gradB :

$$\vec{v} = -\{B_z + \frac{mc}{q}(\frac{cE_A\ \sin\{2\pi(\frac{t}{T} - \frac{R_0\theta}{\lambda}) + \frac{\pi}{2}\}}{B_z^2}\xi_r)\}^{-1}(E_A \sin\{2\pi(\frac{t}{T} - \frac{R_0\theta}{\lambda}) + \frac{\pi}{2}\} - \frac{\mu}{q}\xi_r + \frac{mc^2}{q}\frac{(E_A\ \sin\{2\pi(\frac{t}{T} - \frac{R_0\theta}{\lambda}) + \frac{\pi}{2}\})^2\xi_r}{B_z^3})\vec{e_\theta}$$

so, $v_{grad} = \frac{1}{B_z}\frac{\mu}{q}\xi_r$

assumption $B_z = \frac{B_E}{L^3}$ (in magnetic equator) , $B_E = 3.11 \times 10^{-5}\mathrm{T} = 3.11 \times 10^{-1}\mathrm{G}$
if $L = 6$, $B_z = 1.4 \times 10^{-7}\mathrm{T} = 1.4 \times 10^{-3}\mathrm{G}$

$$\mu = \frac{mv_\perp^2}{2B_z} = \frac{(9.1\times10^{-28}\mathrm{g})\times(3.0\times10^8\mathrm{cm/s})^2}{2.0\times1.4\times10^{-3}\mathrm{G}}$$

$$\xi_r = \frac{\partial B_z}{\partial r} = \frac{\partial B_z}{\partial L}\frac{\partial L}{\partial r} = -3\frac{B_E}{L^4}\frac{1}{R_0} = \frac{-3\times3.1\times10^{-1}\mathrm{G}}{6^4\times6\times10^8\mathrm{cm}}$$

$$v_{grad} = \frac{1}{B_z}\frac{\mu}{q}\xi_r = \frac{1}{1.4\times10^{-3}\mathrm{G}} \times \frac{1}{4.8\times10^{-10}\mathrm{statC}} \times \frac{(9.1\times10^{-28}\mathrm{g})\times(3.0\times10^8\mathrm{cm/s})^2}{2.0\times1.4\times10^{-3}\mathrm{G}} \times \frac{-3\times3.1\times10^{-1}\mathrm{G}}{6^4\times6\times10^8\mathrm{cm}}$$

$$v_{grad} = -\frac{9.1\times3.0\times3.0\times3.1}{1.4\times4.8\times2.0\times1.4\times6^4\times6}10^{-5}\mathrm{cm}/s$$