**Class\_\_\_\_\_\_ Student ID\_\_\_\_\_\_\_\_\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Instructor\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pre-class Assignment Grade\_\_\_\_\_\_\_\_\_\_\_ Final Grade\_\_\_\_\_\_\_\_\_\_**

**Experiment: Equal-thickness Interference and It’s Applications**

**Ⅰ. Pre-Lab**

Read experimental preparation guide. Suppose the rm is the radius of the mth order dark ring of Newton's rings, corresponding to an air gap thickness of d, and the radius of curvature of the lens is R and the refractive index (n) of the air gap is 1. Then the formula for the radius (rm) of the mth order dark ring is given by: , please prove the above equation.

**II. Original data record**

1.

Data Record for Measuring the Radius of Curvature of a Lens Using Newton's Rings

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Order of the ring | *m* | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 |
| Position of the ring /mm | Left |  |  |  |  |  |  |  |  |  |  |  |
| Right |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Order of the ring | *n* | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |
| Position of the ring /mm | Left |  |  |  |  |  |  |  |  |  |  |  |
| Right |  |  |  |  |  |  |  |  |  |  |  |

2.

Data Record for Measuring Magnetic Tape Thickness Using Wedge Interference (Optional)

|  |  |  |
| --- | --- | --- |
| Number of tests | Position of the ith interference fringe *x*1（mm） | Position of the (i+10)th interference fringe *x2*（mm） |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |

|  |  |
| --- | --- |
| **Instructor**  **Signature** |  |

**Ⅲ. Data processing**

Use the difference-by-difference method to obtain the average value of *D*- *D*; calculate the average value and uncertainty of the radius of curvature *R*; calculate the thickness of the magnetic tape (optional). The detailed calculation process is necessary.

**Ⅳ. Analysis of the Experimental Phenomena and Conclusion**

**Ⅴ.** **Questions**

1. Theoretically, the center of Newton's rings is a dark spot, but in practice, it often appears as a flickering spot. What causes this, and does it affect the measurement of the lens curvature radius (*R*)?

2. If there are minor bumps on the flat glass plate during the experiment, how do the interference fringes change at the bumps?