

Inductors and Inductor Circuits

Inductors and Inductor Circuits

1. Introduction

- An inductor is a component that stores energy in a magnetic field.
- It is typically a coil of wire that opposes changes in current.

2. Inductor Basics

- **Inductance:** the property that opposes current change, measured in henries.
- Inductance increases with more turns, a core material, and coil area.
- **Faraday's law:** a changing current induces a voltage across the coil.

3. Behavior in Circuits

- An inductor resists sudden current changes and passes steady DC freely.
- **Time constant:** equals inductance divided by resistance.
- It opposes high-frequency AC, acting opposite to a capacitor.

4. Inductor Networks

- **Series inductors:** total inductance equals the sum of values.
- **Parallel inductors:** reciprocal of total equals the sum of reciprocals.
- Mutual inductance occurs when coupled coils affect each other.

5. Applications

- Filters, chokes, and tuning circuits.
- Transformers that transfer energy between coils.
- Energy storage in switching power supplies.