto B^2 \propto J_1^2\underbrace{(3\sin\vartheta)}_{\in[-3,3]}}$$

$\in[-3,3] \Rightarrow$ en maksimum med 0 & $\frac{\pi}{2}$



+

graf: $3\sin\vartheta \approx 1.8 \Rightarrow \boxed{\vartheta \approx 37^\circ \quad \vartheta \approx 143^\circ}$ +

Vprašanje glede primerjave z MAJHNO zanko je slabo formulirano.