Mid-spatial Frequency Optical Surface Error Control

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Project Description: The initiative to be researched by an undergraduate student will advance optical metrology of mid-spatial frequencies. Optical mid-spatial frequencies lie between the low-spatial frequencies that describe the overall shape of the optic and the high spatial frequencies which affect light scattering. Polishing control over these features is difficult for complicated surface shapes, but necessary for next generation large telescopes such as the Giant Magellan Telescope. The proposed work will create (i) critical experimental data investigating the smoothing effect during a precision optical manufacturing process and (ii) data processing software to process the measured experimental result. For the first 6 weeks, the student will perform actual fabrication runs using polishing machines in the optics shop and measured the optical surface statistics using metrology systems. Using the acquired data, for the remaining 4 weeks, he/she will develop the data processing software modules.

Required Skills:
• Performing hands-on experiments in optics shop as directed
• Using Excel (or similar) software
• Writing lab reports (or technical memos)
• Communicating effectively with peers and mentor
• Working as a team player

Ideal Skills:
• Having basic knowledge in optical or mechanical engineering
• Using Matlab (or similar) software
• Using precision measurement instruments (e.g. profilometer)