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FOR OPTICAL ENGINEERING

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## Editorial

The Editors of *Optica Applicata* requested us to take over the duties of invited editors of the volume entitled

**DIFFRACTION OPTICS AND OPTICAL INFORMATION PROCESSING.**

It was a pleasure for us to assume that responsibility and we addressed our request to scientific centres, both in Poland and those abroad which cooperate with Polish scientists engaged in optics, asking them to send us original papers covering the field of optics that is of interest here. We have forwarded 13 papers to the editorial office of *Optica Applicata*, which we received from authors working in the following institutions:

- Institute of Automation and Electrometry, Novosibirsk,
- Department of Optics, University of Valencia,
- Department of Optics and Optometry, Polytechnic University of Catalonia,
- Physics Department, Autonomous University of Barcelona,
- Institute of Physics, Wrocław University of Technology,
- Institute of Geophysics, Warsaw University,
- Department of Physics, Warsaw University,
- Institute of Applied Physics, Military University of Technology, Warsaw,
- Institute of Computer Science, Silesian Technical University,
- Polish Holographic Systems Co., Warsaw.

The papers which come first in the volume (seven altogether) are devoted to diffraction optics. The following topics are discussed:

– Investigations of intensity distribution along the optical axis of axicon transforming a plane wave. The experimental results appeared to be in good agreement with theoretical ones, obtained using the Fresnel diffraction integral.

– Designing hybrid lenses with optimized aberration correction. Investigations were carried out with the aim of using such an element as an eyeglass lens, and constructing an apochromat without the necessity of applying special glasses.

– Analysis of image quality in an ideally corrected confocal microscope. To improve the quality of imaging advantage has been taken of the nonlinear delayed fluorescence phenomenon.

– Influence of the boundary wave on amplitude distribution generated by a phase filter which transforms Gaussian beam into one of uniform intensity distribution.

– Diffraction of Gaussian beams containing multi-charge optical vortices by an edge and a single slit. Knowledge of these issues is inevitable in constructing high-resolution optical microscopes.

The other six papers deal with problems connected with optical processing of information. The following issues are in the focus of attention:

– Correlation methods of pattern recognition. The existing methods have been reviewed, pointing to their advantages and optoelectronic realizations.

– Optical correlator with variable discrimination capability and its usefulness in pattern recognition. A method of dual nonlinear correlation which includes both linear and nonlinear correlation algorithms has been discussed.

– Modelling of a composite binary phase-only filter with the use of a genetic algorithm and its applicability to correlation based pattern recognition.

– Optimized optical-digital processor in which a ring-wedge detector is replaced with a computer-generated hologram.

– An effective method of image compression by means of morphological filters.

– Application of wavelet analysis to identification of characteristic image features.

*Prof. Katarzyna Chałasińska-Macukow*
*and Prof. Jerzy Nowak*