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Optical Testing Methods for Ophthalmic Optics

Patrick J. Reardon

University of Alabama in Huntsville

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RCEU Proposal: Optical testing methods for ophthalmic optics

Faculty Mentor:

Patrick J. Reardon, ECE

Asst. Prof., Electrical and Computer Engineering Department

Assoc. Director, Center for Applied Optics

X2530

patrick.reardon@uah.edu

OPB400

Project Summary

Metrology of optical systems requires different optical methods depending on the type of optic being measured and the fidelity necessary to ensure complete answers. The PI is investigating the performance of a new, proprietary intraocular lens being developed by a small business. Before the lenses can be employed in clinical trials, a quantitative measure of the optics is desired. This project will investigate the performance of several different commercial metrology tools available in the Center for Applied Optics and some custom instrumentation developed by the PI in testing IOL-like optics. The student will be taught how to perform several optical tests and will assist in the comparison of the resulting data sets. In addition, the student will be taught the fundamentals in operating an optical design code to analyze an optical element or the model an optical test.

Over the course of this program, the student will learn by instruction, independent review and independent laboratory activity various forms of optical testing available to an optical engineer or scientist. For each separate experiment, the PI will provide an overview of the fundamental basis of the measurement and training in its implementation. The student will perform computer based surveys to provide a fuller understanding for each method and will physically perform each experiment. Lecture notes and the computer survey will provide a basis for a report written for each experiment, with the results of that experiment documented and analyzed. The individual results will form sections for a summary report comparing the different tests, focusing on what unique information each test provides, and how will the same information correlates between tests.

Student Prerequisites

The student must have a science and/or engineering background. Experience in using computers is a necessity, and programming, such as MatLab, is desired. Courses in geometrical optics and/or physical optics would be an advantage.

Student Duties

The student will be responsible for taking measurements using a variety of optical instruments. The student must follow all rules for safety and proper lab techniques for each measurement. The student will be responsible for fully documenting and recording all data taken during the program. The student will perform brief research into each test in order to more fully understand the experiments being performed.

Mentor Supervision and Interaction

The PI will provide training and assistance for all optical tests being performed. This will include both a lecture format and lab training. Meetings will nominally be occurring daily. The student will also interact with CAO staff and graduate students who can provide assistance with locating necessary optical components and operating the equipment.