

CONCEPT Electromagnetic induction (EI): An application of the interactions between electricity and magnetism. The EI model explains the generation of electricity from magnetic fields.

BACKGROUND

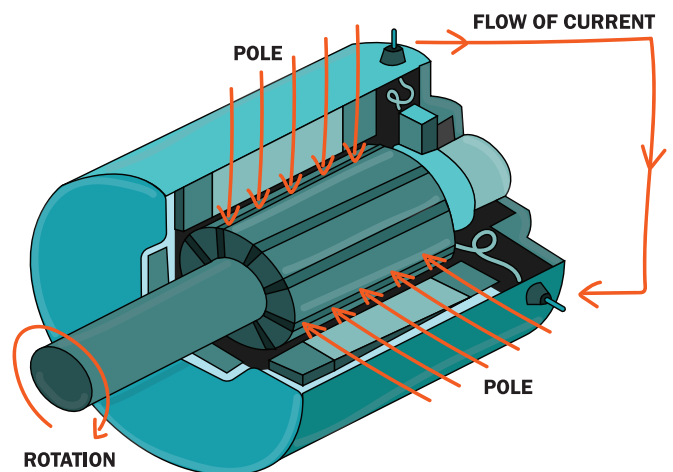
Michael Faraday observed the effects that changing magnetic flux through a conductor had in the mid-1800's. Faraday's law of induction describes his observations; The electromotive force induced in a coil of wire is proportional to the rate of change of flux through the coil.

To understand induction, begin by studying the concept of magnetic flux. Magnetic flux is an extension of the magnetic field. Think of a magnetic field in terms of imaginary field lines. These lines are close together where the field is strong and far apart where the field is weak. Faraday's model helped visualize the magnetic field. It enables us to see the strength of the field relative to other fields.

Field strength also considers the area over which the field lines are counted. Scientists consider the magnetic flux, as a measure of the relative number of imaginary field lines drawn through an area perpendicular to the magnetic field. Thus, magnetic flux is measured in field lines per unit area. The greater the flux for a given magnet, the stronger the magnetic field.

REAL WORLD CONNECTIONS

If a coil rotates in a magnetic field, the angle between the area vector of the coil and the magnetic field changes. The flux through the coil changes and current is induced in the coil. That is the basic operation of a power plant, a hydroelectric plant, or a wind turbine. The whole goal of the power plant is to turn a coil in a generator to change the flux through the coil and generate a current. Today we see this done from Wind Turbines and Water flowing through spillways in dams.



ELECTROMAGNETIC INDUCTION