

PROCEEDINGS OF SPIE

Laser Optics 2006

Wavefront Transformation and Laser Beam Control

Leonid N. Soms

Editor

26–30 June 2006

St. Petersburg, Russia

Organized by

Fund for Laser Physics (Russia) • Institute for Laser Physics Vavilov SOI (Russia) • Ministry of Education and Science (Russia) • Federal Agency on Industry (Russia) • St. Petersburg Government (Russia) • International Science and Technology Center (Russia) • Ioffe Physical-Technical Institute of Russian Academy of Sciences (Russia) • Research Center, Vavilov State Optical Institute (Russia) • Laser Research Institute of St. Petersburg State University (Russia) • St. Petersburg State University of Information Technologies, Mechanics and Optics (Russia) • LOMO PLC, St. Petersburg (Russia) • Research Institute for Complex Testing (Russia) • Russian Foundation for Basic Research (Russia) • SPIE Russia Chapter • European Physical Society (France) • Optical Society of America (USA) • European Optical Society (Germany) • Rozhdestvensky Optical Society (Russia)

Cooperating Organization

SPIE—The International Society for Optical Engineering

Sponsored by

SPIE Russia Chapter

Published by

SPIE—The International Society for Optical Engineering

Volume 6613



The International Society
for Optical Engineering

Proceedings of SPIE—The International Society for Optical Engineering, 9780819467546, v. 6613

SPIE is an international technical society dedicated to advancing engineering and scientific applications of optical, photonic, imaging, electronic, and optoelectronic technologies.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Laser Optics 2006: Wavefront Transformation and Laser Beam Control*, edited by Leonid N. Soms, Proceedings of SPIE Vol. 6613 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819467546

Published by
SPIE—The International Society for Optical Engineering
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone 1 360/676-3290 (Pacific Time) · Fax 1 360/647-1445
<http://www.spie.org>

Copyright © 2007, The Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at <http://www.copyright.com>. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/07/\$18.00.

Printed in the United States of America.

Contents

vii *Symposium Committees*

SESSION 1 LASER BEAM CONTROL AND MEASUREMENTS

- 661302 **Lasng of a phase-locked three-channel laser system based on oscillators with self-phase-conjugate loop cavities** [6613-01]
T. T. Basiev, General Physics Institute (Russia); A. V. Fedin, A. V. Gavrilov, Kovrov State Technological Academy (Russia); V. V. Osiko, General Physics Institute (Russia); S. N. Smetanin, Kovrov State Technological Academy (Russia)
- 661303 **Formation of nondiffracting and nondispersing pulsed beams using one-dimensional photonic crystals** [6613-02]
S. Kurilkina, V. Belyi, N. Kazak, Institute of Physics (Belarus)
- 661304 **Diffractive gradient mirror for the formation of YAG:Nd laser one-mode radiation** [6613-03]
A. S. Kuchyanov, A. I. Plekhanov, A. G. Poleshchyk, V. V. Cherkashin, The Institute of Automation and Electrometry (Russia)
- 661305 **Influence of a finite polarization relaxation time on the transverse structure of the optical field of a wide-aperture laser** [6613-04]
N. E. Molevich, A. P. Zaikin, P.N. Lebedev Physics Institute (Russia)
- 661306 **Deformable mirror on the basis of piezoelectric actuators for the adaptive system of ISKRA-6 facility** [6613-05]
S. Y. Bokalo, FSUE SRI SIA Luch (Russia); S. G. Garanin, S. V. Grigorovich, M. O. Koltygin, S. M. Kulikov, RFNC-VNIIEF (Russia); D. M. Lyakhov, FSUE SRI SIA Luch (Russia); A. N. Manachinsky, RFNC-VNIIEF (Russia); P. P. Mizin, FSUE SRI SIA Luch (Russia); A. B. Ogorodnikov, RFNC-VNIIEF (Russia); O. I. Shanin, V. I. Shchipalkin, V. P. Smekalin, FSUE SRI SIA Luch (Russia); S. P. Smyshlyaev, S. A. Suharev, RFNC-VNIIEF (Russia); V. G. Zhupanov, FSUE SRI SIA Luch (Russia)
- 661307 **Measurements of laser divergence without the analysis of the field of radiation** [6613-06]
S. G. Slavnov, A. P. Zhevlakov, S.I. Vavilov State Optical Institute (Russia)

Pagination: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication.

SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

- 661308 **New method for measurement of far IR beam intensity profile** [6613-07]
A. A. Soloviev, E. A. Khazanov, I. E. Kozhevatorov, O. V. Palashov, The Institute of Applied Physics (Russia)
- 661309 **Peculiar properties of polarized transmission spectrums of crystal plates** [6613-08]
A. V. Syuy, N. A. Kravtsova, V. I. Stroganov, V. V. Lihtin, V. V. Krishtop, V. A. Maksimenko, Far Eastern State Transport Univ. (Russia)

SESSION 2 TRANSFORMATIONS OF LIGHT BEAMS IN FULLERENES AND PHOTONIC CRYSTALS

- 66130A **Photoinduced and thermal processes in fullerene solutions** [6613-09]
I. V. Bagrov, I. M. Belousova, O. B. Danilov, V. M. Kiselev, T. D. Murav'eva, E. N. Sosnov, S.I. Vavilov State Optical Institute (Russia)
- 66130B **Formation of radical ions and peculiarities of optical limiting in solution containing C₆₀, perlyne, and tetramethylbenzidine** [6613-10]
M. V. Gryaznova, V. V. Danilov, G. M. Ermolaeva, A. I. Khrebtov, T. A. Shakhverdov, S.I. Vavilov State Optical Institute (Russia)
- 66130C **Solid-phase fullerene-like nanostructures as singlet oxygen photosensitizers in liquid media** [6613-11]
I. M. Belousova, O. B. Danilov, V. M. Kiselev, I. M. Kislyakov, T. K. Kris'ko, T. D. Murav'eva, D. A. Videnichev, S.I. Vavilov State Optical Institute (Russia)
- 66130D **Gases sorption and oxygen photodesorption on/from solid-state fullerene and fullerene-like adsorbents** [6613-12]
I. M. Belousova, V. P. Belousov, O. B. Danilov, A. V. Ermakov, V. M. Kiselev, I. M. Kislyakov, E. N. Sosnov, S.I. Vavilov State Optical Institute (Russia)

SESSION 3 LIGHT SCATTERING AND SPECKLE FIELDS

- 66130E **Statistical properties of superposed fractal speckle fields** [6613-13]
T. Okamoto, Kyushu Institute of Technology (Japan)
- 66130F **Calculation of the selective photorefractive light scattering indicatrix in Rh-doped LiNbO₃ crystals** [6613-14]
V. A. Maksimenko, E. V. Danilova, A. V. Syuy, Far Eastern State Transport Univ. (Russia)
- 66130G **Stimulated globular scattering in photonic crystals** [6613-15]
V. S. Gorelik, A. D. Kudryavtseva, M. V. Tareeva, N. V. Tcherniega, P.N. Lebedev Physical Institute (Russia)
- 66130H **Dependence of characteristics of dynamic laser speckle patterns from roughness** [6613-16]
V. I. Bronnikov, Scanning Lasers Ltd. (Russia)

SESSION 4 LASER-INDUCED EFFECTS IN NONLINEAR MEDIA

- 66130I **Self-consistent microscopic theory for non-linear optical response of ultrathin metal films** [6613-17]
A. V. Andreev, S. S. Postnov, M.V. Lomonosov Moscow State Univ. (Russia)

- 66130J **Light-induced dynamics of metal aggregated nanoparticles** [6613-18]
S. V. Perminov, Institute of Semiconductor Physics (Russia); V. P. Drachev, Purdue Univ. (USA); S. G. Rautian, P.N. Lebedev Physical Institute (Russia)
- 66130K **Optical bistability of the nanoparticle surrounded by resonant atoms** [6613-19]
G. N. Nikolaev, Institute of Automation and Electrometry (Russia)
- 66130L **Anti-Stokes photoluminescence of CdSe/ZnS nanoparticles in solution and condensed phase** [6613-20]
M. V. Artemyev, Belarussian State Univ. (Belarus); A. A. Chistyakov, S. V. Daineko, I. L. Martynov, Moscow Engineering Physics Institute (Russia); I. R. Nabiev, Univ. de Reims Champagne-Ardenne (France); V. A. Oleinikov, Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry (Russia); K. V. Zaharchenko, Moscow Engineering Physics Institute (Russia)
- 66130M **Laser induced luminescence of dense films of CdSe/ZnS nanoparticles** [6613-21]
M. V. Artemyev, Belarussian State Univ. (Belarus); A. A. Chistyakov, S. V. Daineko, I. L. Martynov, Moscow Engineering Physics Institute (Russia); I. R. Nabiev, Univ. de Reims Champagne-Ardenne (France); V. A. Oleinikov, Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry (Russia); K. V. Zaharchenko, Moscow Engineering Physics Institute (Russia)
- 66130N **Laser modification of physico-chemical properties of copper-based nanostructures** [6613-22]
A. Khairullina, T. Olshanskaya, V. Yasinskii, A. Sukhadolau, V. Babenko, Instytut Fizyki (Belarus); D. Yavsin, V. Kozhev, S. Gurevich, A.F. Ioffe Physico-Technical Institute (Russia)
- 66130O **The high-speed molecular switch (stabilizer) of temperature on the basis of Vavilov-Pringsheim cycle: the principle and approaches** [6613-23]
V. V. Danilov, V. A. Smirnov, V. B. Shilov, S.I. Vavilov State Optical Institute (Russia)

