

# **All-Russian Conference with the School for Young Scientists Thermophysics and Physical Hydrodynamics 2016**

Journal of Physics: Conference Series Volume 754

Crimea  
19-25 September 2016

## **Editors:**

**D. M. Markovich**

**S. V. Golovin**

ISBN: 978-1-5108-3178-0  
ISSN: 1742-6588

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2016) by the Institute of Physics  
All rights reserved. The material featured in this book is subject to  
IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## PREFACE

<b>ALL-RUSSIAN CONFERENCE WITH THE SCHOOL FOR YOUNG SCIENTISTS "THERMOPHYSICS AND PHYSICAL HYDRODYNAMICS - 2016"</b> .....	1
<i>D. M. Markovich, S. V. Golovin</i>	
<b>PEER REVIEW STATEMENT</b> .....	2
<i>N/A</i>	

## HEAT TRANSFER AND HYDRODYNAMICS IN SINGLE PHASE FLOWS

<b>MICROCONVECTION IN VERTICAL CHANNEL AT GIVEN HEAT FLUX</b> .....	3
<i>V. B. Bekezhanova, I. A. Shefer</i>	
<b>MATHEMATICAL SIMULATION OF NONISOTHERMAL FILLING OF PLANE CHANNEL WITH NON-NEWTONIAN FLUID</b> .....	12
<i>E. Borzenko, K. Ryltseva, O. Frolov, G. Shrager</i>	
<b>AN EXPERIMENTAL INVESTIGATION OF THE INTERACTION BETWEEN A PAIR OF PRECESSING VORTICES IN A TANGENTIAL VORTEX CHAMBER</b> .....	18
<i>S. V. Dremov, S. I. Shtork, S. G. Skripkin, I. K. Kabardin</i>	
<b>ACOUSTIC STREAMING WITH HEAT EXCHANGE</b> .....	24
<i>A. A. Gubaidullin, A. V. Pyatkova</i>	
<b>LINEAR AND NONLINEAR DEVELOPMENT OF CONTROLLED DISTURBANCES IN THE SUPERSONIC BOUNDARY LAYER ON A SWEEPED WING AT MACH 2.5</b> .....	30
<i>G. L. Kolosov, A. D. Kosinov</i>	
<b>A MODEL OF PYROLYSIS IN A STAGED SCHEME OF LOW-GRADE SOLID FUEL GASIFICATION</b> .....	37
<i>A. A. Levin, V. A. Shamansky, A. N. Kozlov</i>	
<b>SIMULATION OF HELIUM-METHANE MIXTURE SEPARATION ON SELECTIVELY PERMEABLE MEMBRANES</b> .....	42
<i>V. S. Naumkin</i>	
<b>TURBULENCE AND HEAT EXCHANGE INSIDE THE DOME ROOM OF LIDAR STATION. EXPERIMENT AND SIMULATION</b> .....	47
<i>V. V. Nosov, V. P. Lukin, E. V. Nosov, A. V. Torgaev</i>	
<b>HEAT AND MASS TRANSFER WITH EVAPORATION COOLING OF A POROUS PLATE</b> .....	53
<i>S. N. Makarova, A. A. Shibaev</i>	
<b>TURBULENT CONVECTIVE FLOWS IN A CUBIC CAVITY AT HIGH PRANDTL NUMBER</b> .....	59
<i>A. Vasiliev, A. Sukhanovskii, P. Frick</i>	

## HYDRODYNAMICS AND HEAT MASS TRANSFER IN MULTIPHASE FLOWS

<b>LINEAR WAVES ON A SURFACE OF VERTICAL RIVULET</b> .....	64
<i>S. P. Aktershev, S. V. Alekseenko, D. G. Arkhipov</i>	
<b>THERMOCAPILLARY DEFORMATION IN A LOCALLY HEATED LAYER OF SILICONE OIL</b> .....	70
<i>E. V. Barakhovskaya, I. V. Marchuk, A. A. Fedorets</i>	
<b>CHARACTERISTICS OF FILM FLOW DURING TRANSITION TO THREE-DIMENSIONAL WAVE REGIMES</b> .....	76
<i>A. Bobylev, V. Guzanov, A. Kvon, S. Kharlamov</i>	
<b>THERMOCAPILLARY INSTABILITY OF A LIQUID LAYER ON INTERIOR SURFACE OF A ROTATING CYLINDER</b> .....	82
<i>O. A. Burmistrova</i>	
<b>NUMERICAL MODELING OF GRAVITY-DRIVEN BUBBLE FLOWS WITH ACCOUNT OF POLYDISPERSION</b> .....	88
<i>A. S. Chernyshev, A. A. Schmidt</i>	

