

Chapter 28: Physical Optics: Interference and Diffraction

Summary

Chapter 28 discusses two major properties of light that illustrate its wave characteristics, interference and diffraction. Superposition of waves was first discussed in Chapter 14 and is applied to electromagnetic waves in this chapter. Double-slit interference, single-slit diffraction, and thin-film interference are the main topics covered.

Major Concepts

By the end of the chapter, students should understand each of the following and be able to demonstrate their understanding in problem applications as well as in conceptual situations.

- Superposition
- Interference
 - Young's two-slit experiment
 - Air wedge
 - Newton's rings
 - Thin-film interference
- Diffraction
 - Single-slit diffraction
 - Resolution
 - Diffraction gratings

Assignment: Conceptual Questions

Chapter 29: Relativity

Summary

Chapter 29 begins the study of "modern" physics. Relativity governs the behavior of systems moving at large velocities, and quantum mechanics, the subject of Chapter 30, deals with microscopic systems. All of these new laws must reduce to the more familiar Newtonian mechanics as the systems enlarge to macroscopic size and slow down to everyday speeds. The postulates of special relativity are presented, and their consequences, including time dilation, length contraction and mass increase, are derived. Einstein's famous equation $E = mc^2$ is also discussed. The chapter ends with a presentation of general relativity, which applies to accelerating reference frames and gravitation.

Major Concepts

By the end of the chapter, students should understand each of the following and be able to demonstrate their understanding in problem applications as well as in conceptual situations.

- Special relativity
 - The two postulates
 - Time dilation
 - Length contraction
 - Mass increase
 - Relativistic addition of velocities
- Mass-energy equivalence and $E = mc^2$
 - Matter and anti-matter
 - Relativistic kinetic energy
- General Relativity
 - The equivalence principle

Assignment: Conceptual Questions