

AP Physics - Magnetism - Induced EMF

Note Title

4/8/2008

Symmetry

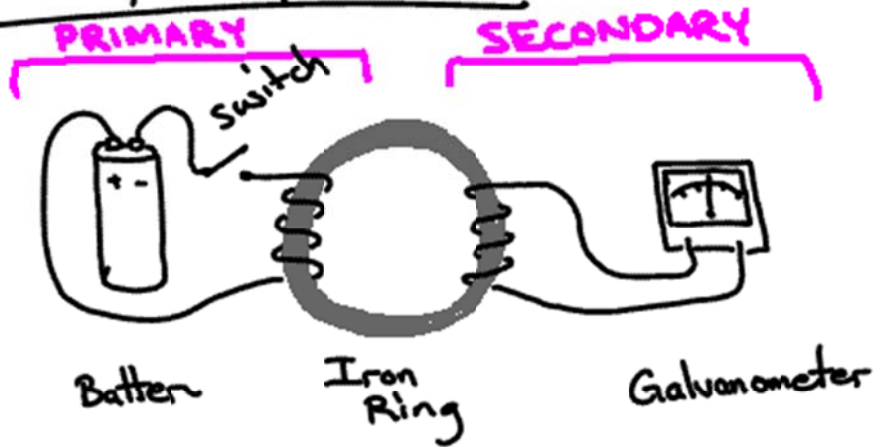
Hans Christian Oersted discovered that a current flowing through a wire created a magnetic field proportional to the current and inversely proportional to the distance from the wire:

$$\vec{B} \propto \frac{I}{r}$$

After he published, several scientists, operating under the assumption that if one thing results in another, then the other might be modified in some way to affect the first. This idea of "symmetry" of the universe has parallels throughout physics (i.e. Newton's 3rd Law - if I push on you, you push back on me).

Michael Faraday (English) and Joseph Henry (American) independently found the way to reverse the process, and create electricity using magnetic fields and movement.

Faraday's Experiment



1. Switch is closed \rightarrow Needle jumps positive on galvanometer, then current dies away to zero.
2. Switch is opened \rightarrow Needle jumps negative on galvanometer, then dies away to zero.

Therefore, Faraday concludes that only when the magnetic field is changing does current flow in the secondary circuit. This current is caused by an "Induced EMF" in the secondary coils.