

CHAPTER OVERVIEW

19: Electric Current

Learning Objectives

- Understand the differences in modelling conductors when charges are stationary or moving.
- Understand how to define current and current density.
- Understand the differences between resistance, resistivity, and conductivity.
- Understand Ohm's Law.
- Understand how to model how power is dissipated in a resistor.
- Understand how to model alternating current.
- Understand some elements of electrical safety.

In this chapter, we introduce tools to model electric current, namely, the motion of charges inside a conductor. We will show how we can connect the microscopic motion of electrons to macroscopic quantities, such as current and voltage, that can be measured in the laboratory. We will also introduce the notion of resistance, as well as the resistor, a common component in electric circuits.

prelude

Why is it safe to touch the 300000 V terminal of a Van de Graaf generator, and not the 12 V terminal of a car battery?

- A. The Van de Graaf generator cannot sustain a large current.
- B. The Van de Graaf generator produces alternating current.
- C. The car battery produces 12 V of alternating voltage.

[19.1: Current](#)

[19.2: Microscopic model of current](#)

[19.3: Ohm's Law](#)

[19.4: Resistors](#)

[19.5: Alternating voltages and currents](#)

[19.6: Electrical safety](#)

[19.7: Summary](#)

[19.8: Thinking about the material](#)

[19.9: Sample problems and solutions](#)

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