

COMBUSTION, EXPLOSION, AND SHOCK WAVES

Volume 51, Number 1–6, 2015

(A translation of *Fizika Goreniya i Vzryva*)

Engl./Russ.

Volume 51, Number 1, January–February, 2015

Cellular Structures of a Multifront Detonation Wave and Initiation (Review) - A. A. Vasil'ev .....	1	9
Current Status of Research of Continuous Detonation in Fuel–Air Mixtures (Review) – F. A. Bykovskii and S. A. Zhdan .....	21	31
Initiation and Propagation of Multidimensional Detonation Waves - V. A. Levin, I. S. Manuilovich, and V. V. Markov .....	36	47
Collapse of Spherical Cavities and Energy Cumulation in an Ideal Compressible Liquid – V. F. Kuropatenko .....	45	57
Experimental Verification of Discrete Models for Combustion of Microheterogeneous Compositions Forming Condensed Combustion Products (Review) – A. S. Rogachev and A. S. Mukas'yan .....	53	66
Nonclassical Detonation Regimes of Pressed and Liquid Explosives (Review) - A. V. Utkin and V. M. Mochalova .....	63	77
On the Structure of Self-Similar Detonation Waves in TNT Charges - A. L. Kuhl .....	72	87
Nanostructured Explosives Produced by Vapor Deposition: Structure and Explosive Properties – D. V. Mil'chenko, V. A. Gubachev, L. A. Andreevskikh, S. A. Vakhmistrov, A. L. Mikhailov, V. A. Burnashov, E. V. Khaldeev, A. I. Pyatoikina, S. S. Zhuravlev, and V. N. German .....	80	96
Mechanically Activated Oxidizer–Fuel Energetic Composites - A. Yu. Dolgoborodov .....	86	102
Aluminum/HMX Nanocomposites: Synthesis, Microstructure, and Combustion – A. N. Zhigach, I. O. Leipunskii, A. N. Pivkina, N. V. Muravyev, K. A. Monogarov, M. L. Kuskov, E. S. Afanasenkova, N. G. Berezkina, P. A. Pshechenkov, and A. A. Bragin .....	100	117
Simulation of the Hydrodynamic Instability of a Filtration Combustion Wave in a Porous Medium – A. P. Aldushin and T. P. Ivleva .....	107	125
Temperature of the Detonation Front of an Emulsion Explosive - V. V. Sil'vestrov, S. A. Bordzilovskii, S. M. Karakhanov, and A. V. Plastinin .....	116	135
Influence of the Temperature-Induced Martensitic–Austenitic Transformation on the Strength Properties of High-Alloy Steels under Dynamic Loading - A. S. Savinykh, G. V. Garkushin, S. V. Razorenov, S. Wolf, and L. Kruger .....	124	143
Numerical Analysis of the Effect of the Geometric Parameters of a Combined Shaped-Charge Liner on the Mass and Velocity of Explosively Formed Compact Elements – S. V. Fedorov, Ya. M. Bayanova, and S. V. Ladov .....	130	150

## Volume 51, Number 2, March–April, 2015

Catalytic Combustion: Achievements and Problems – V. N. Parmon, A. D. Simonov, V. A. Sadykov, and S. F. Tikhov .....	143	5
Superadiabatic Temperature Phenomenon in the Combustion Processes Due to a Competition between Chemical Reactions – V. S. Babkin, V. A. Bunev, and T. A. Bolshova .....	151	14
Near-Wall Flows of Chemical Reactants: A Review of the Current Status of the Problem – V. V. Lukashov, V. V. Terekhov, and V. I. Terekhov .....	160	23
Combustion of Nano Aluminum Particles (Review) – D. S. Sundaram, V. Yang, and V. E. Zarko .....	173	37
Specific Features of Ignition and Combustion of Composite Fuels Containing Aluminum Nanoparticles (Review) – A. M. Starik, A. M. Savel'ev, and N. S. Titova .....	197	64
Research in Mechanics of Reacting Homogeneous and Heterogeneous Media at the Khristianovich Institute of Theoretical and Applied Mechanics of the Siberian Branch of the Russian Academy of Sciences – V. M. Fomin and A. V. Fedorov .....	223	92
Energy Efficiency of a Continuous-Detonation Combustion Chamber – S. M. Frolov, V. S. Aksenov, A. V. Dubrovskii, V. S. Ivanov, and I. O. Shamshin .....	232	102
Detonation of a Gas Fuel Based on Methyl Acetylene and Allene – V. Yu. Ul'yanitskii, A. A. Shtertser, and I. S. Batraev .....	246	118
Gas-Disperse Synthesis of Metal Oxide Particles – A. N. Zolotko, N. I. Poletaev, and Ya. I. Vovchuk .....	252	125
Deformation Models under Intense Dynamic Loading (Review) – L. A. Merzhievskii .....	269	144

