Homework 3 PH507 Grad EM due 19 Oct. 2007 posted: 6 October 2007

Reading: Guenther handout on multilayer systems. There will be an additional problem on waves in plasmas that I'll post later.

- Using Mathematica, set up a program to calculate the reflectivity and transmission of a multilayer stack. Keep the function definitions sufficiently general that the calculation will work for different angles of incidence and polarization. You may wish to use the Fresnel coefficients in the sample notebook. For two different choices of the number of high-low index pairs N, plot the reflectivity of the multilayer mirror design vs. wavelength and incident angle.
- 2) Your choice of design:
  - a. A multilayer polarizing beamsplitter at oblique incidence, which transmits at one polarization completely and reflects 99% of the other.
  - b. A broad-band, sharp-edged filter using the idea of coupled potential wells:  $glass \mid (HL)^q H (HL)^p H (HL)^q \mid air$

where *p* is small.

c. High- and low-pass filters based on a multilayer mirror in which the layer thickness changes monotonically through the stack.