

SEVENTH ISHPMIE PROCEEDINGS
VOLUME II

SEVENTH INTERNATIONAL SYMPOSIUM
ON HAZARDS, PREVENTION,
AND MITIGATION
OF INDUSTRIAL EXPLOSIONS:

Thirteenth International Colloquium on Dust Explosions
&
Eighth Colloquium on Gas, Vapor, Liquid, and Hybrid Explosions

St. Petersburg, Russia

July 7-11, 2008



CONTENTS

GASEOUS DETONATIONS	1
Transient Numerical Code with Grid Adaptation for Gas Combustion and Detonation Studies <i>N. Gascoin, S. M. Frolov, and Ph. Gillard</i>	3
Numerical Study of the Influence of Tube Wall Profile on Shock-to-Detonation Transition <i>I. Semenov, P. Utkin, and V. Markov</i>	16
A Deflagration-to-Detonation Transition Through Hydraulic Resistance <i>L. Kagan, M. Frankel, and G. Sivashinsky</i>	25
Numerical Simulation on the Multi-Dimensional Effects of Spherical Detonation by Direct Initiation <i>T. Nirasawa and A. Matsuo</i>	34
Prediction of Detonation Cell Size in Hydrogen–Nitrous Oxide–Argon Mixtures Using Chemical Kinetics Correlations and 2-D Numerical Simulation Code <i>R. Mével, D. Davidenko, F. Lafosse, G. Dupré, and C. E. Paillard</i>	41
Numerical Simulation of Viscous Detonations <i>A. V. Trotsyuk and M. S. Ivanov</i>	54
Flow Reversal in Spinning Detonation <i>F. Viro, M. Kurosaka, B. Khasainov, D. Desbordes, and H. N. Presles</i>	66
Continuous Spin Detonation of a Hydrogen–Oxygen Mixture in a Flow-Type Combustor <i>F. A. Bykovskii, S. A. Zhdan, and E. F. Vedernikov</i>	73
Continuous Spin Detonation in the Oxidizer Ejection Regime <i>F. A. Bykovskii, S. A. Zhdan, and E. F. Vedernikov</i>	84
Studying of Devices for Mitigation of the Detonation and Strong Shock Waves, Propagating in the Cylindrical Duct <i>N. Kh. Remeev, V. V. Vlasenko, and R. A. Khakimov</i>	94
Initiation, Propagation and Stabilization of Detonation in the Supersonic Gas Flow <i>V. A. Levin, V. V. Markov, T. A. Zhuravskaya, and S. F. Osinkin</i>	110
HYDROGEN SAFETY	119
Hazard Estimations of Hydrogen and Synthetic-Gas Mixtures <i>A. A. Vasil'ev</i>	121
Diffusion Self-Ignition of Sudden Discharge of Hydrogen <i>V. V. Golub</i>	128
Experimental Investigation of Diffusion Self-Ignition at a Pulse Release of Hydrogen into a Channel <i>V. V. Golub, D. I. Baklanov, S. V. Golovastov, K. V. Ivanov, and V. V. Volodin</i>	139
The Effect of Pressure Boundary Rupture Rate on the Spontaneous Ignition of Pressurized Hydrogen Release <i>B. P. Xu, J. X. Wen, S. Dembele, and V. H. Y. Tam</i>	147
Uniform Hydrogen–Air Deflagrations in Vented Enclosures and Tunnels: Predictive Capabilities of Engineering Correlations and LES <i>V. Molkov, F. Verbecke, and J. B. Saffers</i>	158

LES of High Pressure Hydrogen Jet Fire <i>S. Brennan, D. Makarov, and V. Molkov</i>	168
Numerical Studies of DDT in Hydrogen Storage Facilities: Flame Acceleration and Detonation in Channels with Obstacles <i>T. Ogawa, V. N. Gamezo, and E. S. Oran</i>	179
Pyrotechnic Source of Hydrogen Based on Burning Aluminum–Water Mixtures <i>P. V. Komissarov, R. H. Ibraghimov, and G. N. Sokolov</i>	189
Development of Virtual Reality Operator Training System for Hydrogen Refueling Station <i>E. Kim, J. Kim, Y. Lee, and Il Moon</i>	195
HETEROGENEOUS AND CONDENSED-PHASE DETONATIONS	201
On the Theory of Heterogeneous Detonation of Gas-Particle Mixtures <i>A. V. Fedorov</i>	203
Detonability of Aluminium Suspensions <i>A. Briand, B. Veyssiere, and B. A. Khasainov</i>	213
Reaction Mechanism of Aluminum Particles–Air Detonation <i>F. Zhang, K. B. Gerrard, and R. Ripley</i>	223
Cellular Detonation Formation and Propagation in Polydisperse Mixtures <i>A. V. Fedorov, T. A. Khmel, and Yu. V. Kratova</i>	238
Dispersion of Drops and Theory of the Aerosol Detonation <i>S. K. Aslanov and V. E. Volkov</i>	250
Influence of Physical Properties of Carbon on the Detonation Behaviour of Ammonium Nitrate and Carbon Mixtures <i>A. Miyake, H. Echigoya, K. Katoh, Sh. Kubota, Y. Wada, Y. Ogata, and T. Ogawa</i>	255
Detonation Characteristics of Packed Bed of Metal Particles Saturated with Nitromethane <i>Y. Kato and K. Murata</i>	260
Structure and Critical Parameters of a Bubble Detonation Wave <i>A. A. Vasil'ev, A. V. Pinaev, and I. I. Kochetkov</i>	270
Nonsteady Combustion Research of High-Energy Materials <i>V. A. Arkhipov, S. S. Bondarchuk, and A. G. Korotkikh</i>	279
Reactivity of Small-Scale Boron-Containing Nano-Size Particles <i>V. G. Slutsky, S. A. Tsyganov, E. S. Severin, and L. A. Polenov</i>	282
Oxidation of Aluminium Behind Fronts of Shock and Detonation Waves <i>I. M. Voskoboinikov</i>	286