<b>STABILITY OF A DOME-SHAPE LIQUID FILM FOR CONDITIONS WHEN IT FLOWS AROUND A PLATE</b> .....	94
<i>R. A. Dekhtyar, E. Yu Slesareva, V. V. Ovchinnikov</i>	
<b>ANOMALOUS WAVES IN GAS-LIQUID MIXTURES NEAR GAS CRITICAL POINT IN GARDNER EQUATION APPROXIMATION</b> .....	99
<i>V. G. Gasenko</i>	
<b>INVESTIGATION OF THE TWO-LAYER FLUID FLOWS WITH EVAPORATION AT INTERFACE ON THE BASIS OF THE EXACT SOLUTIONS OF THE 3D PROBLEMS OF CONVECTION</b> .....	105
<i>O. N. Goncharova, O. A. Kabov</i>	
<b>INVESTIGATION OF THE PROPERTIES OF DIFFERENT SURFACES USED IN EVAPORATION SYSTEMS</b> .....	111
<i>E. O. Kirichenko, E. Ya Gatapova</i>	
<b>THE SUPERFLUID HELIUM FLOW IN THE CHANNEL WITH POROUS INSERT AT THE PRESENCE OF LONGITUDINAL HEAT FLUX</b> .....	116
<i>P. V. Korolyov, A. P. Kryukov, Yu Yu Puzina</i>	
<b>EFFECT OF TEMPERATURE ON THE CONVECTION FLOW WITHIN THE LIQUID EVAPORATION INTO THE GAS FLOW</b> .....	122
<i>A. Kreta, Y. Lyulin, O. Kabov</i>	
<b>TWO-PHASE MICROFLUIDICS: THERMOPHYSICAL FUNDAMENTALS AND ENGINEERING CONCEPTS</b> .....	127
<i>V. V. Kuznetsov</i>	
<b>HYDRODYNAMIC STRUCTURE OF A BUBBLY FLOW IN AN ANNULAR CHANNEL: EXPERIMENTAL STUDY BY MEANS OF PIV/PFBI/PTV</b> .....	133
<i>P. D. Lobanov, M. V. Timoshevskiy</i>	
<b>CRITICAL HEAT FLUX AND DYNAMICS OF BOILING IN NANOFLUIDS AT STEPWISE HEAT RELEASE</b> .....	139
<i>M. I. Moiseev, D. V. Kuznetsov</i>	
<b>THEORETICAL RESEARCH OF THE CARBON DIOXIDE INJECTION PROCESS INTO THE ROCK SATURATED WITH ICE</b> .....	145
<i>N. G. Musakaev, M. K. Khasanov</i>	
<b>BUBBLY FREE AND IMPINGING JETS: EXPERIMENTAL STUDY BY MEANS OF PIV AND PFBI</b> .....	151
<i>K. S. Pervunin, M. V. Timoshevskiy</i>	
<b>THICKNESS MEASUREMENT IN A HORIZONTAL LIQUID LAYER WHEN HEATED FROM A LOCALIZED HOT-SPOT</b> .....	157
<i>S. E. Spesivtsev, Yu V. Lyulin, I. V. Marchuk, O. A. Kabov</i>	
<b>THE SURFACE TEMPERATURE OF FREE EVAPORATING DROPS</b> .....	162
<i>V. Y. Borodulin, V. N. Letushko, M. I. Nizovtsev, A. N. Sterlyagov</i>	
<b>CRITICAL HEAT FLUX IN LOCALLY HEATED LIQUID FILM MOVING UNDER THE ACTION OF GAS FLOW IN A MINI-CHANNEL</b> .....	170
<i>E. M. Tkachenko, D. V. Zaitsev, E. V. Orlik, O. A. Kabov</i>	
<b>SIMULATING NONLINEAR STEADY-STATE TRAVELING WAVES ON THE FALLING LIQUID FILM ENTRAINED BY A GAS FLOW</b> .....	176
<i>O. Yu Tsvlodub</i>	
<b>MODELING WAVE PROCESSES AT THE OUTFLOWING OF A WATER COOLANT WITH SUPERCRITICAL INITIAL PARAMETERS</b> .....	181
<i>I. S. Vozhakov, M. V. Alekseev, S. I. Lezhnin, N. A. Pribaturin</i>	
<b>SIMULATING THE NONLINEAR WAVE MODE EVOLUTION IN THE PROBLEM OF THE FALLING THIN LAYER OF A VISCOUS LIQUID</b> .....	186
<i>I. S. Vozhakov, D. G. Arkhipov, O. Yu Tsvlodub</i>	

