Experiment 7 Solutions: Faraday’s Law

MEASUREMENTS

Part 1: Current and Flux through a Loop Moving Past a Dipole

1. Press ‘Go’ to start recording current and flux

2. Move the wire loop from well above to well below the magnet and back again. Try to make the motion as smooth as possible and at a constant velocity.

Question 1:
During the complete motion which of the following graphs (one for motion downwards, one for motion back upwards) most closely resembled the graph of:
(a) magnetic flux through the loop as a function of time? D (both directions)
(b) current through the loop as a function of time? C (both directions)

Question 2:
Does the downward motion yield the same or different results from the upward motion? Why?

The upward and downward motions yield the same results. In both cases the upward flux through the loop increases as the loop approaches the magnet and decreases as it moves away from the magnet, hence both the flux & induced current are the same.
**Part 2: Feeling the Force**

Although we could do this part of the lab with the same coil we just used, in order to better feel the force we will instead use an aluminum tube.

1. First hold the aluminum tube near the side of the magnet to convince yourself that Al is non-magnetic.
2. Place the tube over the Plexiglas and then push the tube downwards.
3. When you get to the bottom, pull the tube back up.

**Question 3:**

For each of the following four situations please indicate the direction of the magnetic force on the tube that you feel.

As you are moving the loop from well *above* the magnet to well *below* the magnet at a constant speed…
(a) … and the loop is *above* the magnet.
(b) … and the loop is *below* the magnet

As you are moving the loop from well *below* the magnet to well *above* the magnet at a constant speed…
(c) … and the loop is *below* the magnet.
(d) … and the loop is *above* the magnet

In all of these cases the force opposes the motion. For (a) & (b) it points upwards, for (c) and (d) downwards.