

Thesis Title	Elasto-Optics Property Investigation of Photoelastic Materials using Mach-Zehnder Interferometer (MZI)
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Abstract

The elasto-optics property investigation of photoelastic materials is described in this thesis. This property change when materials get load. Mach-Zehnder Interferometer (MZI) is an instrument using interference principle. The elasto-optics property is investigated by putting photoelastic materials in the MZI. He-Ne laser is used as the light source. Its wavelength is 632.8 nm. Light passes via beam splitter is divided into two beams. The first beam is the reference beam and the second one is the object beam. Force is applied on the material using the load set. The object beam and the reference beam are combined by another beam splitter. The interference signal is detected and changed to electrical signal by a pin photodiode. Results of applied stress are plotted against the interference signal intensity. These graphs can be used to find the stress optic coefficients of materials. The stress optic coefficients are $109.9 (10^{-12} \text{ 1/Pa})$, $121.7 (10^{-12} \text{ 1/Pa})$ and $1757.8 (10^{-12} \text{ 1/Pa})$ for Polycarbonate, Polyvinylchloride and Araldite , respectively. Comparison of stress optic coefficients with the compressive strength of materials show that the compressive strength increase when the stress optic coefficients decrease.

Keywords : Mach-Zehnder Interferometer (MZI) / Photoelasticity / Polarization /
Stress Optic Coefficient