

*Proceedings of*

# ***LFNM 2008***

9-th International Conference on

## ***Laser and Fiber-Optical Networks Modeling***

Kharkiv National University of Radio Electronics



V.N.Karazin Kharkiv National University



Tavrida National University



University of Guanajuato



Alushta, Crimea, Ukraine  
October 2-4, 2008

# *CONTENTS*

## **Dispersive media and light beam propagation in the optical waveguides and gratings**

### **Optimization of chirped mirrors**

*Sergii O. Iakushev, Oleksiy V. Shulika, José A. Andrade-Lucio, Oscar G. Ibarra-Manzano.....* 1

### **Anisotropic photonic crystals and microcavities based on dispersive anisotropic porous silicon**

*V.I. Fesenko, I.A. Sukhoivanov, S.N. Shulga.....* 4

### **Band spectrum properties of periodic structures, formed by the layers of different materials**

*Alexey A. Bulgakov, Svetlana I. Khankina, Oksana V. Shramkova, Vladimir M. Yakovenko.....* 8

### **Polarization and spin effects in processes of synchrotron radiation and pair creation in strong magnetic field**

*O. P. Novak, R. I. Kholodov.....* 11

### **Nonresonant electron-muon scattering in the pulsed electromagnetic field**

*E.A. Padusenko, S.P. Roshchupkin, A. I. Voroshilo.....* 14

## **Modeling of physical processes in lasers including semiconductor, solid-state, and gas lasers**

### **Change of photon polarization in magnetic field**

*P.I.Fomin, R.I.Kholodov.....* 17

### **Observations of instabilities in two-mode He-Ne laser radiation by means of interference of polarized beams**

*E.D.Makovetsky, L.A.Ageev, V.K.Miloslavsky, K.S.Beloshenko, H.Elashhab.....* 20

### **Demonstration of interference and laser generation instabilities in semiconductor laser beam reflected from glass plate**

*E.D.Makovetsky, L.A.Ageev, V.K.Miloslavsky, K.S.Beloshenko.....* 23

### **Modeling and numerical analysis of temperature variations along the cavity and in the heat sink of a single quantum well high power laser diode**

*F. Gity, M. N. Moghaddasi, L. Ansari.....* 26

### **Simulation of intramolecular dynamics at transformation of two light pulses by molecules of active media of photochemical lasers**

*V.A. Morozov, D.E. Doronkin, Y.M. Dubina.....* 29

### **Modeling of end-pumped CW Yb:YAG disk laser**

*A. Khayat Jafari, M. Aas.....* 32

### **Numerical calculation of temperature-dependent absorption in end pumped Yb:YAG thin disk laser**

*Seyfollah Toroghi, Mehdi Aas, Ahmad Khayat Jafari.....* 35

### **Nonresonance spontaneous bremsstrahlung of an electron scattered by a nucleus in a pulsed light field**

*Alexander A. Lebed', Sergei P. Roshchupkin.....* 38

### **Enhanced Passively Q-switched Nd:YAG Lasers Modeling**

*Adel A. Mohamed, Samy A. Ghoniemy, and Samy Mahmoud.....* 41

### **Methods of computer modeling of uniform field laser electrodes profile**

*Slavomir S. Anufrik, Vasiliy O. Shkleinik Alexander P. Volodenkov, Kazimir F. Znosko.....* 45

### **Technique of XeCl-exilamps computer modeling**

*Slavomir S. Anufrik, Vasiliy O. Shkleinik, Alexander P. Volodenkov, Kazimir F. Znosko.....* 48

<b>The optimization of near infrared cw <math>\text{Gd}_3\text{Ga}_5\text{O}_{12}:\text{Nd}</math>-, <math>\text{YAlO}_3:\text{Nd}</math>- and <math>\text{YVO}_4:\text{Nd}</math>- microlasers</b>	51
<i>O.A. Buryy, D.Yu. Sugak, O.I. Izhnin, I.I. Izhnin, S.B. Ubizskii, M.M. Vakiv</i>	
<b>The temperature distribution and thermomechanical strains in passively Q-switched YAG:Nd<sup>3+</sup>/YAG:Cr<sup>4+</sup> and GGG:Nd<sup>3+</sup>/GGG:Cr<sup>4+</sup> microchip lasers</b>	54
<i>O.A. Buryy, O.I. Izhnin, I.I. Syvorotka, I.M. Syvorotka, I.I. Izhnin, D.Yu. Sugak, S.B. Ubizskii, M.M. Vakiv</i>	
<b>Nonlinear effects in active and passive optical devices and systems</b>	
<b>Interchannel soliton collisions in periodic dispersion maps in the presence of third order dispersion with loss and amplification</b>	57
<i>Francisco J. Diaz-Otero, Pedro Chamorro-Posada</i>	
<b>Laser action in photonic crystal structures with activated glass</b>	60
<i>Olga N. Kozina, Leonid A. Melnikov</i>	
<b>Properties of fluoride materials and coatings for various optical systems</b>	63
<i>Viktor F. Zinchenko, Grygoriy I. Kocherba, Yegor V. Timukhin, Valeriy P. Sobol', Ol'ga V. Mozgova, Boris A. Gorshtain</i>	
<b>Design of optimization technique for electro- and acousto-optical interactions of light in crystalline materials</b>	66
<i>Anatoliy S. Andrushchak, Bohdan G. Mytsyk, Nataliya M. Demyanyshyn, Mykola V. Kaidan, Oleg V. Yurkevych</i>	
<b>Analysis and comparison of multiwavelength raman amplifiers with different configurations</b>	69
<i>Farzin Emami, Amir H. Jafari</i>	
<b>Generation of clusters of optical vortices</b>	73
<i>Yana V. Izdebskaya, Vladlen G. Shvedov, Alexander V. Volyar</i>	
<b>Interaction and fusion of light pulses at the dynamical four-wave mixing in photorefractive media</b>	76
<i>Svitlana Bugaychuk, Robert Conte</i>	
<b>Full transparency regime for optical transmission and lasing threshold in silica fibers due to nonlinear raman interaction</b>	79
<i>G. Felinskyi, P. Korotkov</i>	
<b>Acoustogyration diffraction of optical waves</b>	82
<i>I. Martynyuk-Lototska, O. Krupych, R. Vlokh</i>	
<b>Polarizable vacuum approach for describing of gravitation induced optical effects</b>	83
<i>M. Kostyrko, O. Kvasnyuk, R. Vlokh</i>	
<b>Short pulse generation, ultrafast effects and dynamical phenomena</b>	
<b>Optical coupling of two microcavities with time discontinuity in permittivity</b>	86
<i>Nataliya Sakhnenko, Alexander Nerukh, Trevor Benson, Phillip Sewell</i>	
<b>Few cycle powerful pulse production under filamentation in gaseous media without external compressor</b>	89
<i>A. Savel'ev, O. Kosareva, D. Uryupina, M. Kurilova, A. Mazhorova, N. Panov, S. Gorgutsa, R. Volkov</i>	
<b>Technique of XeCl-exilamps computer modeling</b>	92
<i>Slavomir S. Anufrik, Vasiliy O. Shkleinik, Alexander P. Volodenkov, Kazimir F. Znosko</i>	
<b>Complex modification of the semiconductor laser active area for efficient carriers transport</b>	95
<i>Ivan M. Safonov, Mikhail V. Klymenko, Oleksiy V. Shulika, Igor A. Sukhoivanov</i>	

