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**LAB#15**

**APPLIED PHYSICS LAB**

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**AC Circuits - RLC Circuit:**

The inductor is based on the principle of inductance - that moving charges create a magnetic field (the reverse is also true - a moving magnetic field creates an electric field). Inductors can be used to produce a electric fields and storing energy in their electric field. At its simplest level, an inductor consists of a coil of wire in a circuit.

In an ideal setting (no internal resistance) these oscillations will continue indefinitely with a period (T) and an angular frequency ω given by circuit. This is referred to as the circuit’s natural angular frequency. A circuit containing a resistor, a capacitor, and an inductor is called an RLC circuit (or LCR). With a resistor present, the total electromagnetic energy is no longer constant since energy is lost via Joule heating in the resistor. The oscillations of charge, current and potential are now continuously decreasing with amplitude. This is referred to as damped oscillations. The oscillations in the RLC circuit will not damp out if an external emf source supplies enough energy to account for the energy lost from the resistor. This energy is supplied from an oscillating emf source with an alternating current (AC).



E = E 0 sin(ωt + φ)

V R = V 0R sin(ωt)

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where V 0R , V 0C , and V 0L are the maximum (amplitude) voltages across the resistor, capacitor, and inductor components respectively. The ω here is the driving angular frequency. Notice that the voltage across the capacitor V C lags V R by 90 ◦ , and the voltage across the inductor V L leads V R by 90 ◦

Diagram, schematic

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Chart, line chart

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