## **PHASE TRANSITIONS**

<b>FEATURES OF SHOCK-WAVE AND VORTEX PROCESSES SIMULATION AT DEPRESSURIZATION OF CIRCUITS WITH SUPERHEATED WATER COOLANT</b> .....	192
<i>M. V. Alekseev, M. E. Kuznetsova, S. I. Lezhnin, N. A. Pribaturin</i>	
<b>EXPERIMENTAL STUDY OF HEAT TRANSFER FROM THE GAS-VAPOR MIXTURE TO THE SURFACE IN RECTANGULAR CHANNEL WITH THE WATER VAPOR CONDENSATION</b> .....	198
<i>V. V. Bespalov, V. I. Bespalov, D. V. Melnikov</i>	

<b>ON THE MECHANISM OF EXPLOSIVE ERUPTION OF MOUNT EREBUS VOLCANO: THE DYNAMICS OF THE RUPTURE STRUCTURE IN A CAVITATING LAYER .....</b>	<b>202</b>
<i>E. S. Bol'Shakova, V. K. Kedrinskiy</i>	
<b>KINETICS OF BULK CRYSTALLISATION OF SUPERCOOLED MELT.....</b>	<b>207</b>
<i>A. A. Chernov, A. A. Pil'Nik</i>	
<b>GAS HYDRATE FORMATION AT CYCLIC BOILING-CONDENSATION OF HYDRATE-FORMING GAS IN A CLOSED VOLUME OF LIQUID.....</b>	<b>213</b>
<i>D. S. Elistratov, I. V. Mezentsev, A. V. Meleshkin, S. L. Elistratov, A. Yu Manakov</i>	
<b>WATER DROPLET EVAPORATION AND DYNAMICS IN A MINI-CHANNEL UNDER ACTION OF THE GAS FLOW.....</b>	<b>217</b>
<i>E. A. Isachenko, E. V. Orlik, E. F. Bykovskaya</i>	
<b>MULTIPHASE SYSTEMS: WAVE PROCESSES, STATE DYNAMICS, AND MATHEMATICAL MODELS.....</b>	<b>223</b>
<i>V. K. Kedrinskii</i>	
<b>EVAPORATION OF LIQUID MICRODROPLETS LEVITATED ABOVE A SOLID SURFACE HEATED BELOW THE SATURATION TEMPERATURE.....</b>	<b>229</b>
<i>D. P. Kirichenko, D. V. Zaitsev, O. A. Kabov</i>	
<b>KINETICS OF POWDER LAYER SHRINKAGE DURING ELECTRON-BEAM TREATMENT.....</b>	<b>234</b>
<i>A. Knyazeva</i>	
<b>DYNAMICS OF THE WALL THERMAL BOUNDARY LAYER AT THE INITIAL STAGE OF THE NUCLEATE BOILING.....</b>	<b>239</b>
<i>A. A. Levin, A. S. Safarov, P. V. Khan</i>	
<b>INTENSIFICATION OF HYDRATE FORMATION BY MEANS OF EXPLOSIVE BOILING INCIPIENCE OF RAREFIED GAS IN A BULK OF WATER.....</b>	<b>243</b>
<i>I. V. Mezentsev, A. V. Meleshkin, D. S. Elistratov, S. L. Elistratov, M. N. Mutali</i>	
<b>FEATURES OF LIQUID MIXTURES SEPARATION IN LARGE-SCALE DISTILLATION COLUMNS WITH STRUCTURED PACKING. NEW IDEAS AND APPROACHES.....</b>	<b>247</b>
<i>A. N. Pavlenko, V. E. Zhukov, N. I. Pecherkin, X. Li, H. Sui</i>	
<b>VISUAL STUDY OF PROPAGATION OF SELF-SUSTAINED EVAPORATION FRONT WITHIN THE THICKNESS OF A THERMAL LIQUID LAYER.....</b>	<b>252</b>
<i>V. E. Zhukov, M. I. Moiseev, D. V. Kuznetsov</i>	