<b>Modeling of a vertical cavity surface emitting laser containing a resonant multi-QW heterostructure</b>	
<i>N. N. Elkin, A. P. Napartovich, V. N. Troshchieva, D. V. Vysotsky, V. I. Kozlovsky, B.M. Lavrushin.....</i>	96
<b>Wide modal gain spectra in the asymmetric multiple quantum-well heterostructures <math>\text{Ga}_{0.47}\text{In}_{0.53}\text{As}-\text{Ga}_{0.18}\text{In}_{0.82}\text{As}_{0.4}\text{P}_{0.6}</math></b>	
<i>D. V. Ushakov, V. K. Kononenko.....</i>	104
<b>Posters</b>	
<b>Analysis of wave structure functions</b>	
<i>H.T. Eyyuboğlu.....</i>	107
<b>Calculation of dynamic characteristics of thin-film optical filters</b>	
<i>G.A. Sukach, V.A. Manko, A.A. Manko.....</i>	110
<b>Semi-analytical semiconductor parameters extraction algorithm for optical link simulations</b>	
<i>Samy S. A. Ghoniemy, Samy Mahmoud, Leonard MacEachern.....</i>	113
<b>Random lasing modeling under diffusive light propagation</b>	
<i>Vasil P. Yashchuk, O.A. Prygodiuk, M.V.Zhuravsky.....</i>	117
<b>One-photon annihilation of an electron-positron pair in the intense pulsed laser field</b>	
<i>A. I. Voroshilo, S. P. Roshchupkin, E.A. Padusenko.....</i>	120
<b>Formation of a beam with a uniform intensity distribution of radiation in a waveguide quasi-optical rectangular resonator with a nonuniform mirror</b>	
<i>A.V.Volodenko, A.V.Degtyarev, V.A.Maslov, T.F.Ruban, V.A.Svich, A.N.Topkov.....</i>	123
<b>Chang of spectrum width of tunable ultra-short pulses of radiation of distributed feedback dye laser</b>	
<i>Vladislav Kurstak, Henadzi Sazonka.....</i>	127
<b>The peculiarity on radiation spectrum of the system of four electrons moving in a spiral in transparent medium</b>	
<i>Aurel V. Konstantinovich, and Ivan A. Konstantinovich.....</i>	130
<b>Influence of the electron-ion recombination on the positive column characteristics in narrow discharge tubes</b>	
<i>L. V. Mikhaylovskaya, A.S. Mykhaylovska.....</i>	133
<b>Non-traditional structures of interferometer Fabry-Perot for IR spectral region</b>	
<i>Iryna Ya. Yaremchuk, Volodymyr M. Fitio, Yaroslav. V. Bobitski.....</i>	136
<b>Alternative methods for antireflection of optical surfaces with use of the transition layer and diffraction gratings</b>	
<i>V.M. Fitio, Ya.V. Bobitski.....</i>	139
<b>The cores of waveguide structure in waist of fused biconical tapered coupler</b>	
<i>G.D. Basiladze, V.N. Berzhansky, A.I. Dolgov, E.T. Milyukova.....</i>	142
<b>Three-dimensional Gaussian beam scattering from a bi-isotropic photonic structure</b>	
<i>V. Tuz.....</i>	145
<b>Resonant two-photon annihilation of an e-e+ pair in the laser field</b>	
<i>O.I. Denisenko, S.P. Roshchupkin.....</i>	148
<b>A new binary multi-layer diffraction grating</b>	
<i>Abbas Zarifkar, Reza Yousefi.....</i>	151
<b>Laser Distance Meter Model</b>	
<i>V. S. Tyurin, Y. P. Machehin.....</i>	155
Author Index	