

Optics I Theory CPHY 62250/72250

Assignment 3

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Due: Nov. 4, 2018.

October 28, 2018

1. The electric field of a light wave is given by

$$\mathbf{E} = E_x \hat{\mathbf{x}} \cos(kz - \omega t + \phi_x) + E_y \hat{\mathbf{y}} \sin(kz - \omega t + \phi_y) \quad (1)$$

where $E_x = 10V/m$, $E_y = 3V/m$, $\phi_x = 33^\circ$ and $\phi_y = 65^\circ$.

- (a) Plot the polarization ellipse.
 - (b) What is the angle between the long axis of the ellipse and the x -axis?
 - (c) What is the aspect ratio b/a of the ellipse?
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2. π - polarized light is incident at 45° on a water - glass interface. What fraction of the incident light energy is reflected?
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3. Explain why there is no reflection of light when the light is incident on a plane interface at Brewster's angle.

4. σ -polarized light is incident at 45° on a glass - air interface from the glass side. The interface is in the $x - y$ plane.
- (a) Give an expression for the electric field on the glass side.
 - (b) Give an expression for the electric field on the air side.
 - (c) Give an expression for the magnetic field on the air side.