

## PHYS 542 Homework 6

**1. A Dispersive Dielectric** The polarization of a medium obeys  $\mathbf{P} = \gamma \nabla \times \mathbf{E}$ .

(a) Find the differential equation for the electric field  $\mathbf{E}(\mathbf{r}, t)$  in this medium (i.e, the analog to the standard wave equation in free space).

(b) Two specific polarization states have well-defined dispersion relations for plane waves that propagate in this medium. What are those polarization states and what are their corresponding dispersion relations.

**2. Project Report** Please describe the topic you plan to cover for your end-of-semester project. This should include (a) the general area of electromagnetic theory you plan to investigate, and (b) the specific situation you plan to examine with this theory.