

Contents

PART ONE: ELEMENTARY PROCESSES	1
Quasi-Classical Calculations of Large Sets of Vibrationally Dependent Cross Sections for Atom–Molecule Collision Processes Involving Hydrogen, Nitrogen, and Oxygen <i>F. Esposito</i>	3
Kinetic Processes in $\text{H}_2\text{--O}_2$ and $\text{H}_2\text{--CO--O}_2$ Mixtures with Singlet Oxygen Addition <i>A. M. Starik, N. S. Titova, and A. S. Sharipov</i>	12
Theoretical Study of 5-Aminotetrazole Thermal Decomposition <i>V. G. Kiselev and N. P. Gritsan</i>	20
Heterogeneous Vibrational Relaxation of Carbon Monoxide Molecules <i>G. M. Grigorian and I. V. Kochetov</i>	27
H, HS, and H_2S Influence on Carbon Particle Growth Induced by Ultraviolet Pulse Photolysis of C_3O_2 <i>A. V. Eremin, E. V. Gurentsov, and Ch. Schulz</i>	31
Experimental and Numerical Investigation of Mo(CO)_6 Decay Behind Shock Wave Front in Noble Gas <i>V. S. Ziborov, V. P. Efremov, V. V. Shumova, and V. E. Fortov</i>	38
Kinetics of Carbon Particle Charging Behind Shock Waves <i>A. V. Emelianov, A. V. Eremin, S. Y. Bronin, A. G. Khrapak, H. K. Jander, and H. Gg. Wagner</i>	43
Investigations of Chemical Relaxation of $\text{CO}_2\text{--N}_2$ Mixture Behind a Shock Wave <i>A. Munafo, M. Panesi, Y. Babou, and O. Chazot</i>	54
Cermet Membranes as Catalyst Supports for Carbon-Dioxide Reforming of Methane <i>V. I. Uvarov, I. P. Borovinskaya, and I. G. Malevannaya</i>	60

Regime of Synchronous Multichannel Electrohydrodynamic Autooscillations for Emission Spectroscopy <i>R. N. Medvedev, K. A. Lomanovich, and V. S. Teslenko</i>	64
Deviation of Reciprocity Law Between the Intensity and Duration of Irradiation in LiF Irradiated with 195 MeV ^{132}Xe Ions <i>A. K. Dauletbekova, A. T. Akilbekov, and M. V. Zdorovets</i>	69
Computer Simulation Model of Nano-Islands Deposition <i>G. I. Zmievskaya and A. L. Bondareva</i>	75
Formation of Plasma Focus at Superdeep Penetration of Microparticles in Solid <i>V. V. Sobolev and S. M. Usherenko</i>	82
Molecular Dynamics Simulation of Hydrogen Adsorption in Carbon Nanotube Arrays <i>V. L. Kovalev and A. N. Yakunchikov</i>	83
Photoemission Measurements of Soot Particles Temperature at Pyrolysis of Ethylene <i>Y. A. Baranyshyn, L. I. Belaziorava, K. N. Kasparov, and O. G. Penyazkov</i>	87
Application of Highly Accurate Quantum Chemistry Approach for the Study of Thermochemistry of N,O-Containing High-Energy Compounds <i>V. G. Kiselev and N. P. Gritsan</i>	94
Effect of Low Temperature Glow Discharge Plasma on Surface Nanorelief of 1,3,5,7-Tetranitro-1,3,5,7-Tetraazacyclooctane Particles <i>A. P. Korobko, S. V. Krashenninikov, S. N. Drozd, and I. V. Levakova</i>	101
Electron Mobility in Dense Inert Gases <i>S. Nazin and V. Shikin</i>	104
Decay of Falling Wavy Liquid Films at Nonstationary Heat Release <i>A. N. Pavlenko and A. S. Suetaev</i>	110
Transient Processes and Crisis Phenomena at Liquid Boiling and Evaporation <i>A. N. Pavlenko, I. P. Starodubtseva, V. Yu. Chekhovich, O. A. Volodin, A. N. Chernyavski, and A. N. Tsoi</i>	117

