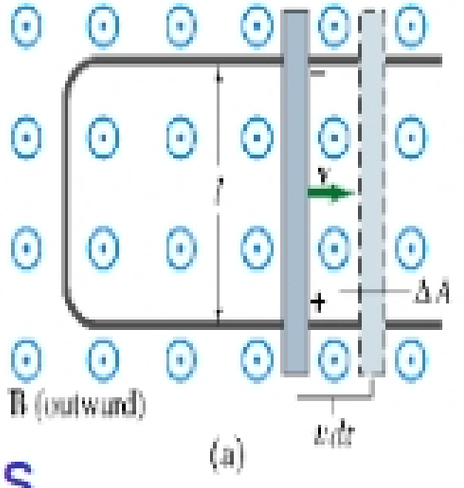
PHYS 1444 – Section 004
Lecture #18

Wednesday, April 11 2007
Dr. **Andrew Brandt**

- Generator
- Transformer
- Inductance

HW8 due Mon 4/16 at 11pm on CH 28+29
Start Ch. 30/Review on 4/16
Test on ch 26-29 Weds 4/18

EMF Induced on a Moving Conductor



- Another way of inducing emf is using a U shaped conductor with a movable rod resting on it.
- As the rod moves at a speed **v**, it travels **v**dt in time dt, changing the area of the loop by dA=**l**v**v**dt.
- Using Faraday's law, the induced emf for this loop is

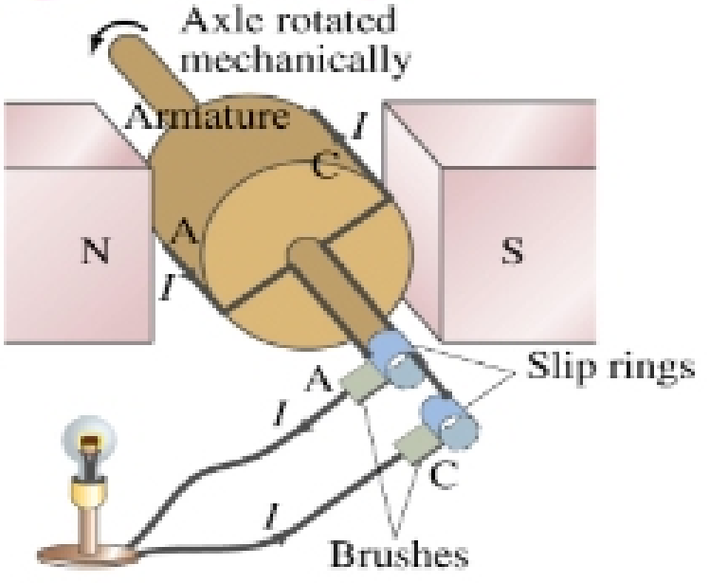
$$|\mathcal{E}| = \frac{d\Phi_B}{dt} = \frac{BdA}{dt} = \frac{Blvdt}{dt} = Blv$$

  - This equation is valid as long as B, l and v are perpendicular to each other.

- An emf induced on a conductor moving in a magnetic field is called a **motional emf**

Electric Generator (Dynamo)

- An electric generator transforms mechanical energy into electrical energy
- It consists of many coils of wires wound on an armature that can be rotated in a magnetic field
- An emf is induced in the rotating coil
- Electric current is the output of a generator



- Which direction does the output current flow when the armature rotates counterclockwise?
  - Initially the current flows as shown in figure to reduce flux through the loop
  - After half a revolution, the current flow is reversed
- Thus a generator produces alternating current