Warm-Up for April 20th, 2022

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1 Memory Bank

1. Definitions of bound currents, given the *magnetization* $\mathbf{M}$ (magnetic dipole moment per unit volume).

$$\mathbf{J}_b = \nabla \times \mathbf{M} \tag{1}$$

$$\mathbf{K}_b = \mathbf{M} \times \hat{\mathbf{n}} \tag{2}$$

2 Bound Currents and Magnetization

1. An infinitely long circular cylinder (Fig. 1) carries a uniform magnetization $\mathbf{M}$ parallel to its axis. Find the magnetic field (due to $\mathbf{M}$) inside and outside the cylinder. *[Hint: let* $\mathbf{M} = M\hat{\mathbf{z}}$*, and try to vizualize the current.]*

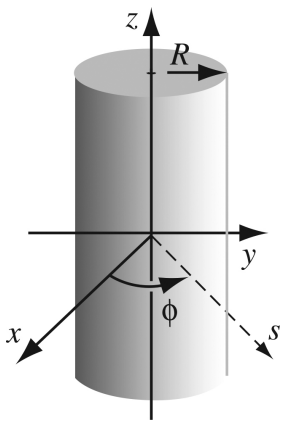

Figure 1: A circular cylinder with uniform magnetization along the z-axis.