Миняева Лина БФЗ-22 ФКС-1

№1

$dx = \cos\varphi\, d\rho - \sin\varphi\, \rho\, d\varphi$

$dy = \sin\varphi\, d\rho + \cos\varphi\, \rho\, d\varphi$

$ds^2 = \cos^2\varphi\, d\rho^2 + \sin^2\varphi\, d\varphi^2 - 2\sin\cos\varphi\, d\rho\, d\varphi +$
$+ \sin^2\varphi\, d\rho^2 + \cos^2\varphi\, d\varphi^2 + 2\sin\varphi\cos\varphi\, d\rho\, d\varphi +$
$+ dz^2 \Rightarrow ds^2 = d\rho^2 + \rho^2 d\varphi^2 + dz^2$

$H_\rho = 1 \quad H_\varphi = \rho \quad H_z = 1.$

Т. Гаусса:

$E_r\, 2\pi r \cdot h = 4\pi Q$

$E_{r+dr} \cdot 2\pi(r + dr) \cdot h = 4\pi Q + 4\pi dQ$

$\cancel{E_{r+dr}} \Rightarrow d(E_r r)\, 2\pi h = 4\pi dQ$

$dQ = 2\pi r\, dr \cdot h\rho$

$d(E_r r)\, 2\pi h = 4\pi 2\pi r\, dr\, h\rho$

$\frac{1}{r}\frac{d(E_r r)}{dr} = 4\pi\rho = \nabla \bar{E} \quad \bar{E} = -\mathrm{grad}\,\varphi = -\frac{d\varphi}{dr}$

$\mathrm{div}\,\mathrm{grad}\,\varphi = \frac{1}{r}\frac{d}{dr}\left(r\frac{d\varphi}{dr}\right) \Rightarrow \Delta\varphi = \frac{1}{r}\frac{d}{dr}\left(r\frac{d\varphi}{dr}\right).$

№2.

$\bar{H} = \nabla \times \bar{A} = \frac{e}{c}\nabla \times \frac{\bar{v}}{\left(R - \frac{\bar{v}\bar{R}}{c}\right)} = \frac{e\gamma^2}{cR^2}\left[\frac{R}{\gamma}\nabla \times \bar{v} -\right.$
$\left.- \nabla\left(R - \frac{\bar{v}\bar{R}}{c}\right) \times v\right] = \bar{n} \times \frac{e\gamma^3}{c^2 R}\left(\bar{n} \times \left(\bar{n} - \frac{\bar{v}}{c}\right) \times \dot{\bar{v}}\right) +$
$\bar{n} \times \frac{e\gamma^3}{R^2}\left(\bar{n} - \frac{\bar{v}}{c}\right)\left(1 - \frac{v^2}{c^2}\right) = \bar{n} \times \left(\frac{e\gamma^3}{R}\left(\frac{1}{c^2}\bar{n} \times \left(\bar{n} - \frac{\bar{v}}{c}\right) \cdot \dot{v}\right) +\right.$
$\left.+ \frac{1}{R}\left(\bar{n} - \frac{\bar{v}}{c}\right)\left(1 - \frac{v^2}{c^2}\right)\right) = \underline{\bar{n} \times \bar{E}}$

N3 $\vec{S} = \frac{c}{4\pi}\bar{E}\times\bar{H} = \frac{c}{4\pi}\bar{E}\times(\bar{n}\times\bar{E}) =$

$= \frac{c}{4\pi}\left(\bar{n}\,|\bar{E}|^2 - \bar{E}\right) = \frac{c}{4\pi}|\bar{E}|^2\bar{n}$

$R\to\infty$
$v \ll c$ $\Rightarrow \bar{E} = \frac{e}{c^2 R}\, n\times[n\times\dot{\bar{v}}]$

$|S| = \frac{c}{4\pi}\cdot\frac{e^2}{c^4R^2}\,|n\times(n\times\dot{\bar{v}})|\,|^2 = \frac{e^2}{4\pi c^3 R^2}\,(n\times(n\times\dot{v})]^2$

N5 $\bar{v} = const$ $\bar{R}_{t'} - \frac{\bar{v}}{c}R_{t'} = \bar{R}_{t'} - \bar{v}\,(t - t')$

$\vec{S} = \vec{R} - \vec{R}_0(*) = \bar{R} - \bar{R}_0(t') - \vec{v}\,(t - t') =$

$\vec{E} = \frac{e\,f^3}{R^2}\left(1 - \frac{v^2}{c^2}\right)\left(\bar{n} - \frac{\bar{v}}{c}\right) = R\sqrt{1 - \frac{v^2}{c^2}\sin^2 f}$

$E = \frac{e\,f}{s^2}\,\frac{1 - v^2/c^2}{\left(1 - \frac{v^2}{c^2}\sin^2 u\right)^{3/2}}$