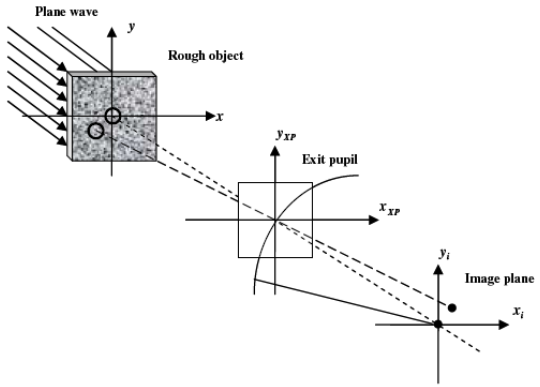
Statistical Imaging

College of Optical Sciences/University of Arizona
Tucson, Arizona

Description and Objective

Description: Investigate properties of coherence, speckle and statistical image distortions due to rough surfaces and other causes.

Objective: Become a center of excellence for statistical imaging understanding, application and education.



Effects aberration on Gaussian laser speckle is described in a recent *Optics Express* paper. [OptExp **17**(5), p.3084 (2009)]

Approach

Develop simulation tools for predicting statistical optics effects.

Perform experiments on test stands scaled appropriately to system parameters, using random phase masks generated on MLT.

Evaluate experimental results and form theoretical models from observed behavior.

Accomplishments and Plans

Analyzed EUV optical systems as a function of coherence and defocus for line-edge roughness caused by variations in the mask.

Developed novel phase-shifting interferometer based on a scatter plate.

Developed simulation tools for non-Gaussian speckle in imaging systems.

Developed theory for effects of aberration in imaging systems with Gaussian laser speckle.

Developed theory for effects of partial coherence and Hurst exponent in speckle from fractal rough surfaces.

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