**General Physics eJournal 10**

**Diffraction of Light**

**Instructions:**

Follow the Writeup and fill out the eJournal as you complete the lab activities. Submit your eJournal report by uploading the completed WORD or PDF document to our class Learninghub site. If the Learninghub site is down, email the completed report file directly to a lab TA.

**Preliminaries:**

* Title:
* Name(s):
* Date:
* Time In & Out:

**Plan:**

**Hypothesis**

Form a hypothesis regarding the diffraction of coherent, monochromatic light passing through a diffraction grating or reflecting off the equally-spaced grooves of a CD.

**Experiment Outline**

Briefly describe your plan for testing your hypothesis.

**Equipment List**

* List
* Equipment
* Here

**Action:**

Describe the techniques used to collect data by responding to the bullet point questions:

* Describe the arrangement of the laser, diffraction grating/CD, and screen.
* What quantities did you measure?
* How did you determine the angle, θ1?

*Insert a labeled image of each apparatus*

**Results:**

Record the slit spacing, dgrating, distance, L, between the diffraction grating and screen, and your measurement of y1 ave for the grating.

**Table I: Diffraction Grating Data**

|  |  |
| --- | --- |
| **dgrating = 1/k (m)** |  |
| **L (m)** |  |
| **|y1| + |y-1| (m)** |  |
| **y1 ave (m)** |  |

Record the distance, L, between the CD and screen and your measurement of y1 ave for the CD.

**Table II: CD Diffraction Data**

|  |  |
| --- | --- |
| **L (m)** |  |
| **|y1| + |y-1| (m)** |  |
| **y1 ave (m)** |  |

**Analysis:**

Calculate and record the angle, θ1, for the diffraction grating.

θ1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ degrees

Calculate and record the laser wavelength, λmeas. Record the average wavelength, λave, of the labeled values on your laser pointer (655 nm, 650 nm, or some other average depending on the wavelength listed on your laser). Use a percent difference to compare λmeas to λave.

**Table III: Wavelength Comparison**

|  |  |  |
| --- | --- | --- |
| **λave (m)** | **λmeas (m)** | **% Difference** |
|  |  |  |

Calculate and record the angle, θ1, for the CD.

θ1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ degrees

Calculate and record the groove spacing of the CD, dCD. Look up the typical CD groove spacing, dCD pred, at the following link:

<https://hypertextbook.com/facts/2001/InnaSokolyanskaya2.shtml>

Use a percent difference to compare dCD to dCD pred.

**Table IV: CD Groove Spacing Comparison**

|  |  |  |
| --- | --- | --- |
| **dCD pred (m)** | **dCD (m)** | **% Difference** |
|  |  |  |

**Conclusion:**

Interpret your results in light of your hypothetical predictions. How well did your hypothesis match the results? How do you think the results would change if a DVD or Blu-ray disc were used as a diffracting surface rather than an audio CD? How might you improve this experiment or explore it further?