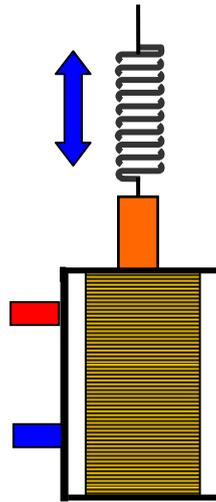


TAP 414- 6: Quick demonstrations of electromagnetic induction

Magnets oscillating in a coil

You will need:

- ✓ Retort stand + boss head + clamp
- ✓ 600 turn coil (or larger)
- ✓ Oscilloscope
- ✓ Helical spring



What to do

Suspend a magnet from a spring so that it hangs within a coil connected to an oscilloscope. Displace the magnet and allow it to bob up and down. The resulting induced voltage can be studied. Notice the direction of the induced voltage compared with the direction of motion of the magnet.

Ask the students whether or not they would expect to see damping (due to eddy currents) in this demonstration.

What you have seen

The magnet oscillates in the coil producing induced voltages.

The size of the induced voltage being proportional to the speed of the magnet.

A demonstration of simple harmonic motion

LED and coil

You will need:

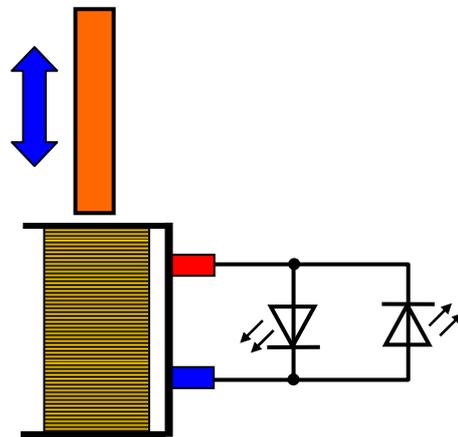
- ✓ two low current LEDs
- ✓ large coil of insulated copper wire e.g. 1100 turns
- ✓ a strong magnet

What to do

Connect the two LEDs in parallel with each other but facing opposite directions as shown in the diagram.

What you have seen

The change of direction of the induced current as the magnet is moved in opposite directions through the coil



Detecting radiation

You will need:

- ✓ yourself
- ✓ 1 lead
- ✓ oscilloscope

What to do

Set the oscilloscope to a sensitive setting. Use yourself as an aerial to detect mains frequency! Connect yourself to a cathode ray oscilloscope by holding a lead inserted into the Y INPUT socket. Put your other hand near to or around an insulated mains cable that has a current flowing through it. (Reaching up towards a fluorescent lamp also works). You will see an ac trace of frequency 50 Hz on the oscilloscope screen.

Tape recorder simulation

You will need:

- ✓ 3600 turn coil
- ✓ at least ten Magnadur magnets
- ✓ amplifier
- ✓ speaker or oscilloscope

What to do

Induced voltages can be shown in this simple simulation of the action of the playback head in a tape recorder. Move a 3600 turn coil over a row of ceramic Magnadur magnets placed flat

down on the bench with their poles alternately N - S face up with the coil connected to an amplifier and speaker or to an oscilloscope

What you will see

As the coil moves a changing voltage will be induced in it and this can be detected by the speaker or oscilloscope.

Practical advice

These are intended to be quick demonstrations and so should be set up in advance

External Reference

This activity is taken from Resourceful Physics