

Polarized Light: Applications for Polarization Holography and Polarimetry

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Polarization is an essential property of all electro-magnetic waves, including light. Together with amplitude, phase and wavelength it fully describes the light wave. Polarization can be linear, circular or in the general case elliptical. We will consider the polarization characteristics of light and in particular the Stokes parameters, that allow us to describe both fully and partially polarized light. The polarization state of light can be controlled and measured using polarizers, wave plates and polarimeters. The two-dimensional polarization distribution of a light field can also be recorded using the methods of polarization holography. It requires special media, sensitive to the polarization of light, namely photoanisotropic materials. Using polarization holography diffractive optical elements with unique polarization properties can be obtained.

Measurement and analysis of the polarization of light transmitted through or reflected from an object is known as polarimetry. It allows to determine the anisotropic properties of various materials – optical materials, biological tissues, etc. Polarimetry finds numerous applications in medicine, in particular in early-stage cancer diagnostics, Mueller microscopy, remote sensing and other fields.

Acknowledgements: The author is grateful for the funding provided by the European Union-NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project № BG-RRP-2.004-0002, "BiOrgaMCT". Research equipment of Distributed Research Infrastructure INFRAMAT, part of Bulgarian National Roadmap for Research Infrastructures, supported by Bulgarian Ministry of Education and Science was used.