

## CHAPTER OVERVIEW

### 22: Source of Magnetic Field

#### Learning Objectives

- Understand how to apply the Biot-Savart Law to determine the magnetic field from an electric current.
- Understand how to apply Ampère's Law.
- Understand how to model the forces that are exerted on each other by two wires carrying current.
- Understand how to model a solenoid and a toroid.

In this chapter, we develop the tools to model the magnetic field that is produced by an electric current. We will introduce the Biot-Savart Law, which is analogous to Coulomb's Law in that it can be used to calculate the magnetic field produced by any current. We will also introduce Ampère's Law, which can be thought of as the analogue to Gauss' Law, allowing us to easily determine the magnetic field when there is a high degree of symmetry.

#### prelude

How does an electromagnet work?

- A. Current is passed through a magnet, increasing its strength.
- B. Current is passed through a circular coil, creating a magnetic field.

[22.1: The Biot-Savart Law](#)

[22.2: Force between two current-carrying wires](#)

[22.3: Ampere's Law](#)

[22.4: Solenoids and Toroids](#)

[22.5: Summary](#)

[22.6: Thinking about the material](#)

[22.7: Sample problems and solutions](#)

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