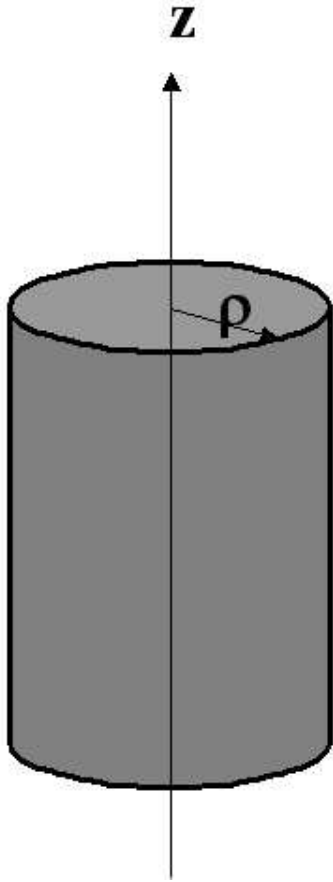


PHY 712 – Problem Set # 15

Continue reading Chapter 5 of **Jackson**.

1.



A current source has the form of a very long right circular cylinder of radius a oriented along the z axis as shown. The current density is uniform in the angular direction (ϕ), but varies along the radial direction (ρ) according to:

$$\mathbf{J}(\rho) = \begin{cases} J_0 \hat{\mathbf{z}} \left(1 - \frac{\rho}{a}\right)^2 & \text{for } \rho \leq a \\ 0 & \text{for } \rho \geq a \end{cases} \quad (1)$$

Find the vector potential $\mathbf{A}(\rho)$ and the magnetic field $\mathbf{B}(\rho)$ for all ranges of ρ .