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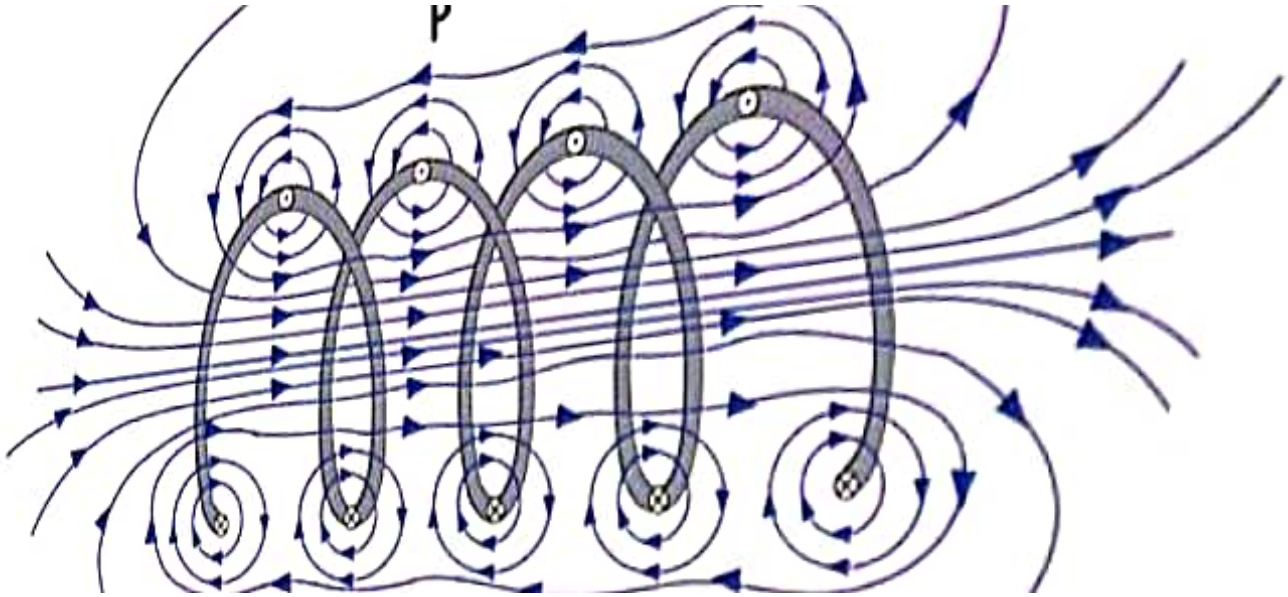
Giridhar Kumar

B.Sc, Degree - 2 (Hons), 10/07/2024, Physics Notes
paper- IV, Group- B. Current Electricity.

Topic :- Self - Inductance.

The property of self-inductance is a particular form of electromagnetic induction. Self inductance is defined as the induction of a voltage in a current carrying wire when the current in the wire itself is changing.

In the case of self-inductance the magnetic field created by a changing current in the circuit itself induces a voltage in the same circuit. Therefore, the voltage is self-induced. In circuit diagrams, a coil or wire is usually used to idicate an inductive component. The alternating current running through a coil creates a magnetic field in and around the coil that is increasing and decreasing as the current changes.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Govindhan. Kumar

B.Sc, D-2 (Hons), 10/02/2014, Physics Notes

When the current increase in one loop the expanding magnetic field will cut across some or all of the neighboring loops of wire, inducing a voltage in these loops. This causes a voltage to be induced in the coil when the current is changing.

* Increasing the amount of induced voltage

$$V_L = N\frac{d\phi}{dt}$$

Where V_L = induced voltage in volts.

N = number of turns in the coil.

$\frac{d\phi}{dt}$ = rate of change of magnetic flux in Webers/sec.

The equation simply states that the amount of induced voltage (VL) is proportional to the number of turns in the coil and the rate of change of the magnetic flux. $\left(\frac{d\phi}{dt}\right)$.

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The equation can also be recognized to allow the inductance to be calculated when the amount of induced voltage can be determined and the current frequency is known as

$$V_L = L \cdot \frac{di}{dt}$$

Where V_L = the induced voltage in volt(V)

L = the value of inductance in heneries (H).

$\frac{di}{dt}$ = the rate of change of current in amperes per second (A/s).