

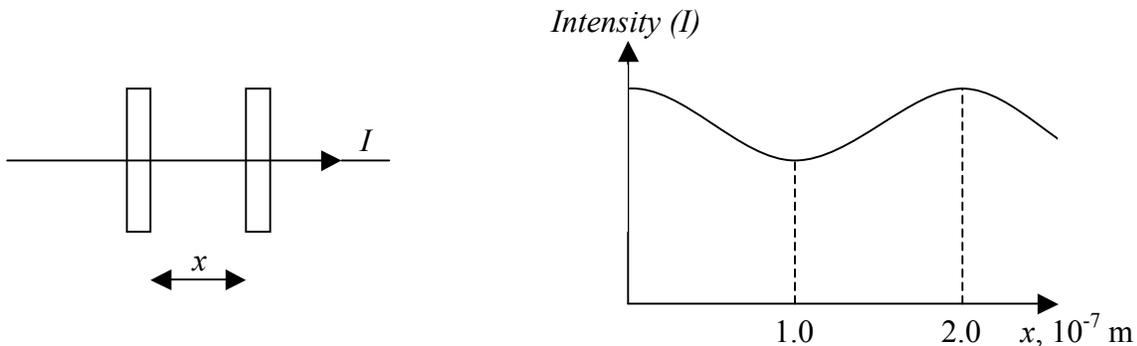
PHYS 2022 - Homework 9
Due Wednesday, April 7, 2010

Reading:

French: Chapter 8; Haliday: Interference, Diffraction.

Problems:

1. A spherical sound wave is generated in the air and propagates away from its source. At a distance $r_0=100$ m from the source the loudness of the sound is $\beta_0=100$ dB. Assuming no decay, find the sound loudness β at distances $r_1=2$ km and $r_2=8$ km.
2. French 8-2
3. The intensity of *visible* light passing through two semi-transparent reflecting plates is found to vary periodically when the distance x between the plates is gradually increased. (The light propagates perpendicular to the plates. At each plate, some light reflects and some goes through. Disregard the thickness of the plates.)
 - a. Explain this phenomenon.
 - b. Using the figure below, determine the wavelength of light.



4. An electromagnetic wave enters from vacuum into a medium where the index of refraction is n . What are the changes in the wave's: a) wavelength; b) speed; c) frequency?
5. You are on UMD campus and you are to take a photograph of a ship in the Duluth Harbor. Estimate the smallest possible size of an object on that ship that could be still visible in your photograph. Assume that the camera's film (or matrix) does not limit the resolution.