PART TWO: PLASMA	123
Mechanisms of Charged Nanoparticle Formation in Complex Burning Plasmas <i>A. M. Starik, A. M. Savel'ev, and N. S. Titova</i>	125
Nonequilibrium Kinetic Processes in Air Plasma Produced by Shock Waves <i>I. V. Arsentiev, N. S. Titova, and A. M. Starik</i>	132
Created by Annular Electric Discharge Nonplanar Shock Wave as a Mean f Distant Heating and Ignition of Flammable Gas <i>E. M. Barkhudarov, N. K. Berezhetskaya, T. S. Zhuravskaya, V. A. Kop'ev, I. A. Kossyi, V. A. Levin, V. V. Markov, N. A. Popov, N. M. Tarasova, S. M. Temchin, and M. I. Taktakishvili</i>	138
Investigation of Nonequilibrium Pulsed Nanosecond Discharges for Combustion <i>F. Grisch, D. Messina, G. A. Grandin, and B. Attal-Trétout</i>	142
Influence of Gas Halo NO ₂ Near Optical Breakdown of Air on Plasma Luminescence Parameters <i>S. A. Shishigin</i>	153
Characterization of Plasma Environment in the VKI Plasmatron Facility <i>H. Krassilchikoff and O. Chazot</i>	155
Ion Ambipolar Diffusion Within Shock Wave Propagating in Weakly Ionized Plasmas <i>A. F. Kolesnikov</i>	161
The Influence of Corona-Like Discharges on Processes of Stabilization of Electrohydrodynamic Autooscillations in Water Electrolytes <i>V. S. Teslenko, R. N. Medvedev, and A. V. Zaykovskiy</i>	162
A Dielectric Semiconductor Model of Dielectric Barrier Discharge Plasma <i>S. Li, Y. Wei, R. Rong, and F. Gu</i>	169
Nonequilibrium Thermodynamics of Thermal Breakdown Generation <i>N. V. Andreyeva and Yu. P. Virchenko</i>	176

Atmospheric-Pressure Runaway Electrons Preionized Diffuse Discharges and Their Applications <i>E. H. Baksht, A. G. Burachenko, I. D. Kostyrya, M. I. Lomaev, D. V. Rybka, M. A. Shulepov, and V. F. Tarasenko</i>	183
Increase in Energetic Efficiency of Photocatalytic Oxidation of Organic Vapors Under the Action of Negative Atmospheric Corona Discharge <i>A. S. Besov, A. V. Vorontsov, M. N. Lyulyukin, and D. A. Trubitsyn</i>	190
Generator of Nanosecond 200-kilovolt Pulses for Plasmochemical Reactors <i>A. S. Besov, A. V. Vorontsov, I. A. Gusev, M. N. Lyulyukin, and E. I. Palchikov</i>	198
Nonequilibrium Plasma-Assisted Reforming of Ethanol into Hydrogen Enriched Syngas for Combustion <i>A. I. Shchedrin, D. S. Levko, V. V. Naumov, V. Ya. Chernyak, and V. V. Yukhymenko</i>	204

PART THREE: COMBUSTION 205

Ignition of Flammable Gas Mixture in a Closed Volume by Direct CO ₂ -Laser Heating of Gas Layer <i>S. Yu. Kazantsev, I. G. Kononov, I. A. Kossyi, N. M. Tarasova, and K. N. Firsov</i>	207
Ignition of Gaseous Methane–Oxygen Mixture in a Closed Volume by a Freely Localized Spark Generated by Hf Laser <i>S. Yu. Kazantsev, I. G. Kononov, I. A. Kossyi, N. M. Tarasova, and K. N. Firsov</i>	208
Auto-Ignitions of <i>n</i> -Hexadecane and Heptamethylnonane at High Temperatures <i>M. Assad, V. V. Leschevich, O. G. Penyazkov, K. L. Sevrouk, V. E. Tangirala, and N. D. Joshi</i>	210
Dual Nature of Fluorinated Hydrocarbons as Inertization Agents <i>V. V. Azatyan, Yu. N. Shebeko, A. Yu. Shebeko, and Yu. Navzenya</i>	221

