

# **Thermophysical Basis of Energy Technologies 2015**

**EPJ Web of Conferences Volume 76 (2015)**

**Tomsk, Russia  
10-12 October 2015**

**Editor:**

**G. Kuznetsov**

**ISBN: 978-1-63439-327-0**

**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.**

This work is licensed under a Creative Commons Attribution license:  
<http://creativecommons.org/licenses/by/2.0/>

**You are free to:**

**Share** – copy and redistribute the material in any medium or format.

**Adapt** – remix, transform, and build upon the material for any purpose, even commercial.

The licensor cannot revoke these freedoms as long as you follow the license terms.

**Under the following terms:**

You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. The copyright is retained by the corresponding authors.

Printed by Curran Associates, Inc. (2014)

For additional information, please contact EDP Sciences – Web of Conferences  
at the address below.

EDP Sciences – Web of Conferences  
17, Avenue du Hoggar  
Parc d'Activité de Courtabœuf  
BP 112  
F-91944 Les Ulis Cedex A  
France

Phone: +33 (0) 1 69 18 75 75

Fax: +33 (0) 1 69 28 84 91

[contact@webofconferences.org](mailto:contact@webofconferences.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: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

|  |    |
|--|----|
| <b>Convective Heat Transfer in a Closed Two-phase Thermosyphon</b> .....   | 1  |
| <i>Al-Ani M. A.</i>  |    |
| <b>The Formation of Acid Rain in the Atmosphere, Adjacent to the TTP with the Joint-condensing of Sulfur Dioxide and Water Vapor</b> .....   | 8  |
| <i>Gvozdyakov D. V., Gubin V. E., Matveeva A. A.</i>   |    |
| <b>Development Methods of Steam Turbines 3D Geometry Optical Control for Effective Heat Power Equipment Quality Improvement</b> .....  | 14 |
| <i>Dvoynishnikov Sergey</i>  |    |
| <b>Heat Transfer at In-line Tube Bank Under Low-frequency Asymmetrical Impulses Impact on Fluid Flow</b> .....   | 18 |
| <i>Khaibullina Aigul, Khairullin Aidar, Sinyavin Alexey, Ilin Vladimir</i>   |    |
| <b>Experimental Study and Mathematical Simulation of the Mixed Convection in a Rectangular Area with a Local Heat Source and the Heat Sink at the External Boundaries</b> .....                                  | 21 |
| <i>Vyacheslav I. Maksimov, Nagornov Dmitriy A.</i>   |    |
| <b>Influence of Heatsink from Upper Boundary on the Industrial Premises Thermal Conditions at Gas Infrared Emitter Operation</b> .....   | 25 |
| <i>Maksimov Vyacheslav I., Nagornova Tatiana A.</i>  |    |
| <b>Numerical Modelling the Unsteady Process of Closed Rectangular Area Radiant Heating in Conjugate Formulation with Accounting Energy Distribution Along Horizontal and Vertical Enclosure Structures</b> ..... | 30 |
| <i>Nee A. E.</i>   |    |
| <b>The Analysis of Applicability of the Refractive-index-matching Method for Flow Investigation by LDA Method in Models of the Fire Chambers of Complex Geometry</b> .....                                       | 36 |
| <i>Rakhmanov Vitaly V., Kulikov Dmitry V.</i>  |    |
| <b>Definition of Dispersed Material Layer Parameters on the Porous Filtering Partition</b> .....   | 40 |
| <i>Vasilevsky Mikhail, Razva Alexander, Sevostyanov Sergey</i>   |    |
| <b>Experimental Research of Heat Transfer Conditions Influence on the Distillate Fuels Ignition Characteristics</b> .....  | 45 |
| <i>Zakharevich Arkadiy V., Belkov Nikita S.</i>  |    |
| <b>Analysis of Moist Air Unwatering by Adsorbent in Fluidized Bed for Thermal Power Stations Units Conservation</b> .....  | 49 |
| <i>Goldaev Sergey, Khushvaktov Alisher</i>   |    |
| <b>Dynamics and Heat and Mass Transfer Under Spreading of Liquid-droplet Aviation Fuel in the Atmosphere</b> .....   | 54 |
| <i>Arkhipov Vladimir, Zharova Irina, Kozlov Eugene, Tkachenko Aleksey</i>  |    |
| <b>Peculiarities of Solid Particles Separation in an Unsteady Turbulent Flow of a Pneumatic Centrifugal Classifier</b> .....   | 60 |
| <i>Zyatikov Pavel, Roslyak Alecsander</i>  |    |
| <b>Prediction of Power Semiconductors Devices Reliability Working in Cyclic Mode</b> .....   | 64 |
| <i>Kravchenko E. V., Kuznetsov G. V.</i>   |    |
| <b>Modeling the Hydrodynamics and the Process of Averaging a Highly Concentrated Granular Medium in a Mixing Hopper</b> .....  | 70 |
| <i>Shvab Alexander, Martsenko Anastasia, Martsenko Maksim</i>  |    |
| <b>Mathematical Modeling of Heat Transfer in Closed Two-phase Thermosyphon</b> .....   | 74 |
| <i>Nurpeits Atlant</i>   |    |
| <b>Errors of Optical Vitreous Silica Heat Diffusivity Determination by Pulse Method</b> .....  | 80 |
| <i>Katz M. D.</i>  |    |
| <b>Concentration Organic Components in the Hydrocarbon Fuel Particles Conditions and Characteristic of Ignition</b> .....  | 85 |
| <i>Salomatov Vladimir, Syrodoy Semen, Gutareva Nadegda</i>   |    |
| <b>The Effect of Dependence Between Vapor Heat Capacity, Specific Heat of Evaporation-condensation of Irrigating Liquid and Temperature on Thermodynamic Parameters of Processes Gases</b> .....                 | 91 |
| <i>Khromova Helen, Oparina Irene</i>   |    |
| <b>Simulation of Contact Heat and Mass Transfer in Spray and Bubbling Apparatuses</b> .....  | 94 |
| <i>Shilyaev Michael, Khromova Helen, Tolstykh Alexander</i>  |    |
| <b>Thin Helical Vortex Dynamics in Low-viscosity Liquid</b> .....  | 98 |
| <i>Agafontseva M. V., Kuibin P. A.</i>   |    |

