

Reading Assignment
Chapter 9 Sections 1 ~ 4

Problems Assignment - **due date is
Friday September 14**

Instructions:

- * Neatness counts; lack of neatness counts negatively.
- * Start each problem solution on a new page of paper.

Problem 3-1

Concerning an electromagnetic plane wave in vacuum ...

- (A) Draw the familiar picture of an electromagnetic wave.
- (B) Calculate the energy densities u_E and u_B , and the energy flux density \mathbf{S} . Verify that energy is locally conserved.
- (C) The spectrum of classical waves is infinite; list 7 parts of the EM spectrum.
- (D) State the superposition principle.
- (E) Explain this statement: The e.m. plane waves (in vacuum) are "complete".

Problem 3-2

Concerning an electromagnetic plane wave in vacuum ...

- (a) Prove $\text{phase velocity} = \omega / k$.
- (b) Prove $\text{phase velocity} = c$.

Problem 3-3

Exercise 1.4.2

Problem 3-4

Exercise 5.4.3

Problem 3-5

Exercise 9.1.1

Problem 3-6

Exercise 9.1.3

Problem 3-7

An electromagnetic plane wave with frequency ω is incident **normally** on a planar interface between two continuous media. Ignore magnetic susceptibility; that is, $\mu_I = \mu_T = 1$.

- (A) Calculate the amplitude ratios E_0'/E_0 and E_0''/E_0 . Express the answers in terms of the indices of refraction, n_I and n_T .
- (B) Compare the results of (A) for TE polarization and TM polarization.
- (C) Plot a graph of the two ratios as a function of n_T assuming $n_I = 1$.
- (D) Plot a graph of the two ratios as a function of n_I assuming $n_T = 1$.