PHY431, Homework 6 DUE: Tuesday March 7, 2017

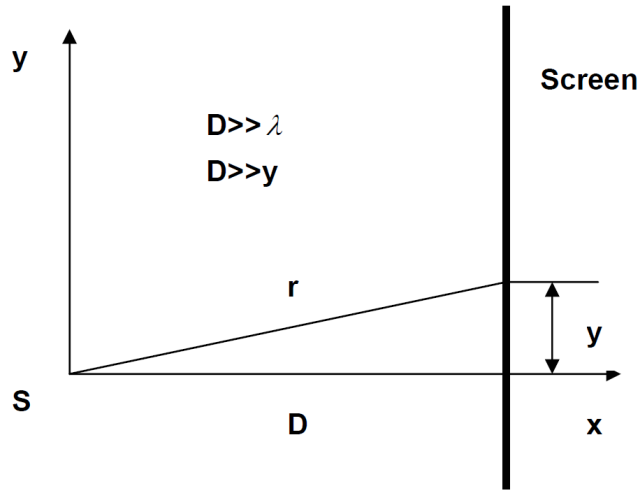
1. (6 pts) A point source *S* located at the origin of a coordinate system emits a spherical sinusoidal wave in which the electric field E_1 is given by

$$E_1 = \frac{AD}{r}\cos(\omega t - \frac{2\pi}{\lambda}r), \qquad (1)$$

where *r* is the distance from *S*. In addition, there is a plane wave propagating along the *x*-axis. This wave is given by

$$E_2 = A\cos(\omega t - \frac{2\pi x}{\lambda}) \qquad (2)$$

Both waves are incident on a flat screen perpendicular to the *x*-axis and at a distance *D* from the origin. Compute the total intensity *I* at the screen as a function of the distance *y* from the *x*-axis for values of *y* small compared to *D*. Express *I* in terms of *y*, *D*, λ and the intensity I_0 at *y*=0. Hints: express the fields in exponential form and $\sqrt{1+\varepsilon} \sim 1 + \frac{\varepsilon}{2}$.



2. (4 pts) White light is incident normally on a thin film which has n=1.5 and a thickness of 500 nm. For what wavelengths in the visible spectrum (400-700 nm) will the intensity of the reflected light be a maximum?