

Contents

Preface	v
Chapter 1 Transient Combustion Phenomena in Various Media	1
Research of Kick-Motor Rocket System of Rotating Detonation Engines <i>J. Kasahara, Y. Kato, K. Ishihara, K. Goto, K. Matsuoka, A. Matsuo, and I. Funaki</i>	3
The Effect of Turbulence on Flow Development in High-Speed Combustor <i>A. E. Zangiev, S. M. Frolov, F. S. Frolov, V. S. Ivanov, S. N. Medvedev, I. V. Semenov, and V. V. Vlasenko</i>	14
Impacts of Flame Folding and Hydraulic Resistance on the Deflagration-to-Detonation Transition <i>L. Kagan and G. Sivashinsky</i>	26
Mechanism of Quasi-Detonation Onset and Propagation Inside Obstructed Channels <i>I. S. Yakovenko, A. D. Kiverin, and M. F. Ivanov</i>	34
A Numerical Study on Various Aspects of Rotating Detonation Combustion in Annular Chambers <i>S. Escobar and I. Celik</i>	42
On the Self-Ignition of the Gas Flow in a Vortex Chamber <i>D. V. Voronin</i>	53
Cartesian Grid Approach for the Modeling of Shock Waves Propagation in Complex-Shape Domains <i>D. A. Sidorenko and P. S. Utkin</i>	62
Transition Boundaries Between Regular and Mach Reflection in Interference of the Counterpropagating Shock Waves <i>V. V. Upyrev</i>	71
Experimental and Numerical Investigation of Shock Wave Synthesis of Solid-State Mixtures <i>S. A. Zelepugin, O. V. Ivanova, A. S. Yunoshev, and V. V. Sil'vestrov</i>	76

Chapter 2	Gaseous, Heterogeneous, and Condensed-Phase Detonations	83
Performance of Rotating Detonation Engines at Elevated Inlet Enthalpies		
	<i>M. L. Fotia, T. A. Kaemming, A. G. Naples, J. Hoke, and F. Schauer</i>	85
On a Theory of Pulsating and Cellular Detonations		
	<i>A. R. Kasimov, L. Faria, and R. Rosales</i>	92
Direct Numerical Computation of Detonation Linear Stability: An Example of the Fickett'S Detonation Analog		
	<i>A. R. Kasimov and D. I. Kabanov</i>	94
Mathematical Modeling of Weakly Unstable Pulsating Detonation Wave Propagation: Laboratory Versus Shock-Attached Frame		
	<i>A. I. Lopato and P. S. Utkin</i>	100
Well-Posed Euler Model of Shock and Detonation Induced Two-Phase Flow in Bubbly Liquid		
	<i>R. R. Tukhvatullina and S. M. Frolov</i>	106
Operation and Performance of Rotating Detonation Rocket Engine Fueled by Natural Gas: Experimental Studies		
	<i>V. S. Ivanov, V. S. Aksenov, S. M. Frolov, and I. O. Shamshin</i>	121
Numerical Study of Multifront Structure of a Classical and Continuous Rotating Detonation Waves in Methane Mixtures		
	<i>A. V. Trotsyuk</i>	136
On the Dynamics of One-Dimensional Gaseous Detonations with Losses		
	<i>A. Sow and A. R. Kasimov</i>	148
Dusty Detonation: Dissipation Increase and Cellular Structure		
	<i>O. V. Sharypov</i>	150
Deflagration-to-Detonation Transition in 'Gaseous Oxygen-Liquid Fuel Film' System		
	<i>S. M. Frolov, V. S. Aksenov, and I. O. Shamshin</i>	161

