Exercise 24

Chapter 5, Page 248

Introduction to Electrodynamics

ISBN: 9780321856562

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Solution ✔ Verified

Step 1 1 of 2

From vector potential we can find the magnetic field:

$$\vec{B} = \frac{1}{s}\frac{\partial}{\partial s}(A_\phi s)\hat{\mathbf{z}} = \frac{k}{s}\hat{\mathbf{z}}$$

Now, from the Ampere law one easily finds the current density:

$$\vec{J} = \frac{1}{\mu_0}\nabla \times \vec{B} = -\frac{1}{\mu_0}\frac{\partial B_z}{\partial s}\hat{\phi} = \boxed{\frac{k}{\mu_0 s^2}\hat{\phi}}$$

Result 2 of 2

$$\boxed{\vec{J} = \frac{k}{\mu_0 s^2}\hat{\phi}}$$

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