## **REACTING FLOW DYNAMICS, DETONATION PROCESSES**

<b>ON PECULIARITIES OF NEAR-THRESHOLD INITIATION OF POWDER DENSITY EXPLOSIVE BY AIR SHOCK WAVE AND BY SOLID IMPACTOR.....</b>	<b>257</b>
<i>A. O. Kashkarov, A. P. Ershov, E. R. Prueel</i>	
<b>ON THE MECHANISMS AND CRITERIA OF DEFLAGRATION-TO-DETONATION TRANSITION IN GASES.....</b>	<b>262</b>
<i>A. D. Kiverin, I. S. Yakovenko, M. F. Ivanov</i>	
<b>MODELING OF THE FLAME PROPAGATION IN COAL-DUST- METHANE AIR MIXTURE IN AN ENCLOSED SPHERE VOLUME.....</b>	<b>268</b>
<i>A. Yu Krainov, K. M. Moiseeva</i>	
<b>THE GROWTH OF CARBON NANOPARTICLES DURING THE DETONATION OF TRINITROTOLUENE.....</b>	<b>274</b>
<i>I. A. Rubtsov, K. A. Ten, E. R. Prueel, A. O. Kashkarov, B. P. Tolochko, V. V. Zhulanov, L. I. Shekhtman, P. A. Piminov</i>	
<b>COMPARISON OF COAL REACTIVITY DURING CONVERSION INTO DIFFERENT OXIDIZING MEDIUM.....</b>	<b>280</b>
<i>A. G. Korotkikh, K. V. Slyusarskiy, K. B. Larionov, V. I. Osipov</i>	
<b>NUMERICAL MODELLING OF CONTINUOUS SPIN DETONATION IN RICH METHANE-OXYGEN MIXTURE.....</b>	<b>286</b>
<i>A. V. Trotsyuk</i>	
<b>INITIATION OF EXPLOSIVE MIXTURES HAVING MULTI-SIZED STRUCTURES.....</b>	<b>292</b>
<i>A. A. Vasil'Ev, V. A. Vasiliev, A. V. Trotsyuk</i>	

## **NUMERICAL METHODS IN THERMOPHYSICS AND PHYSICAL HYDRODYNAMICS**

<b>SIMULATION OF LIQUID CUBE FRACTURE WITH SPH.....</b>	<b>298</b>
<i>M. N. Davydov</i>	

<b>COMPARATIVE STUDY OF DIFFERENT COMBUSTION MODELS FOR TURBULENT GAS FLAMES</b> .....	303
<i>A. A. Dekterev, Ar. A. Dekterev, A. V. Minakov</i>	
<b>APPLICATION OF SOFTWARE COMPLEX TURBO PROBLEM SOLVER TO RAYLEIGH-TAYLOR INSTABILITY MODELING</b> .....	309
<i>S. V. Fortova, P. S. Utkin, V. V. Shepelev</i>	
<b>ABOUT THE FLOWAGE OF VORTEX CHAMBER WITH OUTLET DIAPHRAGM AND SIDE SLOT SWIRLER</b> .....	315
<i>M. S. Makarov, V. S. Naumkin</i>	
<b>VERIFICATION OF A LOW MACH VARIABLE-DENSITY NAVIER-STOKES SOLVER FOR TURBULENT COMBUSTION</b> .....	321
<i>R. Mullyadzhanov, E. Palkin, B. Niceno, L. Vervisch, K. Hanjalic</i>	
<b>HIGH-FREQUENCY ROTARY OSCILLATIONS CONTROL OF FLOW AROUND CYLINDER AT <math>Re = 1.4 \times 10^5</math></b> .....	332
<i>E. Palkin, M. Hadžićabdic, K. Hanjalic</i>	
<b>NUMERICAL AND EXPERIMENTAL STUDY OF LOW-FREQUENCY PRESSURE PULSATIONS IN HYDRAULIC UNITS WITH FRANCIS TURBINE</b> .....	337
<i>D. Platonov, A. Minakov, D. Dekterev, A. Sentyabov</i>	
<b>HEAT TRANSFER IN A FREE LIQUID LAYER UNDER ACTION OF ADDITIONAL TANGENTIAL STRESSES: NUMERICAL MODELING</b> .....	343
<i>E. Rezanova</i>	
<b>SIMULATION OF HEAT AND MASS TRANSFER IN TURBULENT CHANNEL FLOW USING THE SPECTRAL-ELEMENT METHOD: EFFECT OF SPATIAL RESOLUTION</b> .....	349
<i>V. Ryzhenkov, V. Ivashchenko, R. Vinuesa, R. Mullyadzhanov</i>	
<b>THE NUMERICAL STUDY OF ENERGY SEPARATION IN A TWO-CASCADE LEONTIEV TUBE</b> .....	356
<i>M. S. Makarov, S. N. Makarova, A. A. Shibaev</i>	