SESSION 5 MATERIALS AND COMPONENTS

- 66130P **Gratings in polymeric waveguides** [6613-24]
G. Mishakov, V. Sokolov, Institute on Laser and Information Technologies (Russia); A. Kocabas, A. Aydinli, Bilkent Univ. (Turkey)
- 66130Q **Cation polyhedra space formations in non-linear optical crystals** [6613-25]
A. S. Korotkov, V. V. Atuchin, Institute of Semiconductor Physics (Russia)

Author Index

Symposium Committees

Conference Honorary Chairs

Zhores I. Alferov, Ioffe Physical-Technical Institute (Russia)
Charles H. Townes, University of California (USA)

Conference Chair

A. A. Mak, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

Advisory Committee

Zh. I. Alferov, Ioffe Physical-Technical Institute (Russia)
P. A. Apanasevich, Stepanov Institute of Physics (Belarus)
V. I. Bespalov, Institute of Applied Physics (Russia)
D. Bimberg, Technical University Berlin (Germany)
W. Bohn, Institute of Technical Physics, German Aerospace Center (Germany)
Yu. N. Denisyuk, Ioffe Physical-Technical Institute (Russia)
T. Fujioka, Tokai University (Japan)
G. Hager, Air Force Research Laboratory (USA)
D. Hall, Edinburgh University (Great Britain)
G. Huber, University of Hamburg (Germany)
Yu. Kivshar, Australian National University (Australia)
P. Mandel, Université Libre de Bruxelles (Belgium)
E. Moses, Lawrence Livermore National Laboratory (USA)
C. R. Phipps, Photonics Associates (USA)
M. S. Soskin, Institute of Physics (Ukraine)
K.-I. Ueda, Institute of Laser Science (Japan)

Organizing Committee Chair

A. A. Mak, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

Organizing Committee Vice-Chairs

O. D. Gavrilov, NP Laser Optics (Russia)
V. Yu. Venediktov, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

Organizing Committee Members

E. I. Akopov, SPIE Russia Chapter (Russia)
V. M. Arpishkin, Rozhdestvensky Optical Society (Russia)
E. I. Makurov, Vavilov State Optical Institute (Russia)
A. D. Starikov, Institute for Complex Testing (Russia)

L. K. Sukhareva, Institute for Laser Physics, Vavilov State Optical Institute (Russia)
Yu. S. Tverjyanovich, St. Petersburg State University (Russia)
V. N. Vassil'yev, St. Petersburg State University of Information Technologies, Mechanics and Optics (Russia)

Program Committee Chair

A. A. Mak, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

Program Committee Vice-Chairs

A. A. Andreev, Institute for Laser Physics, Vavilov State Optical Institute (Russia)
V. Yu. Venediktov, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

Program Committee Secretary

A. A. Mirzaeva, Institute for Laser Physics, Vavilov State Optical Institute (Russia)

American Local Committee Chair

C. R. Phipps, Photonics Associates, (USA)

Asian Local Committee Chair

Ken-ichi Ueda, University of Electro-Communications (Japan)

European Local Committee Chair

W. Bohn, Institute of Technical Physics, German Aerospace Center (Germany)

Program Subcommittee Cochairs

J. P. Huignard, Thales Research and Technology (France)
V. E. Sherstobitov, Institute for Laser Physics, Vavilov State Optical Institute (Russia)
L. N. Soms, Institute for Laser Physics, Vavilov State Optical Institute (Russia)
M. A. Vorontsov, University of Maryland (USA)

Program Subcommittee Members

P. A. Apanasevich, Stepanov Institute of Physics (Belarus)
V. I. Bespalov, Institute of Applied Physics (Russia)
A. Brignon, Thomson-CSF (France)
A. A. Malyutin, General Physics Institute (Russia)
M. S. Soskin, Institute of Physics (Ukraine)
A. P. Sukhorukov, Lomonosov Moscow State University (Russia)