

Thermophysical Basis of Energy Technologies 2015

EPJ Web of Conferences Volume 110 (2016)

Tomsk, Russia
13 - 15 October 2015

Editors:

G.V. Kuznetsov
P.A. Strizhak

A.O. Zhdanova
E.E. Bulba

ISBN: 978-1-5108-2057-9

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. (2016)

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-edps@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: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

DETERMINATION OF MAINTAINING TIME OF TEMPERATURE TRACES OF AEROSOL DROPLET WATER FLOWS DURING MOTION IN A FLAME	1
<i>Antonov D.V., Voitkov I.S., Strizhak P.A.</i>	
DISPERSIVENESS OF LIQUID DROPLETS SPRAYED WITH COCURRENT GAS FLOW	7
<i>Arkhipov Vladimir, Antonnikova Alexandra, Basalayev Sergey, Zharova Irina, Orlov Sergey</i>	
MATHEMATICAL MODELING OF HYDRODYNAMIC AND HEAT TRANSFER IN A TWO-PHASE THERMOSYPHON	12
<i>Nee Alexander, Nurpeiis Atlant</i>	
ADVANCED DISTRIBUTION MANAGEMENT SYSTEM	18
<i>Avazov Artur R., Sobinova Liubov A.</i>	
MATHEMATICAL MODELING OF THERMAL INFLUENCE FROM FOREST FIRE FRONT ON A CONIFEROUS TREE TRUNK	25
<i>Baranovskiy Nikolay V., Barakhnin Vladimir B., Andreeva Ksenia N.</i>	
TECHNOLOGIES OF PHYSICAL MONITORING AND MATHEMATICAL MODELING FOR ESTIMATION OF GROUND FOREST FUEL FIRE CONDITION	31
<i>Baranovskiy Nikolay V., Bazarov Alexandr V.</i>	
EVALUATION OF HEAT TRANSFER COEFFICIENTS DURING THE WATER VAPOR CONDENSATION CONTAINED IN THE FLUE GAS	37
<i>Bespalov Victor, Bespalov Vladimir, Melnikov Denis</i>	
PRODUCTION OF HEAT RESISTANT COMPOSITE BASED ON SILOXANE ELASTOMER AND MULTIWALL CARBON NANOTUBES	42
<i>Bessonov I.V., Karelina N.V., Kopitsyna M.N., Morozov A.S., Reznik S.V., Skidchenko V. Yu.</i>	
THERMOSYPHON METHOD FOR COOLING THE ROTOR BLADES OF HIGH-TEMPERATURE STEAM TURBINES	47
<i>Bogomolov Alexander R., Temnikova Elena Yu.</i>	
ENERGY AND PROPULSION OPTIMIZATION OF SOLID-PROPELLANT GRAIN OF A HYBRID POWER DEVICE	51
<i>Bondarchuk Sergey S., Bondarchuk Iliya S., Borisov Boris V., Zhukov Alexandr S.</i>	
NUMERICAL SIMULATION OF METHANE UNDER PHASE TRANSFER CONDITIONS WITH ITS REAL PROPERTIES	55
<i>Borisov Boris V., Bondarchuk Sergey S., Skryabinsky Dimitrii O., Striha Victoriya S.</i>	
FEATURES APPLICATIONS OF THE APPROACHES WHEN CONSTRUCTING EFFICIENT ALGORITHMS DURING THE MODELLING OF SOME INTRACANAL FLOWS	60
<i>Borisov Boris V.</i>	
EVAPORATION AND VAPOR FORMATION OF GRAPHITE SUSPENSIONS BASED ON WATER IN A HIGH-TEMPERATURE GAS ENVIRONMENT: AN EXPERIMENTAL INVESTIGATION	64
<i>Borisova Anastasia G., Piskunov Maxim V., Rybatskiy Kirill A.</i>	
SEPARATION OF GASES USING ULTRA-THIN POROUS LAYERS OF MONODISPERSE NANOPARTICLES	69
<i>Bubenchikov Mikhail A, Bubenchikov Alexey M, Usenko Olesya V, Poteryaeva Valentina A, Jambaa Soninbayar</i>	
COMPARATIVE ANALYSIS OF SMART METERS DEPLOYMENT BUSINESS MODELS ON THE EXAMPLE OF THE RUSSIAN FEDERATION MARKETS	75
<i>Daminov Ildar, Tarasova Ekaterina, Andreeva Tatyana, Avazov Artur</i>	
DETERMINATION OF SECTIONAL CONSTANCY OF ORGANIC COAL-WATER FUEL COMPOSITIONS	80
<i>Dmitrienko Margarita A., Nyashina Galina S., Strizhak Pavel A.</i>	
DEVELOPMENT OF ENERGY EFFICIENT TECHNOLOGIES FOR BURNING COAL IN MODERN THERMAL POWER PLANTS AND EFFICIENCY ASSESSMENT TOOLS	86
<i>Dubrovskiy Vitali, Zubova Marina, Sedelnikov Nikolai, Dihnova Anna</i>	
SPREADING MODES ON COPPER AND STEEL SURFACES	89
<i>Feoktistov Dmitry, Orlova Evgeniya, Islamova Anastasiya</i>	
NUMERICAL RESEARCH OF STEAM AND GAS PLANT EFFICIENCY OF TRIPLE CYCLE FOR EXTREME NORTH REGIONS	93
<i>Galashov Nikolay, Tsibulskii Svyatoslav, Matveev Aleksandr, Masjuk Vladimir</i>	