Partial Oxidation of Biogas in Noncatalytic Combustion Regimes	
<i>A. A. Borisov, G. G. Politenkova, K. Ya. Troshin, I. O. Shamshin, I. V. Bilera, and Yu. A. Kolbanovskii</i>	226
Experimental and Numerical Study of Chemical Kinetic Mechanism for NO and NH ₃ Transformation in Hydrogen–Oxygen Flames	
<i>O. P. Korobeinichev, A. G. Shmakov, V. M. Shvartsberg, A. A. Chernov, D. A. Knyazkov, T. A. Bolshova, I. V. Rybitskaya, and A. A. Konnov</i>	233
Spatial Distributions of Instantaneous Velocity in Swirling Turbulent Flames Measured by Stereo Particle Image Velocimetry	
<i>S. V. Alekseenko, V. M. Dulin, Yu. S. Kozorezov, D. M. Markovich, and S. I. Shtork</i>	240
Development of a Compact Electron Beam Fluorescence Instrument for High Enthalpy Flow Characterization	
<i>B. Diop, J. Bonnet, and A. Mohamed</i>	247
Microstructure Formation of Y- α -SiAlON Under Infiltration-Assisted Combustion Synthesis	
<i>Y. S. Zhao, Y. Yang, J. T. Li, I. P. Borovinskaya, and K. L. Smirnov</i>	249
Ignition of Solid Propellants Based on Ammonium Nitrate by Laser Radiation	
<i>V. A. Arkhipov, A. G. Korotkikh, and I. O. Evseenko</i>	255
Nonstationary Burning Rate of Solid Propellants	
<i>V. A. Arkhipov, S. S. Bondarchuk, and A. G. Korotkikh</i>	257
Initiation of Combustion of H ₂ (CH ₄)–O ₂ Mixture with Excitation of O ₂ Molecules by Electric Discharge	
<i>A. M. Starik, B. I. Loukhovitski, A. P. Chernukho, and V. V. Naumov</i>	264
Kinetic Modeling of Kerosene/Air Mixture Ignition	
<i>N. S. Titova, S. A. Torokhov, and A. M. Starik</i>	271
Gas-Phase Self-Ignition of a Spherical Fuel Volume in Oxidizer Environment	
<i>Yu. A. Gostintsev, N. I. Peregudov, L. V. Kustova, N. G. Samoilenko, and B. L. Korsunskiy</i>	280

Ignition of Hydrogen–Air Mixture in the Flow over Hot Catalytic Surface	
<i>S. M. Frolov, S. N. Medvedev, and V. A. Smetanyuk . . .</i>	285
Some Physical and Gasdynamic Aspects of Combustion Initiation by Powerful Electric Discharge	
<i>D. I. Babushenko, O. V. Gouskov, V. I. Kopchenov, V. V. Smirnov, O. M. Stelmach, N. S. Titova, and A. M. Starik</i>	294
Low Toxic Emission Methane Combustion for Gas Turbine Engines	
<i>A. A. Ivanov, A. N. Yermakov, and R. A. Shlyakhov</i>	302
Experimental Capabilities and Design Methodology of a Nontoxic Combustion Chamber of Gas-Turbine Engine	
<i>V. B. Rutovsky, I. V. Kravchenko, and M. N. Bulaeva</i>	310
Supersonic H ₂ –O ₂ Combustion at Microscale	
<i>J. D. Parisse, L. Meister, J. Giordano, P. Perrier, I. Graur, and Y. Burstchell</i>	311
A Multiphenomena Turbulent Burning Velocity Model for Large Eddy Simulation of Premixed Combustion	
<i>V. V. Molkov</i>	315
Spray Penetration and Vaporization in Diesel Engines: Numerical Simulation and Experiments	
<i>S. M. Frolov, V. S. Ivanov, V. A. Smetanyuk, B. Basara, M. Suffa, and E. von Berg</i>	324
High-Pressure Hydrogen Leak Through a Narrow Channel	
<i>V. V. Molkov and M. V. Bragin</i>	332

PART FOUR: DETONATION 339

Continuous Detonation Combustion of Hydrogen in the Regime of Air Ejection	
<i>F. A. Bykovskii, S. A. Zhdan, and E. F. Vedernikov</i>	341
Detonation Mitigation by a Multiorifice Plate	
<i>S. V. Khomik, B. Veyssiere, S. P. Medvedev, V. Montassier, and H. Olivier</i>	348
Effect of Electric Field on Gaseous Detonation	
<i>V. Kamenskihs and J. H. S. Lee</i>	354

