

10th International Symposium on Optics and Biophotonics September 26-30, 2022, Saratov, Russia

Saratov Fall Meeting, the International School-Conference on Optics, Laser Physics and Biophotonics, has been held every autumn in Saratov on the venue of Chernyshevsky Saratov National Research State University for 26 years. During this time, the scientific symposium „Optics and Biophotonics“, which was held for the tenth time in 2022, was separated to become a special structure. The SFM-22 program can be found at the link

<https://sfmconference.org/files/22-sfm-final-program-29-09-22.pdf>.

This issue of the Journal of Technical Physics includes selected papers based on reports presented at five of the sixteen events of the symposium:

- Workshop on Laser Physics and Photonics XXIV.
- Conference on Low-Dimensional Structures XII.
- Workshop on Electromagnetics of Microwaves, Submillimeter and Optical Waves XXII.
- Workshop on Advanced Polarization and Correlation Technologies in Biomedicine and Material Sciences IX.
- Conference on Spectroscopy and Molecular Modeling XXIII.

The Workshop on Laser Physics and Photonics XXIV is presented here by the largest number of papers of both fundamental and applied character. In the field of quantum optics, the effect of the Kerr nonlinearity on the degree of entanglement of qubits induced by the thermal radiation field of the resonator is studied, and the possibility of suppressing sudden death of qubits entanglement is shown, which is important for quantum informatics (E.K. Bashkirov). Using symbolic-numerical software tools, an adiabatic approach to the calculation of integrated-optical waveguides is developed, which is convenient for calculating and interpreting wave propagation in smoothly-irregular waveguide structures (D.V. Divakov et al.). The authors of the paper on the diffraction mathematical model of a laser speckle-interferometer based on the high-precision numerical solution of the problem of diffraction by a moving body (L.A. Maksimova et al.), in fact, developed a high-precision interference method for determining the tangential shift of the object surface.

A number of presentations of this Workshop relate to the experimental physics of lasers and their applications. For example, in the paper on limiting the power of laser radiation by carbon materials with a nonlinear optical threshold effect (M.S. Saveliev et al.), the possibilities of using carbon nanotube suspensions to create optical limiters were studied. In the paper on the spectrum enrichment of multiwavelength picosecond generation of a - synchronously pumped Raman laser (T.P. Tereshchenko et al.), a single-phase solid solution $\text{Sr}(\text{MoO}_4)_{0.8}(\text{WO}_4)_{0.2}$ was used as a Raman-laser active medium for the first time, which allowed the generation of six SRS radiation components with a

pulse duration an order of magnitude shorter than the pump pulses. Articles on laser applications include a method for measuring absolute distances by the maximum frequency of an interference signal with a harmonic deviation of the laser autodyne wavelength (A.V. Skripal et al.), as well as an experimental study of ablation and growth of structures upon the action of femtosecond laser pulses on a gallium surface in an ammonia environment (D.A. Kochuev et al.).

The Conference on Low-Dimensional Structures XII is represented by papers on graphene-nanotube carbon structures. Using the molecular dynamics methods, the deformation behavior of graphene under the influence of dislocation dipoles, which significantly change the strength properties of graphene, was studied (A.Kh. Akhunova, Yu.A. Baimova). Within the framework of the density functional theory in the tight coupling approximation with self-consistent charge calculation, the features of the atomic structure of a hybrid graphene-nanotube film with island topology under uniaxial tension and compression are described, and the effect of deformations on the electric conductive properties of the film is studied (M.M. Slepchenkov et al.). The propagation of a supersonic soliton in chair-type carbon nanotubes has been studied by molecular dynamics methods (V.V. Shunayev et al.).

The Workshop on Electromagnetics of Microwaves, Submillimeter and Optical Waves XXII is represented by a new approach to calculating the diffraction of electromagnetic waves by one-dimensional diffraction gratings formed by slits in an absolutely absorbing screen (A.M. Lerer et al.), as well as a thorough theoretical study of resonant tunneling of photons in layered optical nanostructures (metamaterials) (M.V. Davidovich). The latter paper combines a fundamental theoretical approach with a useful practical application (window pane coating that provides reflection of IR radiation and high transparency in the visible range).

The Workshop on Advanced Polarization and Correlation Technologies in Biomedicine and Material Sciences IX is represented by a thorough analysis of the state-of-art in optical diffusion diagnostics of evolving polymer foams (M.V. Alonova et al.). The paper presents a detailed review of the problem and summarizes the authors' results on the development of physical grounds and experimental verification of the methods of optical diffusion probing of evolving polymer foams based on the effects of multiple dynamic scattering of probing radiation and conversion of laser light into the fluorescence response.

Materials of the Conference on Spectroscopy and Molecular Modeling XXIII were divided among several editions of the Proceedings of SFM-22 (see Optics and Spectroscopy journal). This issue includes the paper by a group of authors from Moscow State University (Ts.B. Sumyanova

et al.), in which the influence of the central metal ion on the stability of of gadolinium and holmium complexes with 1.10'-phenanthroline-2.9-dicarboxylic acid diamide was studied using the spectrophotometric method.

In our opinion, the multidisciplinary nature of the Journal of Technical Physics perfectly fits the goals and spirit of our symposium. The organizers of the symposium are grateful to the editors for publishing the papers and to all the authors for their active participation in the preparation of this issue.

Chair of the Symposium Organizing Committee

V.L. Derbov

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