## **TECHNIQUES OF THERMOPHYSICS AND HYDRODYNAMICS EXPERIMENT**

<b>PIV AND OH PLIF STUDY OF IMPINGING PROPANE-AIR JET-FLAMES</b> .....	362
<i>Z. D. Kravtsov, Z. D. Tolstoguzov, L. M. Chikishev, V. M. Dulin</i>	
<b>ARTIFICIAL NEURAL NETWORK FOR BUBBLES PATTERN RECOGNITION ON THE IMAGES</b> .....	368
<i>I. E. Poletaev, K. S. Pervunin, M. P. Tokarev</i>	
<b>INVESTIGATION OF MASS TRANSFER IN SWIRLING TURBULENT FLAMES</b> .....	381
<i>D. Sharaborin, S. Abdurakipov, V. Dulin</i>	
<b>THE 2D METHOD FOR DETERMINING THE TEMPERATURES FIELD OF THE GAS FLOW AT THE OUTLET OF A MULTI-CHANNEL HEAT EXCHANGER</b> .....	387
<i>E. Yu Slesareva, S. L. Elistratov, V. V. Ovchinnikov</i>	
<b>NON-ZERO HELICITY OF A CYCLONIC VORTEX OVER LOCALIZED HEAT SOURCE</b> .....	391
<i>A. Sukhanovskii, A. Evgrafova, E. Popova</i>	
<b>ULTRA DISPERSED MIXTURE OF PETN AND RDX FOR EXPLOSIVE WELDING</b> .....	397
<i>K. A. Ten, E. R. Prueel, A. O. Kashkarov, I. A. Rubtsov, I. A. Spirin, A. L. Mikhailov, L. I. Shekhtman, V. V. Zhulanov, A. A. Deribas</i>	

## **THERMOPHYSICAL PROPERTIES OF SUBSTANCES AND NEW MATERIALS**

<b>LAWS OF THE CREEP OF METALLIC MATERIALS AT HIGH TEMPERATURES</b> .....	407
<i>I. A. Bانشchikova, B. V. Gorev, M. A. Legan</i>	
<b>THERMO-MECHANICAL RELAXATION OF STRESSES IN A GLASS-METAL JUNCTION</b> .....	412
<i>O. N. Lyubimova, E. P. Solonenko</i>	

## **HEAT TRANSFER AND HYDRODYNAMICS ON MICRO-AND NANOSCALES**

<b>EXPERIMENTAL STUDY OF LIQUID-LIQUID PLUG FLOW IN A T-SHAPED MICROCHANNEL</b> .....	418
<i>A. V. Kovalev, A. A. Yagodnitsyna, A. V. Bilsky</i>	

<b>INVESTIGATION OF FORCED CONVECTION ZRO2 NANOFUID IN A CHANNEL WITH ARTIFICIAL ROUGHNESS .....</b>	<b>423</b>
<i>A. V. Minakov, D. V. Guzei, K. A. Meshkov, V. A. Zhigarev, M. I. Pryazhnikov</i>	
<b>STUDY OF THE DEPENDENCE THE THERMAL CONDUCTIVITY OF NANOFUIDS ON DIFFERENT PARAMETERS .....</b>	<b>429</b>
<i>M. I. Pryazhnikov, A. V. Minakov, D. V. Guzei, V. Ya Rudyak</i>	
<b>THE MORPHOLOGY OF CARBON-METAL COMPOSITE SYNTHESIZED IN ARC DISCHARGE .....</b>	<b>435</b>
<i>D. V. Smovzh, S. Z. Sakhapov, A. V. Zaikovskii</i>	

