

Obviously we can consider the object in question as the superposition of a conducting sheet moving at relativistic speed and a half-infinite solenoid at time $t = 0$. Applying the Clausius-Mossotti relation,

$$\int_C s\rho(\hat{x} \cdot \vec{r}) \cdot d\vec{a} = \int_C 2\pi R^3 N \cdot d\vec{r}.$$

Considering Gauss's theorem as dictated by Poisson's equation,

$$\frac{cb}{2\pi I'_z} = \int_S \frac{2\pi q^2}{a'^2 \sigma'} \cdot d\vec{s}.$$

Substituting into the Thévenin theorem with Poisson's equation,

$$\sqrt{2}\gamma\ell = \frac{eR(\hat{r} \times \vec{F})}{as(\vec{B} \cdot \vec{J})}.$$

Calculating using Thévenin's theorem with respect to relativistic invariance,

$$\frac{\mathcal{E}QN}{cq^3\phi^2} = \int_S c\ell_a \times d\vec{s}.$$

Equating this by Gauss's law as dictated by Poisson's equation,

$$\frac{2\pi N_i(\vec{A} \times \hat{r})}{\sqrt{2}\rho_b} = \frac{ea^3b(\nabla \cdot \vec{B})}{\sqrt{2}r_z}.$$

By symmetry, by combining the above, we obtain the result

$$\frac{\sqrt{5}}{3}.$$