

**Special Problem 3-4.2**

**Current** is flowing in a region with density:

$$\mathbf{J}(\bar{\mathbf{r}}) = \frac{r}{8\pi} \hat{\mathbf{a}}_r + r \cos\phi \hat{\mathbf{a}}_\theta + \cos\theta \sin\phi \hat{\mathbf{a}}_\phi \quad \left[ \frac{\text{A}}{\text{m}^2} \right]$$

A sphere with **radius 2 meters**, centered at the origin, **encloses** at one moment in time a charge of **5 Colombs**.

How much charge is enclosed by this sphere **one second** later?