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Electric Field and Polarization Dependent Spatial Fringe-Patterns in Electro-optic Crystals RANDALL HINTON, ANTHONY GARZARELLA, DONG HO WU, Naval Research Laboratory/ Temple University — Electro-optic (EO) crystals, such as $LiNbO_3$, are being widely used for high speed optical communication applications, which exploit their fast EO modulation capability. This EO modulation capability is also being used for the detection of an electric field over an extremely broad frequency band, namely DC through THz. It is known that most of EO crystals exhibit the photorefractive, pyroelectric, piezo and photo-elastic effects. While considered as parasitic effects and detrimental for most EO applications, our experimental results seem to suggest that some of these effects can increase the effective EO responsivity. To understand how these effects influence the EO responsivity we have carried out systematic investigations with $LiNbO_3$ and $Sr_{0.75}Ba_{0.25}Nb_2O_6$ crystals. When a linearly polarized laser beam (628 nm) passes through the crystal, to which an external low frequency AC field is applied, we observed a periodic interference pattern, which was dynamically modulated by the AC field. We also found that the interference pattern was produced by the reflected beam from the crystal's front and back surfaces. The patterns and dynamic modulation behaviors of the transmitted and reflected beams were noticeably different from each other. We will discuss the implications of these experimental results to the EO responsivity.

Dong Ho Wu
Naval Research Laboratory

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