Universität Leipzig, Fakultät für Physik und Geowissenschaften

Exercises for Experimental Physics 3 – IPSP

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Exercise Sheet 11 (WS 2010/11)

Date of Issue to Students: Jan. 13^{th} 2010

Date of Submission: Jan. 20^{th} 2011

Submission Place: Marked mailbox next to room 302 (Linnestr. 5)
Submission Time: 11:00 a.m. at the submission day noted above

Please note: Write your name and matriculation number on EACH sheet of paper.
Only submit the calculations and results for exercise 1-3, exercise 4 will be discussed during the instruction classes.

Exercises:

1. Light that has a wavelength equal to 600 nm is used to illuminate two glass plates at normal incidence. The plates are 22 cm in length, touch at one end, and are separated at the other end by a wire that has a radius of 0.025 mm. How many bright fringes appear along the total length of the plates? (5 Points)

2. Two narrow slits are separated by a distance d. Their interference pattern is to be observed on a screen a large distance L away. (a) Calculate the spacing between successive maxima near the center fringe for light that has a 500-nm wavelength, when L is 1.00 m and d is 1.00 cm. (b) Would you expect to be able to observe the interference of light on the screen for this situation? (c) How close together should the slits be placed for the maxima to be separated by 1.00 mm for this wavelength and screen distance? (5 Points)

3. A plano-convex glass lens of radius of curvature 2.00 m rests on an optically flat glass plate. The arrangement is illuminated from above with monochromatic light of 520-nm wavelength. The indexes of refraction of the lens and plate are 1.60. Determine the radii of the first and second bright fringe from the center in the reflected light. Use Figure 1 (backside). (5 Points)

4. Suppose that before the lens of Problem 3 is placed on the plate, a film of oil of refractive index 1.82 is deposited on the plate. What will then be the radii of the first and second bright fringes?

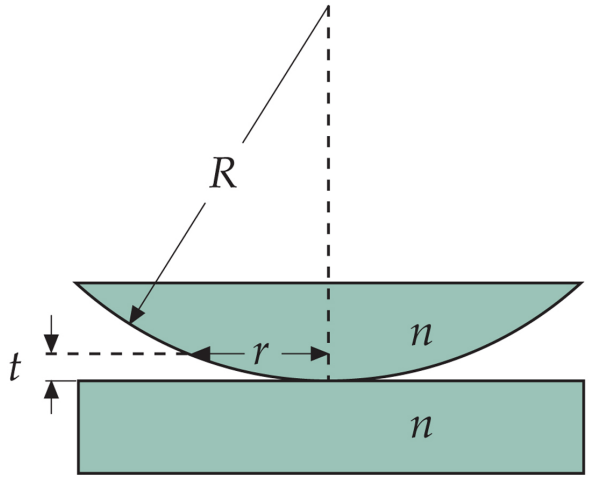

Figure 1: Exercise 3