

Optical Resonators – Science and Engineering

edited by

Ram Kossowsky

Emerging Technologies, Inc.,
Pittsburgh, Pennsylvania, U.S.A.

Miroslav Jelinek

Institute of Physics,
Czech Academy of Science,
Prague, Czech Republic

and

Josef Novak

Institute of Electrical Engineering,
Slovak Academy of Science,
Bratislava, Slovak Republic



Kluwer Academic Publishers

Dordrecht / Boston / London

Published in cooperation with NATO Scientific Affairs Division

TABLE OF CONTENTS

LIST OF SPONSORS	v
PREFACE	xi
PART I: PHYSICS AND THEORY	1
Yu. A. Anan'ev*	
Theory of Laser Resonators and of the Beam Divergence	3
S. G. Anikitchev*	
Laser Resonator Theory	13
A. E. Siegman*	
Nonorthogonal Optical Modes and Resonators	29
I. B. Orlova**	
Influence of Intra-Cavity Distortions on Output of Unstable Resonators	55
K. A. Prokhorov and D. G. Afonin	
Optical Resonators with Dielectric Body	79
Manjusha Mehendale and W. Andreas Schroeder	
Thermal Lensing in Kerr-Lens Modelocked Solid-State Lasers	87
PART II: PHASE CONJUGATION	101
H. J. Eichler*, A. Haase, B. Liu and O. Mehl	
Phase Conjugation Techniques	103
V. E. Sherstobitov*	
Phase Conjugation of CO ₂ Laser Radiation And Its Applications	119
A. F. Kornev, V. P. Pokrovsky, L. N. Soms, V. K. Stupnikov, and V. Yu. Venediktov	
Conjugated Cavity With the Wide Field of Vision	153
PART III: OPTICS	161

* Key Lecturer ** Invited Speaker
Norman Hodgson*

Beam Quality and Efficiency of Annular Gain Lasers	163
Gregory C. Dente** and Michael L. Tilton Unstable Resonators for Semiconductor Lasers	185
Richard C. Wade** Chemical Lasers with Annular Gain Media	211
A. F. Shkapa, Yu. V. Golgopolov, A. M. Dudov, V. A. Khustalev, G. A. Kirillov, G. G. Kochemasov, S. M. Kulikov, V. M. Murugov, A. V. Ryadov, A. B. Smirnov, S. A. Sukharev and L. I. Zykov Beam Quality Control of an Iodine Laser With SBS	225
S. -A Amarande Flattened Gaussian Beams With Rectangular Symmetry	243
R. M. Hofstra, F. A. Van Goor and W. J. Witteman Beam Divergency Studies on a Long Pulse XeCl Excimer Laser	253
E. F. Plinski, K. M. Abramski and J. S. Witkovski Optical Resonators For a Slab-Waveguide Lasers	267
D. G. Afonin, A. V. Kazakov and A. K. Malyshkin Investigations of Open Resonators With Diffraction Coupling	281
M. J. Galushkin, V. S. Golubev, Yu. N. Zavalova, And V. Ya Panchenko Enhancement of Small-Scale Optical Nonuniformities In Active Medium of High-Power CW FAF CO ₂ laser	289
V. N. Shekhtman Synthesis of Interferograms by Lateral Shear To Measure Wave Front from a Light Beam	301
PART IV: OPTIMIZATION OF DESIGN	309
S. A. Dimakov* Resonators For Lasers Used in Precision Technological Operations	311
W. A. Clarkson* and D. C. Hanna Resonator Design Considerations For Efficient	327

Operation of Solid-State Lasers End-Pumped By High-Power Diod-Bars	
P. Y. Baskaev, A. V. Lavrov and V. V. Lobachev Heterogeneity Structure of Active Medium Refraction For Three-Dimensional Pre-Mixing and Mixing Nozzle Banks of Gasdynamic Laser	363
T. Dascalu, N. Pavel and M. Poterasu Optimized Resonators for High Energy Long-Pulse Nd:YAG Laser	373
V. Magni* and M. Zavelani-Rossi High Power Diffraction Limited Solid-State Lasers With Stable Resonators	381
A. Lucianeti**, N. G. Muller, R. Weber, A. Papashvili	
A. V. Konyushkin and T. T. Basiev Highly Efficient High-Average Power Nd:YAG Laser With a Passive Q-Switch	407
M. Jelinek**, R. W. Eason, A. A. Anderson, C. Grivas	
D. S. Gill, J. Šonský, J. Lancok, L. M. B. Hickney, N. A. Vianos and P. Hribek Planar waveguide Lasers of Ti:Sapphire and Nd:YAG (YAP) Grown by LPD	419
A. S. Bashkin**, B. I. Katorgin and N. A. Pirogov Problems of CW Chemical Lasers Scaling	427
J. Lancok**, M. Jelinek, J. Bulir, and P. Machac Creation of Channels Into Ti:Sapphire Waveguiding Layers	435
A. A. Kuznetsov and M. Z. Novgorodov Properties of the Cavities for Compact Slab Gas Lasers	441
A. Mocfanescu and V. Babin Nd:YAG Laser Resonators Using External Stimulated Brillouin Scattering Q-Switching Mirror	453
 *Key Lecturer ** Invited Speaker	
V. E. Zharov, S. N. Markova and V. A. Krainov The Construction of Laser Gyroscope	463

PART V: LATE SUBMISSION	477
L. Zykov, S.Buyko, and Yu.Dolgopolov SBS Propertis of High-Pressure Xenon at a Density of 0.3-1 g/cm ³	479
D.L. Glebov, V.A. Stepanov, B.I. Vasiliev and A.B. Yastrebkov New Optical Scheme of Complicated Resonator in a Two-Frequency NH ₃ -CO ₂ Lidar	489
Index	495
List of Participants	499