HORVAT EDZ. FIZ II

DZ 4

PROMATRAMO PLINIJSKI NABOJ KAO NIZ TOČKASTIH

$$E=\sum_{n=1}^{m} q_n \cdot \frac{1}{r_n^2} \cdot k \quad r_n = |2L - x_n|$$

$$E = k \sum_{n=1}^{m} q_n \cdot \sum_{n=1}^{m} \cdot \frac{1}{(2L-x_n)^2} \quad | \lim$$

$$E = k\,Q \cdot \int_a^b \frac{1}{(2L-x_i)^2}\,dx$$

ZA PRVI NABOJ IMAMO (POZITIVAN)

$$E = kQ \int_0^{\frac{L}{3}} \frac{1}{(2L-x)^2}\,dx \quad 2L-x=t \quad dt=-dx$$

$$E = -kQ \cdot \int_{2L}^{\frac{5}{3}L} \frac{1}{t^2}\,dt = kQ \left.\frac{1}{t}\right|_{2L}^{\frac{5}{3}L} = \frac{1}{10}\frac{kQ}{L}$$

$$\vec{E}_1 = \frac{1}{10}\frac{kQ}{L}\vec{i}$$

ZA DRUGI NABOJ IMAMO (NEGATIVAN)

$$E = kQ \int_{\frac{2L}{3}}^{L} \frac{1}{(2L-x)^2}\,dx$$

$$E = -kQ \cdot \int_{\frac{4}{3}L}^{L} \frac{1}{t^2}\,dt = kQ \cdot \left.\frac{1}{t}\right|_{\frac{4}{3}L}^{L} = \frac{1}{4}\frac{kQ}{L}$$

$$\vec{E}_2 = -\frac{1}{4}\frac{kQ}{L}\vec{i}$$

$$\vec{E}_{uk} = \vec{E}_1 + \vec{E}_2 = -\frac{3}{20}\frac{kQ}{L}\vec{i} \quad \text{DUŽ } x$$

$$k = \frac{1}{4\pi\varepsilon}$$

HORVAT 5. DZ. FIZ 2

DZ 15

$$\vec{E}(r) = \frac{1}{4\pi\varepsilon_0} \int_V \frac{\rho(r)}{r^2} \vec{r}$$

$$E(r) = \frac{1}{4\pi\varepsilon_0} \int_V \frac{\rho(r)}{r^2}$$

PRELAZAK U SFERNE KOORDINATE:

$$x = r \sin\Theta \cos\varphi$$

$$y = r \sin\Theta \sin\varphi$$

$$z = r \cos\varphi$$

$$J =$$

$$J = r^2 \sin\Theta$$

$$E = \frac{1}{4\pi\varepsilon_0} \int_0^{2\pi} d\varphi \int_0^{\pi} \sin\Theta \, d\Theta \int_0^{\alpha R} \frac{\rho}{r^2} r^2 \, dr$$

$$\boxed{\rho_0 = \frac{Q_0}{\frac{4}{3} R^3 \pi}}$$

$$E = \frac{1}{4\pi\varepsilon_0} \int_0^{2\pi} d\varphi \int_0^{\pi} \sin\Theta \, d\Theta \int_0^{\alpha R} \frac{\rho_0}{1 + \left(\frac{r}{R}\right)^2} dr$$

$$E = \frac{\rho_0}{4\pi\varepsilon_0} \cdot 2\pi \cdot 2 \int_0^{\alpha R} \frac{1}{\frac{1}{R^2}} \cdot \frac{1}{r^2 + R^2} \, dr$$

$$= \frac{\rho_0}{\varepsilon_0} R^2 \cdot \frac{1}{R} \operatorname{arctg} \frac{r}{R} \Big|_0^{\alpha R} = \frac{\rho_0}{\varepsilon_0} R \cdot \operatorname{arctg} \alpha$$

ρ_0 SE IZRAČUNA KAO $\frac{Q_0}{\frac{4}{3} R^3 \pi}$, A $\alpha_1 = 1$, $\alpha_2 = 5$

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