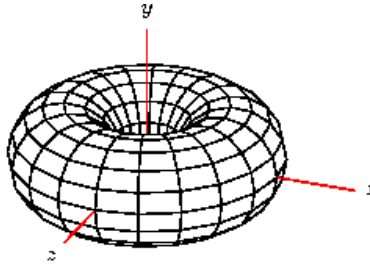


**Physics 122: Practice Problem of the Day****Problem #19: Using Ampere's Law to get the field in a Toroid**

Saturday February 28, 2009



A solenoidal toroid is a device that is constructed by taking a straight solenoid of finite length and bending it into a “donut” shape as shown above. The “hole” of the toroid has a given inner radius  $r_i$  and a given outer radius  $r_o$ . A current of  $I_0$  Amps is run through a wire that is wrapped  $N$  times around the toroid.

Use Ampere's Law to determine the magnitude of the magnetic field for *all positions* on the x-z plane as a function of radius  $r = (x^2 + z^2)^{\frac{1}{2}}$  from distance of the y-axis and other given parameters in the problem.