

OPTICA APPLICATA

INTERNATIONAL ADVISORY BOARD:

KRZYSZTOF ABRAMSKI – physics and technology of lasers, laser metrology, optotelecommunications

OLEG V. ANGELSKY – holography, interferometry, measurements of surface roughness, fractal optics, optical vortices

SIEGFRIED BOSECK – light, electron and ultrasonic microscopy

ROMAN S. INGARDEN – diffraction theory of optical aberrations, transport of information in optical systems

EUGENIUSZ JAGOSZEWSKI – Fourier optics, holography

ROMUALD JÓZWICKI – diffraction theory of imaging, interferometry, digital holography

FRANCISZEK KACZMAREK – laser physics, nonlinear optics

HENRYK KASPRZAK – applied optics, physiological optics

BOLESŁAW KĘDZIA – physiological optics, vision process

MAŁGORZATA KUJAWIŃSKA – optical metrology, machine vision, opto-numerical methods and systems for multimedia and engineering

MIROSLAV MILER – wave optics, holographic methods, diffractive components, optical waveguides

JAN MISIEWICZ – optical properties of solid state, semiconductors, optoelectronics

WŁODZIMIERZ NAKWASKI – semiconductor lasers and light-emitting diodes

JAN PEŘINA – quantum, statistical and nonlinear optics

TADEUSZ STACEWICZ – laser spectroscopy and its applications

TOMASZ SZOPLIK – optical and digital image processing

TOMASZ WOLIŃSKI – fiber optic sensors and systems, optics of liquid crystals, polarization optics

JAN WÓJCIK – fabrication, measurements and applications of optical fibers

A joint publication of the

INSTITUTE OF PHYSICS
WROCŁAW UNIVERSITY
OF TECHNOLOGY
POLAND

&

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

Contents

Diffraction, diffractive elements

| | | |
|---|---|-----|
| <i>Fraunhofer diffraction from a ring aperture with a spiral phase transmission function: numerical and analytical studies</i> | IVO AUBRECHT, MIROSLAV MILER, JAN PALA | 225 |
| <i>Diffraction of a plane TM-polarized optical wave on a non-absorbing medium with a periodic dielectric permeability variation</i> | VOLODYMYR M. FITIO, YAROSLAV V. BOBITSKI | 237 |
| <i>Spectral ellipsometry of binary optic gratings</i> | JAROMÍR PIŠTORA, TOMUO YAMAGUCHI, JAROSLAV VLČEK, JAN MISTRÍK, MASAHIRO HORIE, VASILIJ SMATKO, EVA KOVÁČOVÁ, KAMIL POSTAVA, MITSURU AOYAMA | 251 |
| <i>Magnetooptical gratings with circular dots</i> | JAROSLAV VLČEK, JAROMÍR PIŠTORA, DALIBOR CIPRIAN, TOMUO YAMAGUCHI, IVO VÁVRA | 263 |
| <i>Hybrid achromatic spectacle lens</i> | MAREK ZAJĄC | 273 |
| <i>Simple achromatic hybrid lens</i> | MAREK ZAJĄC, JERZY NOWAK | 285 |

Scattering, inverse problem

| | | |
|---|--|-----|
| <i>Range dependent radiation leakage from thin scattering columns due to multiple small angle scatter</i> | YURY A. KRAVTSOV, LEON A. APRESYAN, ARA A. ASATRYAN, JANUSZ CHRZANOWSKI, JÓZEF KIRKIEWICZ | 293 |
| <i>Detection of Cherenkov radiation: the inverse problem to generation of nondiffracting beams</i> | MIROSLAV MILER, JAN PALA | 307 |
| <i>Inverse problem in scatterometry of rough surfaces</i> | Czesław Łukianowicz | 315 |
| <i>Modeling of direct and inverse problems in light scattering by rough surfaces</i> | Czesław Łukianowicz | 329 |

Polarisation, photoelasticity

| | |
|--|-----|
| <i>Transformation of polarization state of the light using wave plates with arbitrary phase difference: half wave plates</i> | 337 |
| WŁADYŚLAW A. WOŹIAK, FLORIAN RATAJCZYK | 337 |
| <i>Photoelastic properties of the beta barium borate crystals</i> | |
| ANATOLIY S. ANDRUSHCHAK, YAROSLAV V. BOBITSKI, MYKOŁA V. KAIDAN, VOLODYMYR T. ADAMIV, YAROSLAV V. BURAK, BOHDAN G. MYTSYK | 345 |