SOLVING HEAT CONDUCTION PROBLEMS IN MOVABLE BOUNDARY DOMAINS UNDER INTENSIVE PHYSICAL-CHEMICAL TRANSFORMATION CONDITIONS	98
<i>Garashchenko A.N., Rudzinsky V.P., Garashchenko N.A.</i>	
KINETIC CHARACTERISTICS OF IGNITION DISPERSED CONDENSED SUBSTANCE SINGLE HEATED TO A HIGH TEMPERATURE OF THE PARTICLES	103
<i>Glushkov Dmitriy O., Zakharevich Arkadiy V., Tsybalov Dmitriy N.</i>	
SYNTHESIS OF ULTRADISPERSE CARBON DIOXIDE POWDER WITH PLASMA-DYNAMIC METHOD IN THE COAXIAL MAGNETO-PLASMA ACCELERATOR	110
<i>Golyanskaya Evgeniya. O., Sivkov Aleksandr A., Anikina Zhanna S.</i>	
INITIATION OF IGNITION OF HIGHLY FUEL PARTICLES IN THE FLOW OF HIGH TEMPERATURE MEDIUM	114
<i>Syrodoy S.V., Gutareva N.Y., Salomatov V.V.</i>	
THE REVIEW OF IGNITION AND COMBUSTION PROCESSES FOR WATER-COAL FUELS	122
<i>Igorov R.I., Strizhak P.A., Chernetskiy M.Yu.</i>	
INFLUENCE OF THE AIR LAYER BETWEEN THE CONDUCTOR AND THE LAYER OF INSULATING MATERIAL IN CABLE PRODUCTS	135
<i>Ivanova Evgenia V., Yashutina Olga S., Shidlovskiy Stanislav V.</i>	
MODELING OF HYDRODYNAMICS OF A HIGHLY CONCENTRATED GRANULAR MEDIUM ON THE BASIS OF A POWER-LAW	139
<i>Shvab Alexander, Kagenova Natalia</i>	
INFLUENCE PULSE DURATION METHODICAL ERROR OF DETERMINATION OF THERMAL TRANSLUCENT MATERIALS LASER FLASH METHOD	142
<i>Katz Mark M., Katz Ilija M.</i>	
THE OUTLOOK FOR LOW-GRADE FUELS IN TOMSK REGION: RESEARCH EXPERIENCE AT TOMSK POLYTECHNIC UNIVERSITY	146
<i>Khaustov Sergei A., Kazakov Alexander V., Cherkashina Galina A., Sobinova Liubov A.</i>	
DIFFUSION COEFFICIENT WHEN FINE AEROSOL MEDIA PROPAGATE IN A CONFINED VOLUME	151
<i>Korovina N.V., Zharova I.K., Kudryashova O.B., Titov S.S.</i>	
CONJUGATE HEAT TRANSFER DURING VISCOUS INCOMPRESSIBLE LIQUID MOVEMENT IN THE CAVITY CONSIDERING ITS COOLING THROUGH OUTER BOUNDARY	157
<i>Krainov A.V., Arhipov V.A.</i>	
PROTECTIVE EFFECTIVENESS OF POROUS SHIELDS UNDER THE INFLUENCE OF HIGH-SPEED IMPACT LOADING	163
<i>Kramshonkov E.N., Krainov A.V., Shorohov P.V.</i>	
NUMERICAL ANALYSIS OF INFLUENCE OF THICKNESS OF LIQUID FILM ON BOTTOM COVER TO HEAT TRANSFER IN THERMOSYPHON IN CONDITIONS EMERGENCY MODES OF WORK THE RECHARGEABLE BATTERIES OF AIRCRAFTS	169
<i>Krasnoshlykov A.S.</i>	
NEW APPROACH TO MICROCLIMATE PARAMETER SELECTION FOR THE PRODUCTION AREA WITH HEAT SUPPLY SYSTEMS BASED ON GAS INFRARED RADIATORS	174
<i>Kurilenko N. I., Kurilenko E. Yu., Mamontov G. Ya</i>	
ASSESSMENT OF EFFICIENCY OF REGENERATIVE HEATING SYSTEM OF FEED WATER FOR HIGH TEMPERATURE TURBINE PLANT ON DECENTRALIZED POWER ENGINEERING FACILITIES	178
<i>Larionov Kirill, Gvozdjakov Dmitriy, Zenkov Andrej, Zaytsev Vladimir</i>	
MULTI-CRITERIA OPTIMIZATION OF REFINERY	183
<i>Livshits Mikhail Yu., Sizikov Aleksandr P.</i>	
OPTIMAL CONTROL OF TEMPERATURE MODES OF THE INSTRUMENTAL CONSTRUCTIONS OF AUTONOMOUS OBJECTS	187
<i>Livshits Mikhail Yu., Borodulin Boris.B.</i>	
CONNECTION BETWEEN INTERNAL STRUCTURAL STRESSES OF THE IST AND THE IIND KIND AND OPERATIONAL RELIABILITY OF THE BOILER HEATING SURFACE	192
<i>Lyubimova Lyudmila, Tabakaev Roman, Tashlykov Alexander, Zavorin Alexander, Zyubanov Vadim</i>	
CONJUGATE HEAT TRANSFER IN A CLOSED VOLUME WITH THE LOCAL HEAT SOURCES AND NON-UNIFORM HEAT DISSIPATION ON THE BOUNDARIES OF HEAT CONDUCTING WALLS	199
<i>Maksimov Vyacheslav I., Nagornova Tatiana A., Glazyrin Viktor P.</i>	
HIGH-TEMPERATURE HEATING OF LIQUID IN A ROUND TUBE IN TERMS OF AXIAL HEAT CONDUCTION	205
<i>Medvedev G.</i>	

