Сретенский

(1)

Внутри:

$$V(x,y,z) = \pi\rho abc \int_0^\infty \left[1 - \frac{x^2}{a^2+s} - \frac{y^2}{b^2+s} - \frac{z^2}{c^2+s}\right] \frac{ds}{\sqrt{(a^2+s)(b^2+s)(c^2+s)}}$$

Снаружи:

$$V(x,y,z) = \pi\rho abc \int_\lambda^\infty \left[\qquad\right] \frac{ds}{\sqrt{}} ;$$

$$\boxed{\begin{array}{c}\lambda \text{ — корень ур-ния} \\ \dfrac{x^2}{a^2+\lambda} + \dfrac{y^2}{b^2+\lambda} + \dfrac{z^2}{c^2+\lambda} = 1\end{array}}$$

$[\lambda] = м^2$

Поле внутри

$$E_x = -\frac{\partial V}{\partial x} = 2\pi\rho abc\, x \int_0^\infty \frac{ds}{(a^2+s)\sqrt{}} = 2\pi\rho M_x x$$

$$E_y = -\frac{\partial V}{\partial y} = 2\pi\rho abc\, y \int_0^\infty \frac{ds}{(b^2+s)\sqrt{}} = 2\pi\rho M_y \cdot y$$

$$E_z = -\frac{\partial V}{\partial z} = 2\pi\rho abc \cdot z \int_0^\infty \frac{ds}{(c^2+s)\sqrt{}} = 2\pi\rho M_z \cdot z$$

Поле снаружи:

$$E_x = 2\pi\rho abc \cdot x \int_\lambda^\infty \frac{1}{(a^2+s)\sqrt{}} = 2\pi\rho\, M_x(\lambda) \cdot x$$

$$E_y = \quad \dots \quad = 2\pi\rho\, M_y(\lambda) \cdot y$$

$$E_z = \quad \dots \quad = 2\pi\rho\, M_z(\lambda) \cdot z$$

$$M_x(\lambda) = abc \int_\lambda^\infty \frac{ds}{(a^2+s)\sqrt{(a^2+s)(b^2+s)(c^2+s)}} = \frac{abc}{a^5} \int_\lambda^\infty \frac{ds}{\left(1+\frac{s}{a^2}\right)\sqrt{\left(1+\frac{s}{a^2}\right)\left(\frac{b^2}{a^2}+\frac{s}{a^2}\right)\left(\frac{c^2}{a^2}+\frac{s}{a^2}\right)}} =$$

$$= \frac{b}{a}\frac{c}{a} \int_{\lambda/a^2}^\infty \frac{ds}{(1+s)\sqrt{(1+s)(b^2/a^2+s)(c^2/a^2+s)}}$$

$$\frac{b}{a} = \frac{R_y}{R_x} \qquad \frac{c}{a} = \frac{R_z}{R_x}$$

$$M_y(\lambda) = abc \int_\lambda^\infty \frac{ds}{(b^2+s)\sqrt{(a^2+s)(b^2+s)(c^2+s)}} = \frac{abc}{a^5} \int_\lambda^\infty \frac{ds}{\left(\frac{b^2}{a^2}+\frac{s}{a^2}\right)\sqrt{\left(1+\frac{s}{a^2}\right)\left(\frac{b^2}{a^2}+\frac{s^2}{a^2}\right)\left(\frac{c^2}{a^2}+\frac{s^2}{a^2}\right)}} =$$

$$= \frac{b}{a}\frac{c}{a} \int_{\lambda/a^2}^\infty \frac{ds}{(b^2/a^2+s)\sqrt{(1+s)(b^2/a^2+s)(c^2/a^2+s)}}$$

$$M_z(\lambda) = \frac{b}{a}\frac{c}{a} \int_{\lambda/a^2}^\infty \frac{ds}{(c^2/a^2+s)\sqrt{(1+s)(b^2/a^2+s)(c^2/a^2+s)}}$$

$\frac{\lambda}{a^2}$ удовлетворяет ур-нию

$$1 = \frac{x^2/a^2}{1+\lambda/a^2} + \frac{y^2/a^2}{b^2/a^2+\lambda/a^2} + \frac{z^2/a^2}{c^2/a^2+\lambda/a^2} = \frac{x^2/a^2}{1+\lambda/a^2} + \frac{y^2/b^2 \cdot b^2/a^2}{b^2/a^2+\lambda/a^2} + \frac{z^2/c^2 \cdot c^2/a^2}{c^2/a^2+\lambda/a^2}$$