

LightTrans' talks at SPIE Optics & Photonics 2019

Polarization Effects Modeling with Field Tracing

SPIE - Polarization Science and Remote Sensing IX

Session time: 14 August 2019 | 16:30 - 17:10
Session 5: Polarization Analysis of Optical Systems

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Abstract

Polarization effects and phenomena arise due to the vectorial nature of light. Many modern optical techniques rely on such effects; while sometimes polarization effects appear in a detrimental way. It is of great concern to take such effects into optical system modeling and design. Instead of adding polarization onto rays, we follow the field tracing concept and it is a natural choice for polarization modeling. In field tracing, light is represented in the form of electromagnetic field with all vectorial information, and various electromagnetic field solvers are used to modeling light interaction with different optical components. We present simulation examples on several polarization phenomena, for example, focusing light into birefringent crystal, using polarizer in non-paraxial situation, vectorial effect in tightly focused light, polarization conversion at sub-wavelength gratings, and so on.