

Abstract Submitted
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Interference effects in Photo-elastic modulator when using highly coherent light. MD ABDUL AHAD TALUKDER, WILHELMUS J. GEERTS, Texas State University — Photo-elastic modulators (PEMs) are often used in ellipsometers and Magneto-Optical Kerr tracers to improve the signal to noise ratio. The light beam's state of polarization is modulated by a standing sound wave in the PEM's optical head allowing measurements up to the shot noise limit. When using a PEM with a coherent laser source the amplitude of the beam is modulated by an interference effect in the PEM's optical head. Here the effect of the PEM tilt angle and incident polarization is studied for a single axis PEM. The AC amplitude of the detector signal is decreasing with PEM tilt angle. Its dc, 1ω , and 2ω vary periodically as a function of PEM tilt angle. Amplitude and period decrease for larger PEM angles. As the PEM angle dependence of the 1ω and 2ω signal are a quarter wave phase shifted it is not possible to null both of them simultaneously. At small relative retardation (0.25) and perpendicular incidence, the 1ω or 2ω can be nulled by adjusting the polarization angle. Direct observations of the detector signal indicate that the interference is larger for light polarized perpendicular to the modulation direction. This work was supported by DOD grant (HBCU/MI grant W911NF-15-1-0394).

Md Abdul Ahad Talukder
Texas State University

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