A method for measuring the optical transfer matrix in polarization imaging systems

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The optical performance of an imaging system encompasses its image quality, which is crucial for accurate image representation, system design and calibration. Analyzing and evaluating imaging quality are essential steps in optimizing these aspects of the optical system. However, the commonly used Optical Transfer Function (OTF) for evaluating imaging quality in traditional optical systems cannot be directly applied to polarization imaging systems. Therefore, introducing the Optical Transfer Matrix (OTM) is more suitable for this purpose. In this study, we present a method for measuring the OTM of an polarization imaging system and discuss some issues in imaging quality analysis and evaluation of optical polarization imaging systems. The OTM approach characterizes the system's frequency transfer properties for the Stokes parameters between the object plane and the image plane, offering distinct advantages. Experimental results demonstrate that the sinusoidal grating pattern method effectively measures the OTM of a polarization imaging system, enabling analysis and evaluation of imaging quality and polarization error. We hope the proposed method provides a theoretical foundation for assessing imaging quality in polarization imaging systems.

Short biography:

Jianlin Nie was born in 1995 in Xinyang City, Henan Province, China. He is currently a doctoral student at Xi'an Technological University with his major in optical engineering. His interests are centered within polarization imaging, including research on polarization imaging technology, analysis and evaluation of polarization image quality.