Homework #8 (due Oct. 28)

Each problem is 10 points

Problem A1: Under what circumstances can two electromagnetic waves add so that the intensity of the sum is always equal to the sum of their two separate intensities?

Problem A2: Show that an elliptically polarized wave can be regarded as a combination of circularly and linearly polarized waves.

Problem A3: A pair of crossed polarizers, with axes at angle 0^o and 90^o is placed in a beam of unpolarized light of intensity I_0, so that light emerges from the first with $I_1=1/2I_0$ and from the second with $I_2=0$. A third polarizer is placed between the two at angle $\theta=45^o$. What then is I_2?

If the third polarizer rotates at angular frequency ω show that

$$I_2 = \frac{I_0}{16}(1 - cos4\omega t)$$

Problem 10.5: An unpolarized light beam of intensity I_0 is incident perpendicularly on two Polaroid sheets in series. These are rotated in their own planes about the beam as axis. One rotates anticlockwise, the other clockwise, both at angular frequency ω. What is the intensity variation with time? At what frequency does the polarization vector of the transmitted light rotate?