

## Problems

1. **Magnetic dipole moment:**

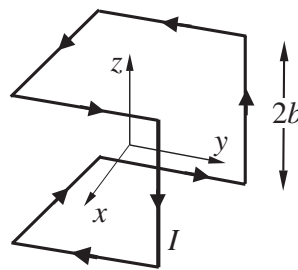
A current distribution produces the vector potential

$$\mathbf{A}(r, \theta, \varphi) = \hat{\varphi} \frac{\mu_0}{4\pi} \frac{A_0 \sin \theta}{r} \exp(-\lambda r).$$

- (a) (50 pts) Find the magnetic (dipole) moment of this current distribution. *Hint:* Find the current from the vector potential and then follow the definition of the magnetic moment. Avoid directly performing integrals, if possible.

2. **A current loop:**

A filamentary current loop traverses eight edges of a cube with side length  $2b$  as shown in the figure. The origin is placed at the center of the cube.



- (a) (50 pts) Find the magnetic dipole moment  $\mathbf{m}$  of this structure.