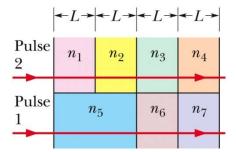
Ch. 27 Worksheet

1. White light is sent downward onto a horizontal thin film that is sandwiched between two materials. The indexes of refraction are 1.80 for the top material, 1.70 for the thin film, and 1.50 for the bottom material. The film thickness is 500.0 nm. Of the visible light (400 – 700 nm) that results in fully constructive interference above the film, what are the longer and shorter wavelengths?

2. A double slit arrangement produces interference fringes for sodium light (589 nm) that have an angular separation of 3.50×10^{-3} rad. For what wavelength would the angular separation be 10.0% greater?

3. In the figure below, two light pulses are sent through layers of plastic with thicknesses of either L or 2L as shown. The indexes of refraction for each material are $n_1 = 1.55$, $n_2 = 1.70$, $n_3 = 1.60$, $n_4 = 1.45$, $n_5 = 1.59$, $n_6 = 1.65$, and $n_7 = 1.50$.



- a. Which pulse travels through the plastic in less time?
- b. What multiple of L/c gives the difference in the transversal times of the pulses?

4. If the first order reflection occurs in a crystal at Bragg angle 3.4°, at what Bragg angle does second-order reflection occur from the same family of reflecting planes?

5. A grating has 400 lines/mm, How many orders of the entire visible spectrum (400-700 nm) can it produce in a diffraction experiment, in addition to the m=0 order?