## Volume 51, Number 3, May–June, 2015

Experimental and Numerical Study of the Structure of a Premixed Methyl Decanoate/Oxygen/Argon Flame – I. E. Gerasimov, D. A. Knyazkov, A. M. Dmitriev, L. V. Kuibida, A. G. Shmakov, and O. P. Korobeinichev .....	285	3
Dynamics of Gas Combustion in a Channel with Combustion Product Flow through a Porous Wall – T. P. Miroshnichenko, N. S. Belyakov, and S. S. Minaev .....	293	12
Formation of Condensed Combustion Products in Metal Dust Flames: Nucleation Stage – N. I. Poletaev .....	299	19
Properties of Dust Clouds of Novel Hydrogen-Containing Alloys – Y. Chen, X. Chen, M.-X. Xu, S. Xu, D.-B. Liu, W.-G. Cao, and J.-X. Zhang .....	313	34
Numerical Study of Mixing in an Air-Breathing Rocket Engine – L. L. Kartovitskii, V. M. Levin, and A. A. Yakovlev .....	319	41
Boundaries of Regions of Rotating Gas Flames – A. A. Valaev .....	324	46
Possibility of Using Gas-Generating Compositions for Increasing the Rocket Propulsion Efficiency – V. I. Trushlyakov, D. B. Lempert, and M. E. Bel'kova .....	326	48
Molecular Dynamics Modeling Melting of of Aluminum Nanoparticles of the Embedded Atom Method – A. V. Fedorov and A. V. Shulgin .....	333	55
Discrete Combustion Waves of Two-Dimensional Nanocomposites – S. A. Rashkovskii and A. Yu. Dolgoborodov .....	338	60
Studies of the Contribution of Light Scattering and Absorption by Inclusions of Aluminum Nanoparticles in PETN – B. P. Aduv, D. R. Nurmukhametov, G. M. Belokurov, and R. I. Furega .....	347	70

Spatial and Temporal Characteristics of Detonation Wave Propagation in Silver Azide – A. V. Kalenskii, A. A. Zvekov, M. V. Anan'eva, V. G. Kriger, V. P. Tshipilev, and A. V. Razin .....	353	76
Detonation Initiation in Shielded Thin Layers of Explosives by Shaped-Charge Jets – I. F. Kobylkin .....	358	82
Evolution of Electrical Conductivity of Emulsion Explosives during Their Detonation Conversion – N. P. Satonkina, E. R. Prueel, A. P. Ershov, V. V. Sil'vestrov, D. I. Karpov, and A. V. Plastinin .....	366	91
Interaction of a Shock Wave with a Closed Cell Aluminum Metal Foam – M. D. Goel, Ph. Altenhofer, V. A. Matsagar, A. K. Gupta, Ch. Mundt, and S. Marburg .....	373	98
Application of Polyvinylidene Fluoride for Pressure Measurements in an Underwater Explosion of Aluminized Explosives – Zhiqiang Fan, Honghao Ma, Zhaowu Shen, and Moujin Lin .....	381	106
Effect of the Liner Material on the Shape of Dual Mode Penetrators – W.-B. Li, W.-B. Li, X.-M. Wang, and H. Zhou .....	387	112
Modelling of Characteristics of a Crater Emerged from a Surface Explosion on the Soil – I. Bjelovuk, S. Jaramaz, P. Elek, D. Micković, and L. Kričak .....	395	120

