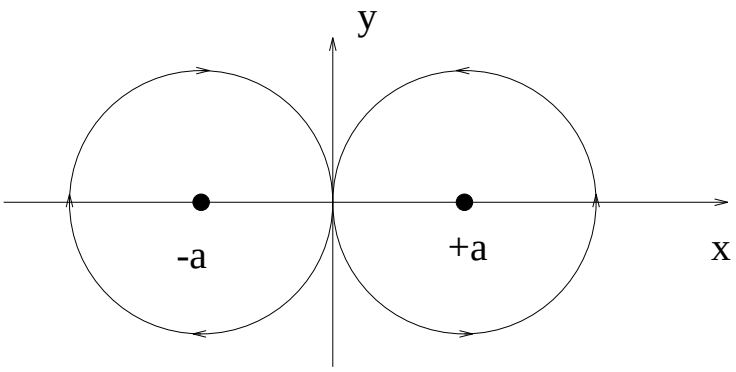
1. Two halves of a long hollow conducting cylinder of inner radius b are separated by small lengthwise gaps on each side, and are kept at different potentials V_1 and V_2.

   (a) Find the electrostatic potential everywhere inside.

   (b) Find the electrostatic field at the center.

2. What are the Cartesian magnetic dipole and quadrupole moment tensors of a "figure-8" current loop (loop radius a) with current flow as indicated in the diagram below? (There is no short-circuit at the cross-over point.)



3. What is the magnetic field everywhere for

   (a) A sphere of constant magnetization?

   (b) A hollow spherical shell with uniform electric surface charge density σ rotating on its axis with angular speed ω?

   (c) Comment.

   (d) For the spinning charged spherical shell, find the vector potential everywhere.