Date: 4/30/98

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Subject: Polarization of Optical Waves

In this lab, the direction of the electric field produced from an optical laser was studied to determine its characteristics. A laser beam was set up to irradiate through a polarizer plate to a photodiode, and then through a birefringent plate. The angle was changed on both plates and measurements were taken to determine when maximums and minimums occured.

Appendix 1: Tabulated angle measurements

The two polarizers really broadened the laser radiation. Even one polarizer caused the angle at which the maximum (or minimum, for that matter) occurred to be much greater than it was without the polarizer. Using two polarizers not only increased this angle even more, but it caused there to be two angles at which the radiation was at a maximum (and minimum). The relationship existing between the attenuation and rotation angle is a sinusoidal relationship.

Birefringening resulted in the radiation maximum and minimum being at different angles than when only two polarizers were used. The values (and the angle at which they occurred) were almost identical to the values read when one polarizer was used without the birefringent plate. The birefringent plate, when rotated, caused numerous maximums and minimums in the radiation.

The reason these values were almost the same for when one plate was used is that one polarizer effects the radiation in one direction, while two effect it in two directions. The birefringent plate, in a sense, reverses the effect of the other direction the second polarizer changes. Therefore, it doesn't really effect the single direction the first polarizer changes.

Appendix 1: Tabulated angle measurements

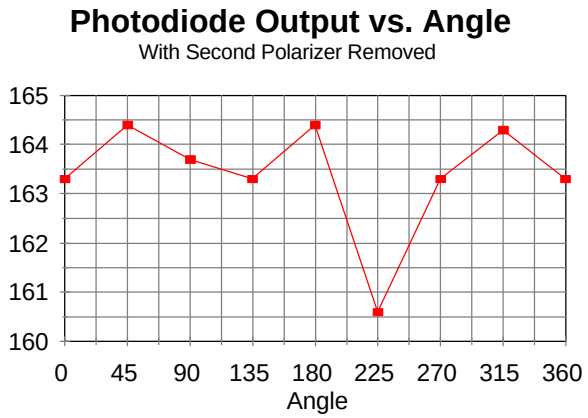
Polarization of Optical Waves

Angles of Second Polarizer:

Maximum	*Minimum*	*Half of Maximum*
162°	**66°**	**30°, 108°**
336°	**246°**	**284°, 216°**

Polarization Ratio: ***1.21***

Plot of Photodiode vs. Angle:



Tabulated Rotation Angles for Maximums and Minimums:

Angles	*Maximum*	*Minimum*
37°	**150.5**	
80°		**133.9**
130°	**150.0**	
170°		**133.9**
220°	**150.0**	
260°		**134.6**
310°	**150.7**	
350°		**134.9**