Homework 2

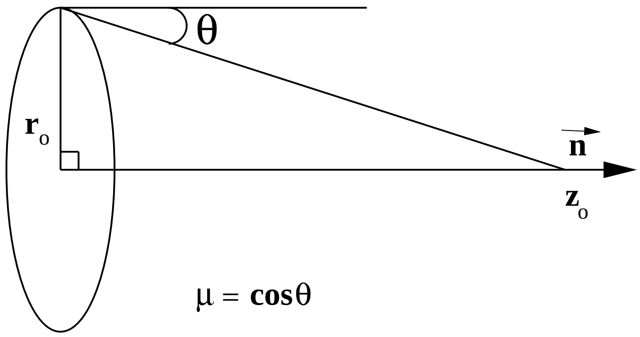

Figure 1: Problem geometry.

1. Derive the scalar flux at a point a distance z_0 from the center of a ring source of radius, r_0 with an intensity of

   (a) $\frac{q_0}{4\pi} \quad p/(cm - sec - steradian)$.

   (b) $\frac{q_0\mu}{4\pi} \quad p/(cm - sec - steradian)$.

2. Derive the scalar flux at a point a distance z_0 from the center of a disk source of radius, r_0 with an intensity of

   (a) $\frac{q_0}{4\pi} \quad p/(cm^2 - sec - steradian)$.

   (b) $\frac{q_0\mu}{4\pi} \quad p/(cm^2 - sec - steradian)$.

3. Evaluate the solution to problem 2 in the limit as $r_0 \to \infty$.

4. Solve problem 3 using the 1-D slab transport equation with:

   (a) vacuum boundary conditions and an equivalent delta-function volumetric source.

   (b) an equivalent incident flux and a zero volumetric flux.

5. Derive the point kernel equation including both anisotropic surface fluxes and and anisotropic volumetric sources that yields the component of the current with respect to an arbitrary normal, $\overrightarrow{n}$, i.e., derive the equation for $\overrightarrow{J} \cdot \overrightarrow{n}$.

6. Repeat problem 1, but solve for $\overrightarrow{J} \cdot \overrightarrow{n}$ rather than the scalar flux.

7. Repeat problem 2, but solve for $\overrightarrow{J} \cdot \overrightarrow{n}$ rather than the scalar flux.

8. Repeat problem 3, but solve for $\overrightarrow{J} \cdot \overrightarrow{n}$ rather than the scalar flux.