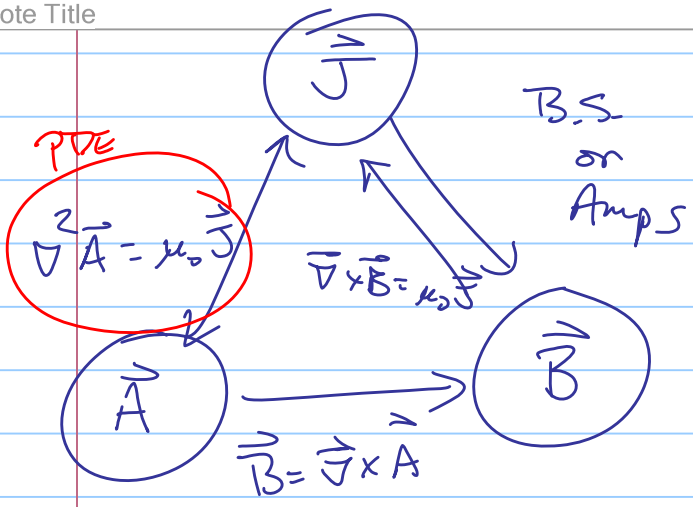
Note Title 3/25/2009



What current density produces constant azimuthal potential?

$$\vec{A} = \text{const}\ \hat{\varphi} + \varphi\,\hat{s} + \varphi\,\hat{z}$$

ONE way $\nabla^2 \vec{A} = \mu_0 \vec{J}$

$$\vec{B} = \vec{\nabla} \times \vec{A} = \frac{1}{s}\frac{\partial}{\partial s}(s\,\text{const})\,\hat{z} + \varphi\,\hat{s} - \varphi\,\hat{\varphi}$$

$$\vec{J} = \frac{1}{\mu_0}\vec{\nabla} \times \vec{B} = \frac{1}{\mu_0}\left(-\frac{\partial}{\partial s}\left(\frac{\text{const}}{s}\right)\right) = \frac{\text{const}}{\mu_0 s^2}\,\hat{\varphi}$$

Given $\vec{J}$ find $\vec{B}$