## **ELECTROPHYSICAL PHENOMENA IN GASEOUS AND LIQUID MEDIA**

<b>NON-LINEAR MEMRISTOR SWITCHING MODEL.....</b>	<b>440</b>
<i>A. A. Chernov, D. R. Islamov, A. A. Pik'Nik</i>	
<b>DUST PARTICLES IN A SPHERICAL GLOW DISCHARGE.....</b>	<b>446</b>
<i>A. V. Fedoseev, S. A. Novopashin, S. Z. Sakhapov, G. I. Sukhinin</i>	
<b>APPLICATION OF DISSIPATION-FREE NUMERICAL METHOD CABARET FOR SOLVING GASDYNAMICS OF COMBUSTION AND DETONATION.....</b>	<b>452</b>
<i>M. F. Ivanov, A. D. Kiverin, S. G. Pinevich, I. S. Yakovenko</i>	
<b>DENSITY DEPENDENCE OF DIELECTRIC PERMITTIVITY OF WATER AND ESTIMATION OF THE ELECTRIC FIELD FOR THE BREAKDOWN INCEPTION.....</b>	<b>461</b>
<i>D. I. Karpov, D. A. Medvedev</i>	
<b>STREAMERS AND PARTIAL DISCHARGES IN WATER.....</b>	<b>467</b>
<i>S. M. Korobeynikov, A. V. Melekhov</i>	
<b>SIMULATION OF WAVES OF PARTIAL DISCHARGES IN A CHAIN OF GAS INCLUSIONS LOCATED IN CONDENSED DIELECTRICS.....</b>	<b>473</b>
<i>A. L. Kupershtokh, D. I. Karpov</i>	
<b>INDUCTIVE DISCHARGE AS A METHOD FOR DIRECT DETECTION OF IMPURITIES IN WATER.....</b>	<b>479</b>
<i>R. N. Medvedev, D. S. Churkin, I. A. Zarubin</i>	

## **HEAT TRANSFER AND HYDRODYNAMICS IN INDUSTRIAL PROCESSES AND ENVIRONMENT PROTECTION**

<b>EXPERIMENTAL AND COMPUTATIONAL STUDY AND DEVELOPMENT OF THE BITUMINOUS COAL ENTRAINED-FLOW AIR-BLOWN GASIFIER FO IGCC .....</b>	<b>484</b>
<i>N. A. Abaimov, P. V. Osipov, A. F. Ryzhkov</i>	
<b>MODELING OHMIC HEATING IN THE DRYING ZONE OF THE PLASMA SHAFT ELECTRIC FURNACE, WHEN RECYCLING THE TECHNOGENIC WASTE .....</b>	<b>490</b>
<i>A. I. Alifjerov, A. S. Anshakov, V. A. Sinitsyn, P. V. Domarov, A. A. Danilenko</i>	
<b>ANALYTICAL CALCULATION OF ADIABATIC PROCESSES IN REAL GASES .....</b>	<b>494</b>
<i>I. B. Amarskaja, V. S. Belousov, P. S. Filippov</i>	
<b>SIMULATION OF PERMAFROST CHANGES DUE TO TECHNOGENIC INFLUENCES OF DIFFERENT ENGINEERING CONSTRUCTIONS USED IN NOTHERN OIL AND GAS FIELDS .....</b>	<b>498</b>
<i>M. Yu Filimonov, N. A. Vaganova</i>	
<b>EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER EFFICIENCY ON THE CONVEX SURFACE OF THE ANNULAR CHANNEL OF VARYING GEOMETRY INTENSIFIERS .....</b>	<b>504</b>
<i>A. T. Komov, A. V. Varava, A. V. Zakharenkov, A. V. Dedov, E. A. Boltenko, B. Y. Agishev</i>	
<b>COMPARATIVE ANALYSIS OF THE INFLUENCE OF TURBULENCE MODELS ON THE DESCRIPTION OF THE NITROGEN OXIDES FORMATION DURING THE COMBUSTION OF SWIRLING PULVERIZED COAL FLOW .....</b>	<b>512</b>
<i>V. Kuznetsov, N. Chernetskaya, M. Chernetskiy</i>	
<b>STUDY OF THE TWO-STAGE GASIFICATION PROCESS OF PULVERIZED COAL AT THE HYDRODYNAMIC FLOW SEPARATION.....</b>	<b>518</b>
<i>V. Kuznetsov, M. Chernetskiy, A. Ryzhkov</i>	
<b>EXPERIMENTAL STUDY OF FLUID DYNAMICS IN THE PEBBLE BED IN A RADIAL COOLANT FLOW.....</b>	<b>524</b>
<i>Y. V. Smorchkova, A. N. Varava, A. V. Dedov, A. T Komov</i>	

<b>NUMERICAL ANALYSIS OF EXPERIMENTS WITH GAS INJECTION INTO LIQUID METAL COOLANT</b> .....	529
<i>E. V. Usov, P. D. Lobanov, N. A. Pribaturin, N. A. Mosunova, V. I. Chuhno, A. E. Kutlimetov</i>	
<b>SIMULATION OF OPTIMAL EXPLOITATION OF AN OPEN GEOTHERMAL LOOP</b> .....	534
<i>N. A. Vaganova, M. Yu Filimonov</i>	
<b>Author Index</b>	