|   |     |
|---|-----|
| <b>Mathematical Simulation of Heat Transfer Processes at the Maximum Possible Electrical Loads in Typical Light-emitting Diodes</b> .....   | 102 |
| <i>Rudenko Oleg M., Strizhak Pavel A.</i>   |     |
| <b>Conjugate Heat Transfer During Viscous Liquid Movement in the Open Cavity, Considering Its Cooling Through Outer Boundary of Back Surface</b> .....  | 108 |
| <i>Krainov A. V., Kuznetsov G. V.</i>   |     |
| <b>Mathematical Modeling of Physico-chemical Processes in the Polymerization of Multicore Cable Products</b> .....  | 114 |
| <i>Ivanova E. V., Kuznetsov G. V., Strizhak P. A.</i>   |     |
| <b>Mathematical Modeling of Heat and Mass Transfer Processes at the Ignition of a Liquid Condensed Substance by an Immersed Hot Particle</b> .....  | 119 |
| <i>Glushkov Dmitrii, Kuznetsov Genii, Strizhak Pavel</i>  |     |
| <b>Unified Low-parametrical Equation of State for Engineering Calculations of Thermodynamic Properties of Substances</b> .....  | 127 |
| <i>Kaplun Alexander, Meshalkin Arkadiy</i>  |     |
| <b>Numerical Study of the Structure Flow of the Gas-vapor Mixture in a Channel with Injection of Water Droplets</b> .....   | 131 |
| <i>Maslov Eugene, Zharova Irina, Borisov Boris, Fedotova Natalya</i>  |     |
| <b>Mathematical Simulation of Heat Transfer at Coniferous Tree Ignition by Cloud-to-ground Lightning Discharge</b> .....  | 137 |
| <i>Kuznetsov Geniy V., Baranovskiy Nikolay V.</i>   |     |
| <b>Heat Loss of Heat Pipelines in Moisture Conditions of Thermal Insulation</b> .....   | 143 |
| <i>Polovnikov V. Yu., Gubina E. V.</i>  |     |
| <b>Numerical Probability Analysis of Low-temperature Insulation Destruction Under the Condition of Periodic Duty</b> .....  | 149 |
| <i>Polovnikov V. Yu., Piskunov M. V.</i>  |     |
| <b>Evaporation of Liquefied Natural Gas in Conditions of Compact Storage Containers Heating</b> .....   | 156 |
| <i>Telgozhayeva D. S.</i>   |     |
| <b>Determination of Formal Kinetic Constants of Thermal Decomposition of Aqueous Hydrogen Peroxide Solution in a Mixture of Magnetic Powder, Based on Experimental Thermogram, Obtained in Adiabatic Conditions</b> .....       | 161 |
| <i>Zaripov Jamshed, Borisov Boris, Bondarchuk Sergey</i>  |     |
| <b>Influence of External Magnetic Field on Thermophysical Parameters of Magnetic Fluid Based on Aqueous Hydrogen Peroxide Or Ethylene Glycol with a Mixture of Lanthanum Manganite Powder and Toner Printer Cartridge</b> ..... | 165 |
| <i>Zaripov Jamshed, Borisov Boris</i>   |     |
| <b>Numerical Evaluation of the Measurement Error of Temperature by Surface Thermocouples in the Conditions of Incomplete Thermal Contact with Object of Measurement</b> .....   | 169 |
| <i>Atroshenko Yuliana K., Strizhak Pavel A.</i>   |     |
| <b>Parameters of Flow in Cyclonic Elements of Separator Battery</b> .....   | 176 |
| <i>Vasilevskiy Mihail, Zyatikov Pavel, Roslyak Alecsander, Shishmina Ludmila</i>  |     |
| <b>Modeling of a Two-phase Swirling Turbulent Flow in the Separation Chamber of the Centrifugal Apparatus</b> .....   | 181 |
| <i>Evseev Nikolay, Shvab Alexander</i>  |     |
| <b>Definition of Water Droplets "Strain Cycles" in Air Times Dependences on Their Sizes and Movement Velocities</b> .....   | 185 |
| <i>Volkov Roman, Zhdanova Alena, Zabelin Maxim, Kuznetsov Geniy, Strizhak Pavel</i>   |     |
| <b>Investigation of Water Droplets, Kerosene and Ethanol Deformation in the Air</b> .....   | 192 |
| <i>Volkov Roman, Zhdanova Alena, Strizhak Pavel</i>   |     |
| <b>The Evaporation of the Water-sodium Chlorides Solution Droplets on the Heated Substrate</b> .....  | 198 |
| <i>Orlova Evgenija, Kuznetsov Geniy, Feoktistov Dmitriy</i>   |     |
| <b>The Dynamics of a Vapour Bubble Growth Under the Boiling of a Subcooled Liquid in Low Volumes</b> .....  | 206 |
| <i>Orlova Evgenija, Kuznetsova Geniy, Feoktistovb Dmitriy</i>   |     |
| <b>Computational Simulation Characteristics Desorption in TPS Aggregates</b> .....  | 213 |
| <i>Goldaev Sergey, Khushvaktov Alisher</i>  |     |
| <b>Author Index</b>   |     |