

OPTICA APPLICATA

Vol. XXX (2000) No. 2–3

PL ISSN 0078-5466

Index 367729

A joint publication of the

INSTITUTE OF PHYSICS,
WROCLAW UNIVERSITY
OF TECHNOLOGY,
POLAND

&

SPIE/POLAND CHAPTER
in association with
SPIE—THE INTERNATIONAL SOCIETY
FOR OPTICAL ENGINEERING

Contents

Editorial	201
PALCHIKOVA I.G., SMIRNOV S.V., Limitations of diffraction measurements by means of axicons	203
NOWAK J., Hybrid lens of optimized aberration correction	213
KOWALCZYK M., MARTÍNEZ-CORRAL M., ZAPATA RODRÍGUEZ C.J., Nonlinear delayed fluorescence in confocal scanning microscopy. Point-spread-function analysis ...	231
MAGIERA L., MULAK G., OSIŃSKI J., Boundary diffraction wave as a phase filter correction tool	239
MASAJADA J., Gaussian beams with optical vortex of charge 2- and 3-diffraction by a half-plane and slit	247
STĘPIEŃ P., Computer generated holograms versus synthetic diffraction gratings in optically variable devices	257
NOWAK J., MASAJADA J., Hybrid apochromatic lens	271
CHALASIŃSKA-MACUKOW K., CAMPOS J., YZUEL M.J., Optical pattern recognition based on pure phase correlation	277
MILLÁN M.S., PÉREZ E., KOTYŃSKI R., CHALASIŃSKA-MACUKOW K., Optical correlator with variable discrimination capability — experimental results	291
KOTYŃSKI R., CHALASIŃSKA-MACUKOW K., BPOF composite filter optimized with a genetic algorithm	303
JAROSZEWICZ L.R., CYRAN K.A., PODESZWA T., Optimized CGH-based pattern recognizer	317
PNIEWSKI J., SZOPLIK T., Compression of greyscale images based on sub-band decomposition using morphological filters	335
NIEDZIELA T., STANKIEWICZ A., ŚWIĘTOCHOWSKI M., Homographic wavelet analysis in identification of characteristic image features	349
ASGHAR S., HAYAT T., Diffraction by a perfectly conducting open-ended waveguide in a homogeneous biisotropic medium	361
RAJKOWSKI B., NOWAK P., Modelling of acutance dye influence on the image sharpness in heterogenic light-sensitive layers	375
ŻENDZIAN W., Optimization of energetic parameters of passively Q-switched lasers	383
BLAHUT M., Optical waveguide splitters based on multimode interference structures made by ion exchange in glass	401

COJOCARU E., Equivalence relations for the enhanced polar Kerr effect at normal incidence	415
FURLAN W.D., MUÑOZ-ESCRIVÁ L., KOWALCZYK M., Jackson cross cylinder – simple formulation of its optical principles	421
VANKOV A., BADZIAK J., Self-phase modulation of temporary overlapped chirped pulses	431
DULSKI R., MADURA H., NIEDZIELA T., SIKORSKI Z., Theoretical model of thermodetection system	443
Letter to the Editor	
MAGIERA A., Point spread function in a confocal microscope with trigonometric pupil filters	455
Presentation	
GODLEWSKI M., Exciton properties in quantum well structures of CdTe/CdMnTe . . .	463

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 Chalasińska-Macukow
and Prof. Jerzy Nowak*