

PH351 Homework 10
November 28, 2005 (Not to turn in)

1. Problem 6.4 in Pain. Show that, for a barely audible sound at 500 Hz, the maximum displacement of an air molecule is about 1 atomic diameter.
2. Problem 6.5 in Pain. Show that for a stereo played very loudly at $100I_0$ in a room of cross section 3 m x 3 m, the sound power output is about 10 watts. In Pain, I_0 is taken to be 10^{-2} W m^{-2} .
3. A light wave in air strikes the surface of some water. The light wave is directed perpendicular to the water surface. Some of the light enters the water, some is reflected. What is the reflection coefficient R (the ratio of the electric field amplitude in the incident wave to the electric field amplitude in the reflected wave)? What fraction of the incident power in the incoming light wave is reflected? If the light wave moves from water to air, what fraction of the incident power is reflected?
4. Challenge problem! Do problem 6.16 in Pain (derivation of tidal wave equation to show that the wave velocity $v^2 = gh$).