**Volume 51, Number 4, July–August, 2015**

On the Boundaries of the Transitional Regime of Mass Transfer during Ethanol Combustion on Horizontal Rear Walls of a Rib and a Step – B. F. Boyarshinov .....	401	3
Numerical Simulation of Ignition of Particles of a Coal–Water Fuel – G. V. Kuznetsov, V. V. Salomatov, and S. V. Syrodoy .....	409	11
Measurements of the Visible Flame Height of a Swirl-Stabilized Kerosene Jet Diffusion Flame – S. K. Birwa and D. P. Mishra .....	416	20
Influence of Flow Swirling on the Aerothermodynamic Behaviour of Flames – M. T. Parra-Santos, V. Mendoza-Garcia, R. Szasz, A. N. Gutkowski, and F. Castro-Ruiz .....	424	29
Physicomathematical Modeling of Ignition and Combustion of Silane in Transient and Reflected Shock Waves – D. A. Tropin and A. V. Fedorov .....	431	37
Combustion of Chemical Transformations in Thermite Systems with Two Active Reducing Agents – V. I. Yukhvid, P. A. Miloserdov, N. V. Sachkova, and V. A. Gorshkov .....	439	46
Firmation of Condensed Combustion Products in Dust Flames of Metals: Coagulation Stage – N. I. Poletaev .....	444	51
Combustion of TiAl Alloy in Nitrogen – B. Sh. Braverman, O. K. Lepakova, Yu. M. Maksimov, Yu. V. Tsybul'nik, and V. D. Kitler .....	457	66
Combustion and Thermal Decomposition of Hydrazine Borane – G. B. Manelis, V. V. Zakharov, G. N. Nechiporenko, V. A. Strunin, A. V. Raevskii, and V. V. Yakovlev .....	462	72
Effect of the Time of Mechanical Activation of a Ti + 2B Mixture on Combustion of Cylindrical Samples and Thin Foils – N. A. Kochetov and S. G. Vadchenko .....	467	77
Influence of the Size of Inclusions of Ultrafine Nickel Particles on the Laser Initiation Threshold of PETN – B. P. Aduiev, D. R. Nurmukhametov, A. A. Zvekov, and I. Yu. Liskov .....	472	82
Instability of a Detonation Waves in Nitromethane and FEFO – A. V. Utkin, V. M. Mochalova, S. I. Torunov, and S. A. Koldunov .....	476	87

Electrical Resistance of High-Pressure Phases of Tin under Shock Compression - S. D. Gilev and V. S. Prokop'ev .....	482	94
Air Explosion Characteristics of a Novel TiH <sub>2</sub> /RDX Composite Explosive - B. Xue, H.-H. Ma, and Z.-W. Shen .....	488	101
Hydrogen and Air Detonation (Deflagration) Synthesis of Carbon-Encapsulated Iron Nanoparticles - H. Yan, T. Zhao, X. Li, and Ch. Hun .....	495	109
Smoothed Particle Hydrodynamics Simulation of the Submarine Structure Subjected to a Contact Underwater Explosion - Z. Zhang, L. Sun, X. Yao, and X. Cao .....	502	116

