

CONTENTS

PULSED BARIUM VAPOR LASER	1
A. A. Isaev, G. Yu. Lemmerman, S. V. Markova, and G. G. Petrash	
1. Experimental Techniques	1
2. Pulsed Lasing at Atomic Transitions of Barium	2
3. Lasing at Transitions in Ionic Barium	6
4. Output Characteristics of and their Dependence on Experimental Conditions	8
5. Discussion of the Results	17
A STUDY OF PULSED GOLD AND BISMUTH VAPOR LASERS	23
S. V. Markova, G. G. Petrash, and V. M. Cherezov	
1. Investigation of Pulsed Lasing at Transitions in Atomic Gold	24
2. Investigation of Pulsed Lasing at a Transition in Atomic Bismuth	33
SPECTRAL COMPOSITION OF STIMULATED RADIATION OF A PULSED COPPER VAPOR LASER	49
A. A. Isaev	
1. Introduction	49
2. Experimental Technique	50
3. Experimental Results and Their Evaluation	55
3.1 Spontaneous Radiation	55
3.2 Superradiance	59
3.3 Lasing	64
3.4 Spectral Composition of the Output of a Laser with an Unstable Resonator	67
3.5 Radial Output Distribution	70
3.6 Spectral Composition of the Output of a Copper Halide Laser	71
3.7 Spectral Characteristics and the Buffer Gas Pressure	73
4. Conclusion	74

PULSED COPPER HALIDE VAPOR LASERS		78
M. A. Kazaryan, G. G. Petrash, and A. N. Trofimov		
0.	Introduction	78
	0.1 Method of introducing metal atoms into the active zone	79
	0.2 A survey of the literature and formulation of the problem	81
1.	Experimental Techniques	83
	1.1 Gas Discharge Tubes	83
	1.2 Excitation Techniques	86
	1.3 Registration System	88
	1.4 Scheme of the apparatus with transillumination of the medium	89
2.	Investigation of Copper Halide Vapor Lasers	91
	2.1 Gas Discharge Tubes with the Lasant in the Discharge Zone	91
	2.2 Gas Discharge Tubes with a Branch	93
	2.3 Gas Discharge Tubes with a Limited Discharge Zone	102
	2.4 The Relative Characteristics of Copper Halide Vapor Lasers	107
3.	Study of the Kinetics of the Elementary Processes in the Plasma of Copper Halide Vapor Lasers	119
	3.1 Determining the Rate of Decay of Metastable Levels of Atomic Copper in Copper Bromide Vapor Lasers	119
	3.2 Spectroscopic Measurements of the Discharge Plasma in Copper Chloride and Copper Bromide Vapor lasers	128
4.	Model of the Kinetics of Copper Halide Vapor Lasers	133
	4.1 The Kinetics of the Processes of Producing Copper Atoms in Copper Halide Vapor Lasers	134
	4.1.1 The Double Pulse Operating Regime	138
	4.1.2 The Pulse Burst Operating Regime	140
	4.1.3 The Continuously Pulsed Regime	141
	4.2 Calculation for Copper Halide Vapor Lasers and Discussion of the Results	143
5.	Conclusion	162
6.	Appendix	170

**A STUDY OF THE CAUSES LIMITING THE OPERATING
LIFE OF COPPER BROMIDE VAPOR LASERS** 183

D.N. Astadzhev, N.K. Vuchkov, G.G. Petrash,
and N.V. Sabotinov

0.	Introduction	183
1.	Experimental Techniques	189
	1.1 Gas Discharge Tubes	189
	1.2 Registration System	192
	1.3 Excitation System	193

1.4	Scheme of the Apparatus for Measuring the Concentration of Bromine Molecules in the Gas Discharge Tube	194
2.	Investigation of a Copper Bromine Vapor Laser	196
2.1	Gas Discharge Tubes without Limiting the Discharge Zone	196
2.2	Gas Discharge Tubes with an Apertured Discharge Zone	202
2.3	Completely Heatable Gas Discharge Tubes	204
2.4	Investigation of the Relationship between the Powers of the Green and Yellow Lines in a Copper Bromide Vapor Laser	206
3.	The Operating Life of a Copper Bromide Vapor Laser and the Processes Leading to its Limitation	215
3.1	Comparison of the Operating Life of a Discharge Tube with Cold Zones and a Completely Heatable Tube	216
3.2	Investigation of the Causes Limiting the Operating Life of a Copper Bromide Vapor Laser	219
3.3	A Sealed Copper Bromide Vapor Laser with a Large Reserve	237
4.	Conclusion	240
 PUMPING SYSTEMS FOR PULSED METAL VAPOR LASERS		250
A. A. Isaev and G. Yu. Lemmerman		
1.	Introduction	250
2.	Electrical Scheme for Pumping Lasers	251
3.	The Process of Charging the Discharge Capacitor C_0	252
4.	Discharge of the Storage Capacitor Across the GDT	256
5.	The Thyatron as the Switching Element of a Pulsed Discharge in Metal Vapor Lasers	262
6.	Variations of the Excitation Schemes of Pulsed Metal Vapor Lasers	268
 THEORY OF RING LASERS IN THE DUAL-MODE OUTPUT REGIME		275
E. G. Pestov		
1.	Introduction	275
2.	Nonlinear Differential Equations for the Amplitude and Phase Difference of the Opposing Waves	276
3.	Amplitude Characteristics of a GRL	281
4.	Frequency Characteristics of Dual Mode Ring Lasers	284
5.	"Interference" Effect of Narrowing the Capture Zone in a Dual Mode GRL	289
6.	Polarization-Frequency Nonreciprocal Effects in a Dual Mode GRL	290