POLARIZATION OPTICS

Modern Polarization Optics

DOI: 10.1134/S0030400X11130200

On November 1–3, 2010, in Moscow, the Second International Conference *Polarization Optics* was held. The conference was organized by the Moscow Power Engineering Institute, the Lebedev Physical Institute of the Russian Academy of Sciences, and the Rozhdestvenskii Optical Society. The conference was devoted to the 80th anniversary of the founding of the Moscow Power Engineering Institute. The main contribution to the organization of the conference was made by researchers from the Electronic Engineering Department at the Moscow Power Engineering Institute. The traditions of optical studies and developments at this institute were set by remarkable scientists, among whom Valentin Aleksandrovich Fabrikant played a special role. Together with S.I. Vavilov, he worked on the creation and perfection of luminescent lamps as early as in the 1940s, and his works on detection of a “negative absorption” anticipated the creation of lasers. Today, optical studies at the institute are being continued by Prof. of the Chair of Lighting Engineering V.A. Budak and Prof. of the Fabrikant Chair of Physics A.L. Sokolov, who headed the organizing committee of this conference.

Scientific delegations from Belarus and Ukraine ensured that the conference had an international character.

At the conference, the following important subjects of modern polarization optics were discussed: the theory of polarization analysis, the theory of polarization radiation transfer in scattering and absorbing media, the polarization characteristics of laser radiation, polarization measurements and calculations in optical monitoring of the environment, polarization effects in lighting engineering, and applications of polarized light in medicine and biology.

Plenary lectures of the conference covered new issues of the modern optics. The participants became acquainted with achievements in the generation of new types of quantum states of polarized and unpolarized light (A.V. Masalov). These states do not have classical analogs and, as a rule, can be useful in implementation of supersensitive optical measurements. V.G. Niz'ev described in his report the possibilities of generation of light beams with an inhomogeneous polarization structure and their unusual applications. The survey lecture by V.S. Lebedev on the structure and transformation of light fields of the subwavelength scale evoked large interest in the audience. The optics of subwavelength fields is topical in connection with the achievements of near-field microscopy, as well as

with rapid development of nanophotonics—the science that studies nanoobjects with the aid of light.

The brief selection of the materials of the conference that are presented in this issue begins with the theoretical paper by V.A. Loiko et al., who describe the propagation of light in monolayer polymer films that contain droplets of liquid crystals. An asymmetry of the angular structure of light scattering was revealed.

The theoretical work by L.I. Chaikovskaya presents an approximate analytical solution of the problem on multiple scattering of polarized radiation in a Rayleigh atmosphere. It can be used in atmospheric investigations to estimate the brightness and polarization of scattered light fields.

The study by E.K. Naumenko presents data on scattering of polarized radiation by erythrocyte suspensions. It was shown that, in the case of illumination by linearly or circularly polarized light, the Stokes parameters of the scattered radiation are highly sensitive to changes in the shape and size of erythrocytes.

In their theoretical investigation, Ya.A. Ilyushin and V.P. Budak solve radiation transfer equations in a turbid medium with a strongly anisotropic scattering. They succeeded in developing a method that takes into account the dispersion of radiation propagation path lengths and the polarization of the radiation. The method can be applied to solve the problem of the field of an isolated point light source in a two-dimensional medium.

The theoretical paper by A.L. Sokolov and V.V. Murashkin deals with diffraction patterns in the far field of radiation reflected from angle reflectors with different coatings of their faces. It is shown that, with an appropriately chosen coating, the diffraction pattern can be efficiently optimized for solving various navigation problems.

The presented selection of papers is a far from exhaustive review of the numerous results discussed in more than 40 reports at this conference. The experience of this conference shows that polarization optics is attractive for specialists in various fields, from theorists to designers of optical instrumentation.

A.L. Sokolov, cochairman of the Conference Organization Committee, professor at Moscow Power Engineering Institute

A.V. Masalov, chairman of the Conference Program Committee, head of the Department of Optics at the Lebedev Physical Institute of the Russian Academy of Sciences

Translated by V. Rogovoi