Dependence of the Thrust of a Reactive Pulsed Detonation Combustor on the Nozzle Geometry and Oxygen Content in a Mixture <i>M. S. Assad, O. G. Penyazkov, and I. I. Chernukho</i>	174
Modeling of Detonation of Condensed High Explosives <i>Yu. A. Bogdanova, S. A. Gubin, A. A. Anikeev, and S. B. Victorov</i>	180
Experimental Studies of Multicomponent Castable Explosives Detonation Characteristics <i>V. N. Kulikov, A. A. Matveev, A. N. Osavchuk, and N. I. Shishov</i>	188
Chapter 3 Applications of Fast Combustion Modes and Detonations in Industry and Propulsion	197
Experimental and Computational Investigation of Shock Wave-to-Bubbly Water Momentum Transfer <i>K. A. Avdeev, V. S. Aksenov, A. A. Borisov, F. S. Frolov, S. M. Frolov, I. O. Shamshin, R. R. Tukhvatullina, B. Basara, W. Edelbauer, and K. Pachler</i>	199
Pulse-Cyclic Combustion of Gases in a Liquid for New Energy Systems <i>V. S. Teslenko, A. P. Drozhzhin, and R. N. Medvedev</i>	220
Continuous Detonation of a Syngas–Air Mixture in a Large Detonation Chamber DC-500 <i>F. A. Bykovskii and S. A. Zhdan</i>	232
Control of Detonation Combustion of a Gas Mixture in a Plane Channel <i>V. A. Levin and T. A. Zhuravskaya</i>	242
Phase and Chemical Transformations in Condensed Substances in Shock and Detonation Waves <i>S. A. Gubin, I. V. Maklashova, and A. L. Mihailov</i>	249
Modeling of Pulsing Mode Operation of the Jet Engine Annular Nozzle <i>V. A. Levin, N. E. Afonina, V. G. Gromov, I. S. Manuylovich, A. N. Khmelevsky, and V. V. Markov</i>	256

Effect of Fuel Injection Area Ratio on the Performance of Hollow Rotating Detonation Engine	262
<i>S. Yao and J. Wang</i>	
Detonation Propagation in Annular Chamber	268
<i>S. Hansmetzger, R. Zitoun, and P. Vidal</i>	
Numerical Study of Natural Gas–Oxygen Rotating Detonation Rocket Engine Operation and Performance	276
<i>S. N. Medvedev, S. M. Frolov, and V. S. Ivanov</i>	
Operation of Air-Breathing Hydrogen-Fueled Rotating Detonation Engine in Supersonic Flight Conditions: Numerical Simulation	290
<i>A. V. Dubrovskii, S. M. Frolov, V. S. Ivanov, and A. E. Zangiev</i>	
Equation of State of Model Energetic Material from Atomistic Simulation of Detonation	305
<i>S. A. Murzov, O. V. Sergeev, S. A. Dyachkov, M. S. Egorova, A. N. Parshikov, and V. V. Zhakhovsky</i>	
Pressure Profile for Transverse Waves of Continuous Spin Detonation in a Heterogeneous Fuel–Air Mixture	311
<i>F. A. Bykovskii, S. A. Zhdan, E. F. Vedernikov, A. N. Samsonov, A. I. Sychev, and A. E. Tarnaikin</i>	
Approximate Mathematical Model of Nonequilibrium Burning in Solid Fuel Gas Generator	321
<i>I. S. Averkov, A. V. Baikov, S. I. Marthinenko, E. V. Surikov, V. A. Strunin, and P. D. Toktaliev</i>	
Interior Ballistic Simulation of Pyrotechnic Catapult Based on Propellant Deflagration Model	328
<i>Q. Liu, Ch. Zhou, L. Jing, and X. Liu</i>	
The Results of Investigation of Oxidizer Phase Structure in Emulsion Explosives	335
<i>S. A. Gorinov, I. Y. Maslov, and E. P. Sobina</i>	
Thermal Analysis of Structural Changes in Detonation Nanodiamonds	343
<i>S. A. Gubin, V. P. Efremov, I. V. Maklashova, and E. I. Zakatilova</i>	
Author Index	349
Color Plates	I