### Volume 51, Number 5, September–October, 2015

On the Flame Shape in Diffusion Combustion of a Liquid Fuel Film on a Substrate - A. A. Korzhavin and I. G. Namyatov .....	511	3
On the Correlation of Inverted Flame Blow-Off Limits with the Boundary Velocity Gradient at the Flame Holder Surface - Y. Shoshin and L. P. H. de Goey .....	520	13
Application of Detailed and Reduced Kinetic Schemes for the Description of Detonation of Diluted Hydrogen–Air Mixtures - I. A. Bedarev, K. V. Rylova, and A. V. Fedorov .....	528	22
Filtration Combustion of Carbon in the Presence of Endothermic Oxidizers - S. V. Glazov and E. V. Polianczyk .....	540	34
Calculation of the Characteristics of Agglomerates during Combustion of High-Energy Composite Solid Propellants - V. A. Babuk, A. N. Ivonenko, and A. A. Nnizyaev .....	549	44
Semi-Empirical Model of the Combustion Wave in a Gas Suspension of Magnesium Particles - A. V. Fedorov, A. V. Shulgin, and Yu. S. Korneeva .....	560	57
On the Theory of Multiple Repetitions of a Nonisothermal Wave Process - V. K. Smolyakov and O. V. Lapshin .....	568	66
Effect of V <sub>2</sub> O <sub>5</sub> on the Oxidation Mechanism of ASD-4 Powder - V. G. Shevchenko, V. N. Krasil'nikov, D. A. Eselevich, A. V. Konyukova, A. I. Ancharov, and B. P. Tolochko .....	572	70
Thermal Explosion in Mechanically Activated Low-Calorific-Value Compositions - M. A. Korchagin .....	578	77
Correction of PIV Data for Reconstruction of the Gas Velocity in a Supersonic Underexpanded Jet - V. M. Boiko, V. I. Zapryagaev, A. A. Pivovarov, and S. V. Poplavski .....	587	87
Method of Shock Wave Overpressure Reconstruction - Y. Guo, Y. Han, and L. Wang .....	597	98
Formation of Cubic Silicon Nitride from the Low-Pressure Phase by High-Temperature Shock Compression - V. V. Yakushev, A. N. Zhukov, A. V. Utkin, A. I. Rogacheva, and V. A. Kudakina .....	603	104
Experimental and Computational Study of Quasispherical Compression of a Copper Shell Loaded by the Detonation of a Plastic Explosive Layer - V. A. Arinin, V. V. Burtsev, A. L. Mikhailov, A. M. Podurets, A. V. Rudnev, M. A. Syrunin, I. A. Tereshkina, B. I. Tkachenko, M. I. Tkachenko, I. R. Trunin, A. P. Tsoi, and I. V. Shiberin .....	611	112

### URGENT COMMUNICATION

Estimating the Mass of a Pyrotechnic Mixture for Burning the Launch Vehicle Nose Fairing - D. B. Lempert, V. I. Trushlyakov, and V. E. Zarko .....	619	121
---	-----	-----

## Volume 51, Number 6, November–December, 2015

Numerical Study of the Combustion Chemistry of Fuel-Rich Mixtures of Formaldehyde and Air – V. M. Shvartsberg, V. A. Bunev, and V. S. Babkin .....	623	3
Combustion in Vortex Chambers with a Fluidized Particle Bed – N. A. Dvornikov .....	631	12
Laminar Flame in Polydisperse Aerosuspensions of Aluminum Particles – A. S. Oparin, A. E. Sidorov, and V. G. Shevchuk .....	641	22
Thermal Explosion in a Binary Homogeneous Mixture – V. Yu. Filimonov and K. B. Koshelev .....	644	25
Combustion of Iron Aluminum Thermite with Ammonium Chloride and Sodium Hydrogen Tarbonate – S. L. Silyakov and V. I. Yukhvid .....	656	39
Convective Combustion in the Slot of an Explosive Charge – L. A. Andreevskikh, S. A. Vakhmistrov, D. A. Pronin, E. V. Khaldeev, and Yu. V. Sheikov .....	659	42
Numerical Simulation of the Extinction of N Powder by a Pressure Drop Based on a Coupled Combustion Model – A. Yu. Krainov and V. A. Poryazov .....	664	47
Study of the Combustion Behavior and Kinetics of Different Types of Coal Gangue – Yu. Zhang, J. Li, F. Cheng, and Ya. Guo .....	670	53
Shock Wave Structure in a Heterogeneous Medium with Two Pressures – A. V. Fedorov .....	678	62
Effect of Combustor Geometry on Continuous Spin Detonation in Syngas–Air Mixtures – F. A. Bykovskii, S. A. Zhdan, E. F. Vedernikov, and A. N. Samsonov .....	688	72
Physical Mechanisms of High-Enthalpy Initiation – A. P. Ershov, A. O. Kashkarov, and E. R. Prueel .....	700	85
Some Aspects of Recording and Interpretation of Rotating Detonation Waves – A. A. Vasil'ev .....	710	96
Diaphragm Effect on the Detonation Wave Transmission Across the Interface between Two Mixtures – J.-M. Li, K.-M. Chung, and Y.-C. Hsu .....	717	104
Shock-Wave Processes in Wire Explosion in Water and Bubbly Media – I. I. Kochetkov and A. V. Pinaev .....	722	109
Yield Stresses in a Ductile Metal at a High Strain Rate in Different Stress States – S.-W. Zhang, C.-L. Liu, G.-W. Ren, and Q.-Z. Li .....	732	120