Nonlinear optics

| | |
|---|-----|
| <i>Conversion efficiency and the beam-quality factors of the second-harmonic interaction in the molecular crystal (-)-2-α-(methylbenzylamino)-5-nitropyridine</i> | |
| PRIMOŽ KERKOC | 359 |

Fluorescence

| | |
|---|-----|
| <i>Application of principal component and factor analysis of fluorescence spectra in camptothecin studies</i> | |
| STEFAN KRUSZEWSKI, RYSZARD SIUDA, BLANKA ZIOMKOWSKA, MICHAŁ CYRANKIEWICZ | 369 |

Optical measurements

| | |
|--|-----|
| <i>Surface profilometry by a holographic confocal microscopy</i> | |
| RADIM CHMELÍK, LUDĚK LOVICAR, ZDENĚK HARNA | 381 |
| <i>Testing of plano-optical elements</i> | |
| ANTONÍN MIKŠ, JIŘÍ NOVÁK | 391 |
| <i>Laser-interferometric device for calibration of ring gauges</i> | |
| JÁN BARTL, ROMAN FÍRA | 403 |

Lasers and applications

| | |
|--|-----|
| <i>Laser beam propagation in gain media of diode pumped lasers</i> | |
| JAN K. JABCZYŃSKI, JACEK KWIATKOWSKI, WALDEMAR ŹENDZIAN | 411 |
| <i>Optical characterization of diode side pumped active elements</i> | |
| JAN K. JABCZYŃSKI, JACEK KWIATKOWSKI, WALDEMAR ŹENDZIAN | 421 |
| <i>Dynamics of the plasma plume induced during laser welding</i> | |
| TOMASZ MOŚCICKI, JACEK HOFFMAN, ZYGMUNT SZYMAŃSKI | 433 |

Detectors and sensors

| | |
|--|-----|
| <i>Optical layout of the fluorescence detector of the Pierre Auger Observatory</i> | |
| MIROSLAV PALATKA, PETR SCHOVANEK, MIROSLAV HRABOVSKÝ, MARTIN VLČEK, JAN RÍDKÝ, JIRÍ GRYGAR, LADISLAV SOUKUP, MICHAEL PROUZA, MARTINA BOHACOVÁ | 445 |
| <i>Application of quasiparticles theory and Fourier analysis in photoelectric effect</i> | |
| JANUSZ CHRZANOWSKI | 457 |
| <i>Optical fiber sensors of magnetic field applying Faraday's effect</i> | |
| TADEUSZ PUSTELNY, CUMA TYSZKIEWICZ, KAMIL BARCZAK | 469 |
| <i>Sol-gel derived sensitive films for ammonia evanescent wave sensors</i> | |
| PAWEŁ KARASIŃSKI | 477 |

Photosensitizers

- Investigation of photo-physical properties of selected diaminoacid protoporphyrin derivatives (PP(AA)₂Arg₂). I. Determination of quantum yield of fluorescence*
 SHU YE, MARIUSZ CZUBA, ANNA ROMISZEWSKA, JERZY KAROLCZAK, ALFREDA GRACZYK 489

- Investigation of photo-physical properties of selected diaminoacid protoporphyrin derivatives (PP(AA)₂Arg₂). II. Determination of quantum yield of singlet oxygen FD*
 SHU YE, MIROSLAW KWAŚNY, MARIUSZ CZUBA, ALFREDA GRACZYK 505

Optical diagnostic and therapy

- Image analysis and statistical evaluation of two-dimensional human eye retina images of healthy and glaucomatous eyes*
 FRANTIŠEK PLUHÁČEK, JAROSLAV POSPÍŠIL 521

Letters to the Editor

- Estimation of the radiation power at the output of the holographic memory system*
 ANDRZEJ ANDRUCHÓW, EUGENIUSZ JAGOSZEWSKI 533
- Exact N-envelope-soliton solutions of the Hirota equation*
 JIAN-JUN SHU 539
- CCD linear image sensor ILX 511 arrangement for a technical spectrometer*
 LUDĚK BARTONÉK, Jiří KEPRT 547