2011 Day 1 Question 1A (FPF)

\( E \subseteq \Omega \subseteq I_0 \)

\[ B = \frac{\mu_0 I_0}{2\pi r^2} \quad \text{if} \quad r < R_0 \]

\[ B = \frac{\mu_0 I_0}{2\pi (2r_0 - r)} \quad \text{if} \quad r > R_0 \]

\[ \vec{r} \times \vec{B} \quad \text{with drift consistently counter-clockwise.} \]

\[ \vec{v}_{BB} \sim \vec{B} \times \vec{DB} \]

\[ r = \frac{B MV}{2 B} \]

\[ \text{drift} \quad -\vec{z} \]

\[ \vec{B} \times \vec{r} \quad \text{(if} \quad r < R_0 \quad \text{and} \quad r > R_0) \]

\[ \vec{E} \times \vec{B} \quad \text{radial drift will vanish exactly at} \quad r = R_0 \]

Yes, I think they should "reach" \( r = R_0 \), though that is obviously not a stable position — it will initially drift with gyromotion along \(-\hat{z}\).