Numerical Simulation of Propane–Air Turbulent Flame Acceleration in Straight Tubes of Different Length <i>S. M. Frolov, V. S. Ivanov, V. A. Smetanyuk, B. Basara, and M. Suffa</i>	356
Direct Simulation Monte Carlo Modeling of Detonation Wave Structure <i>Ye. A. Bondar and M. S. Ivanov</i>	366
Different Scenarios of Deflagration-to-Detonation Transition Due to Shock Wave–Flame Front Interaction <i>M. F. Ivanov, A. D. Kiverin, and V. A. Galburt</i>	374
Effect of External Co-Flow on Wave Process in Pulse Detonation Tube <i>D. I. Babushenko and V. I. Kopchenov</i>	381
Heterogeneous Detonations <i>S. M. Frolov</i>	386
Nonequilibrium Processes in a Two-Phase Detonation Wave with Continuous Flow Acceleration to Supersonic Speed Behind a Lead Shock Wave <i>G. V. Zhizhin</i>	404
Explosive Properties of Furazan Derivatives <i>V. I. Pepekin and Yu. N. Matyushin</i>	406
Shock Waves and Autowaves in Relaxing Gas with the Energy Source <i>R. N. Galimov, V. G. Makaryan, and N. E. Molevich</i>	413
PART FIVE: ATMOSPHERE	421
Database on Chemical and Plasmachemical Reactions with Electronically Excited Molecules and Atoms in Air Involving Ozone and Nitrogen Oxides <i>S. A. Losev and V. N. Yarygina</i>	423
A New Way to Chemically Characterize the Gas–Aerosol Particle Interface Using Heterogeneous Chemistry Applied to Combustion (Soot) Aerosol, TiO ₂ and Amorphous Carbon Nanoparticles <i>A. Setyan, J.-J. Sauvain, M. Riediker, M. Guillemin, and M. J. Rossi</i>	430

Theoretical Investigation of Liquid–Gas Nucleation Kinetics in Binary Systems	
<i>T. I. Golavskaya, M. P. Anisimov, and P. A. Purtov</i>	432
Empirical Detection of Nanosize Cluster Phase Transitions Near Critical Line Conditions	
<i>M. Anisimov, E. Fominykh, and S. Akimov</i>	437
On the Problem of Surface Tension Definition Droplets	
<i>G. V. Kharlamov, A. A. Onischuk, S. V. Vosel, A. V. Bolesta, and P. A. Purtov</i>	444
Reconstruction of Aerosol Mass Concentration in the Atmosphere on the Basis of Thermodynamics	
<i>A. N. Yermakov, A. E. Aloyan, V. O. Arutyunyan, F. Deutsch, and C. Mensink</i>	451
Experimental Study of Simultaneous Removal of CO ₂ and SO ₂ from Flue Gas with Aqueous Ammonia	
<i>Zh.-Zhu Qiu, Ch.-R. Zheng, P. Li, W.-G. Pan, B.-L. Dou, H.-J. Xu, and W.-H. Wang</i>	458
Numerical Simulation of Simultaneous Absorption of CO ₂ and SO ₂ in Flue Gas with Aqueous Ammonia in Absorbing Tower	
<i>Zh.-Zhu Qiu, Ch.-R. Zheng, P. Li, W.-G. Pan, B.-L. Dou, H.-J. Xu, and W.-H. Wang</i>	459
Size of Long Live Particles of Anthropogenic Astrosol in High Atmosphere and Near Space	
<i>E. K. Kolesnikov, S. V. Chernov, A. B. Yakovlev</i>	460
Electrodynamic Formation Mechanism of Astrosol Clouds of Man-Made Submicron Particles in High Atmosphere and Near Space	
<i>E. K. Kolesnikov and S. V. Chernov</i>	466
Experimental Investigation of Ionizing Radiating Hypersonic Flow by Means of a Langmuir Probe	
<i>G. Sami, R. Sobbia, and P. Leyland</i>	472
AUTHOR INDEX	478