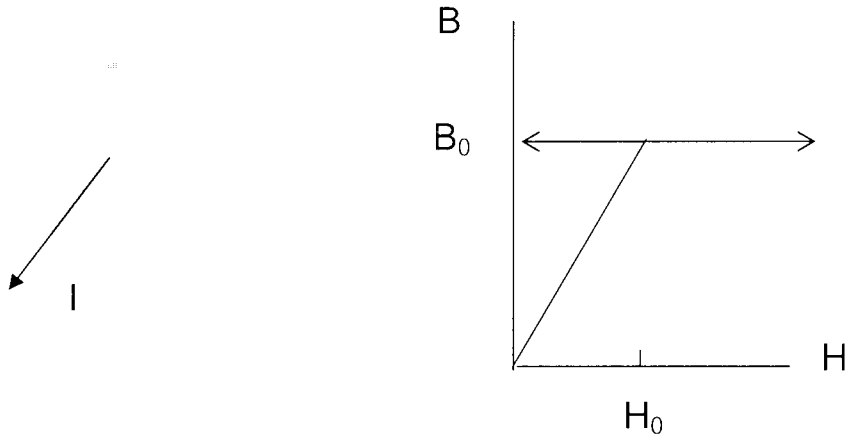
An infinitely long, straight wire of radius R is made from a conducting, magnetic material. The B versus H hysteresis curve is shown below. Assume that the material is isotropic. You may use either SI or CGS units. Recall $\vec{B} = \mu_0 \left(\vec{H} + \vec{M} \right)$ (SI units) or $\vec{B} = \vec{H} + 4\pi\vec{M}$ (CGS units.)



(a) Suppose a battery drives a current I down the wire. Assume that the current is distributed uniformly across the wire. If $I > I_{min}$, part of the wire will be driven into saturation. Find I_{min} and specify the region of the wire where the saturation has occurred.

(b) Assuming $I > I_{min}$, find $\vec{B}, \vec{H}, \vec{M}$ at all points inside and outside the wire. Sketch the three vectors.

(c) The current I is now reduced to zero. Once again, find $\vec{B}, \vec{H}, \vec{M}$ at all points inside and outside the wire.

(d) Once the current returns to zero there are no "free" currents in the sample. However, bound currents still flow if $\vec{M} \neq 0$. Find all the bound currents corresponding to the situation in part c.