

PROCEEDINGS OF SPIE

Laser Optics 2006

Diode Lasers and Telecommunication Systems

Nikolay N. Rosanov

Chair/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 6612



The International Society
for Optical Engineering

Proceedings of SPIE—The International Society for Optical Engineering, 9780819467539, v.6612

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: Diode Lasers and Telecommunication Systems*, edited by Nikolay N. Rosanov, Proceedings of SPIE Vol. 6612 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819467539

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 Committee

-
- 661201 **Simple technique of fiber Bragg gratings apodization by use of Gaussian beam** [6612-01]
S. R. Abdullina, S. A. Babin, S. I. Kablukov, A. A. Vlasov, Institute of Automation and Electrometry (Russia)
- 661202 **New methods for fiber Bragg grating synthesis with improved accuracy** [6612-02]
O. V. Belai, Institute of Automation and Electrometry (Russia); L. L. Frumin, Novosibirsk State Univ. (Russia); E. V. Podivilov, O. Ya. Schwarz, D. A. Shapiro, Institute of Automation and Electrometry (Russia)
- 661203 **Exactly solvable profiles for chirped Bragg grating** [6612-03]
E. V. Podivilov, D. A. Shapiro, Institute of Automation and Electrometry (Russia); D. A. Trubitsyn, Boreskov Institute of Catalysis (Russia)
- 661204 **Homogeneous Raman gain saturation at high pump and Stokes powers in a phosphosilicate fiber** [6612-04]
S. A. Babin, D. V. Churkin, S. I. Kablukov, E. V. Podivilov, Institute of Automation and Electrometry (Russia)
- 661205 **Bidirectional dual wavelength pumped EDFA: optimization of pump conditions** [6612-05]
M. A. Khodasevich, G. V. Sinitsyn, Y. A. Varaksa, B.I. Stepanov Institute of Physics (Belarus)
- 661206 **Role of nonlinear effects in Raman fiber laser spectral broadening** [6612-06]
S. A. Babin, D. V. Churkin, A. E. Ismagulov, S. I. Kablukov, E. V. Podivilov, Institute of Automation and Electrometry (Russia)
- 661207 **The investigation of intermode beat stability and frequency pulling effect at active mode-locking in a three-mirror diode laser** [6612-07]
S. N. Bagayev, S. V. Chepurov, A. V. Kashirsky, V. M. Klementyev, S. A. Kuznetsov, V. S. Pivtsov, V. F. Zakharyash, Institute of Laser Physics (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.

- 661208 **Harmonic passive mode-locked fiber lasers with long-distance modulation of loss and refractive index** [6612-08]
A. Komarov, Institute of Automation and Electrometry (Russia); H. Leblond, F. Sanchez, Univ. d'Angers (France)
- 661209 **Interaction of dissipative solitons under spectral and amplitude control of pulse wings in fiber lasers** [6612-09]
A. Komarov, K. Komarov, Institute of Automation and Electrometry (Russia); H. Leblond, F. Sanchez, Univ. d'Angers (France)
- 66120A **Mode-locked in external cavity fiber Bragg grating lasers** [6612-10]
N. Dogru, Univ. of Gaziantep (Turkey)
- 66120B **Propagation and stability of novel parametric solitons** [6612-11]
A. Degasperis, Univ. La Sapienza (Italy); M. Conforti, F. Baronio, Univ. di Brescia (Italy); S. Wabnitz, Univ. de Bourgogne (France)
- 66120C **Effect of phase modulation of femtosecond pump pulses on the spectral and coherence properties of super-continuum with strongly pronounced soliton structures in its spectrum** [6612-12]
S. Kobtsev, S. Kukarin, N. Fateev, S. Smirnov, Novosibirsk State Univ. (Russia)
- 66120D **Experiment and theory of tunable broadband parametric gain in a photonic crystal fiber** [6612-13]
S. Wabnitz, A. Tonello, S. Pitois, G. Millot, Univ. de Bourgogne (France); T. Martynkien, W. Urbańczyk, Wrocław Univ. of Technology (Poland); J. Wójcik, Univ. Maria Curie-Skłodowskiej Univ. (Poland); A. Locatelli, M. Conforti, C. De Angelis, Univ. of Brescia (Italy)
- 66120E **Coherent amplification of the short optical pulse in a non-linear birefringent medium** [6612-14]
E. V. Kazantseva, Moscow Engineering Physics Institute (Russia) and Univ. de Bourgogne (France); A. I. Maimistov, S. O. Elyutin, Moscow Engineering Physics Institute (Russia); S. Wabnitz, Univ. de Bourgogne (France)
- 66120F **Output parameters of room-temperature green semiconductor lasers as a function of an active region geometry** [6612-15]
M. M. Zverev, N. A. Gamov, E. V. Zdanova, D. V. Peregovodov, V. B. Studionov, Moscow State Institute of Radio Engineering, Electronics and Automation (Russia); S. V. Sorokin, I. V. Sedova, S. V. Ivanov, P. S. Kop'ev, Ioffe Physico-Technical Institute (Russia)
- 66120G **Dynamics of superradiant medium in resonator** [6612-16]
A. M. Basharov, G. G. Grigoryan, Yu. V. Orlov, A. Yu. Shashkov, T. G. Yukina, N. V. Znamenskiy, Russian Research Ctr. Kurchatov Institute (Russia)
- 66120H **Phase memory under the development of optical instability** [6612-17]
A. M. Basharov, N. V. Znamenskiy, Russian Research Ctr. Kurchatov Institute (Russia)
- 66120I **Propagation of videopulse through a thin layer of two-level atoms possessing permanent dipole moments** [6612-18]
S. O. Elyutin, A. I. Maimistov, Moscow Engineering Physics Institute (Russia)

66120J **Useful nonlinear effects in optical microcavities and their applications** [6612-19]
J. L. Arce-Diego, F. Fanjul-Vélez, D. Pereda-Cubián, N. Ortega-Quijano, Cantabria Univ.
(Spain); A. L. Tolstik, O. G. Romanov, O. Ormachea, Belarusian State Univ. (Belarus)

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

Zhores 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. Veneklektov, 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. Venekstikov, 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

S. A. Gurevich, A.F. Ioffe Physical-Technical Institute (Russia)
N. N. Rosanov, Institute for Laser Physics, S.I. Vavilov State Optical Institute
(Russia)

Program Subcommittee Members

A. S. Akhmanov, NICTL (Russia)
D. Bimberg, Technical University Berlin (Germany)
E. M. Dianov, General Physics Institute (Russia)
A. V. Dotsenko, Corning (Russia)
Yu. Kivshar, Australian National University (Australia)
V. Ya. Panchenko, NICTL (Russia)
E. L. Portnoi, A.F. Ioffe Physical-Technical Institute (Russia)
S. K. Turitsyn, Aston (Great Britain)
V. N. Vassil'yev, State Institute of Fine Mechanics and Optics (Russia)