№716 $E = \frac{Q}{R^3} r$, $\varphi = \frac{3Q}{2R} - \frac{Qr^2}{2R^3}$

$$I = \frac{2\ddot{d}^2}{3c^3} = \frac{2e^4Q^2x^2}{3mc^3R^6}$$

використовуючи формули: $m\ddot{x} = \frac{eQx}{R^3}$ $\Rightarrow$ $d = ex \; (\ddot{d} = e\ddot{x})$

$$\Rightarrow \mathcal{E} = \int_0^{t_0} I\, dt = \int_{-R}^{R} I \frac{dx}{\dot{x}}$$

$\frac{m\dot{x}^2}{2} + e\varphi(x) = \mathcal{E}_0 + e\varphi(R)$ або $\frac{m\dot{x}^2}{2} = \mathcal{E}_0 + \frac{Qe}{2R^3}(x^2 - R^2)$

$$\Rightarrow \mathcal{E} = \frac{2Q^2e^4}{3c^3m^2R^6}\sqrt{\frac{mR^3}{|Qe|}}\int_{-R}^{R}\frac{x^2dx}{\sqrt{(u+1)R^2-x^2}} =$$

$$= \frac{2Qe^3}{3mc^2R^2}\sqrt{\frac{|Qe|}{mc^2R}}\left[(u+1)\arcsin(u+1)^{-\frac{1}{2}} - \sqrt{u}\right] \Rightarrow$$

$$\Rightarrow u = \frac{2\mathcal{E}_0 R}{|Qe|}$$

№736 $q = \int_0^{\frac{e}{2}} \varkappa\, dx = \frac{\alpha e^2}{8}$ або $\alpha = \frac{8q}{e^2}$ $\left(\begin{matrix} dq = \varkappa dx \\ \varkappa = \alpha x \end{matrix}\right)$

$$dp_e = 2x\, dq = \frac{16q}{e^2}x^2 dx$$

$$p_e = \frac{16q}{e^2}\int_0^{\frac{e}{2}} x^2 dx = \frac{2qe}{3}$$

№733 $df = R_0^2\, d\Omega$

$$dI = \frac{\ddot{d}^2}{4\pi c^3}\sin^2\theta\, d\Omega = \frac{\ddot{d}^2}{4\pi c^3}\sin^3\theta\, 2\pi\, d\theta$$

$$d\mathcal{E} = \int_0^{+\infty}\frac{1}{4\pi c^3}[\ddot{d}\times n]^2 d\Omega\, dt$$

ze – заряд

$$[\ddot{d}\times n]^2 = \frac{z^2e^6}{m^2x^4}\sin^2\theta \Rightarrow$$

$$d\mathcal{E} = \frac{1}{4\pi c^3}\frac{z^2e^6}{m^2}\sin^2\theta\int_0^\infty \frac{dt}{x^4}$$

$$J = \int_0^\infty \frac{dt}{x^4} = \int_R^\infty \frac{dx}{x^4\dot{x}}$$

$$\frac{m\dot{x}}{2} + \frac{ze^2}{x} = \frac{ze^2}{R} \Rightarrow \dot{x} = \sqrt{\frac{2ze^2}{Rm}\left(1 - \frac{R}{x}\right)}$$

$u = 1 - R/x$, $du = R\,dx/x^2$

$u(x=R) = 0$, $u(x=\infty) = 1$

$$J = \sqrt{\frac{mR}{2ze^2}}\int_0^1 \frac{1}{R^3}\frac{du}{\sqrt{u}}(1-u)^2 = \sqrt{\frac{mR}{2ze^2}}\frac{1}{R^3}\frac{16}{15}$$

$$d\mathcal{E} = \frac{e^2}{15\pi R}\sqrt{\left(\frac{2ze^2}{mRc^2}\right)^3}\sin^2\theta\, d\Omega$$

$$\frac{dI}{d\Omega} = \frac{cB^2}{4\pi}r^2 = \frac{c r^2}{4\pi}\cdot\frac{[\ddot{p}\times \bar{n}]^2}{c^4 r^2} = \frac{[\ddot{p}\times\bar{n}]^2}{4\pi c^3}$$

$$I = \frac{2}{3c^3}\ddot{p}^2$$