DISSOCIATION OF NATURAL AND ARTIFICIAL METHANE HYDRATE	209
<i>Misyura S. Y.</i>	
INFLUENCE OF AIR GAP BETWEEN THE TRANSFORMER OF RESISTANCE AND OBJECT OF MONITORING ON TEMPERATURE MEASUREMENT ERROR.....	212
<i>Atroshenko Yuliana K., Bychkova A.A.</i>	
ANALYSIS OF INFLUENCE OF HEAT INSULATION ON THE THERMAL REGIME OF STORAGE TANKS WITH LIQUEFIED NATURAL GAS	218
<i>Maksimov Vyacheslav I., Nagornova Tatiana A., Glazyrin Viktor P., Shestakov Igor A.</i>	
NUMERICAL MODELING OF CONJUGATE THERMOGRAVITATIONAL CONVECTION IN A CLOSED SYSTEM WITH A RADIANT ENERGY SOURCE IN CONDITIONS OF CONVECTIVE-RADIATIVE HEAT EXCHANGE AT THE EXTERNAL BOUNDARY.....	226
<i>Nee Alexander</i>	
MATHEMATICAL DESCRIPTION OF AN ASYNCHRONOUS MOTOR WITH THE INDIRECT CONTROL OF THE OUTPUT MECHANICAL VARIABLES.....	231
<i>Glazachev A.V., Dementyev Yu. N., Negodin K.N., Umursakova A.D.</i>	
MATHEMATICAL MODELLING OF FORCE CONVECTION IN A TWO-PHASE THERMOSYPHON IN CONJUGATE FORMULATION.....	237
<i>Nurpeiis Atlant, Nee Alexander</i>	
EXPERIMENTAL INVESTIGATION OF DROPLET EVAPORATION OF WATER WITH GROUND ADMIXTURES WHILE MOTION IN A FLAME OF LIQUID FUEL.....	244
<i>Dmitriyenko Margarita A., Nyashina Galina S., Zhdanova Alena O., Vysokomornaya Olga V.</i>	
EXPERIMENTAL EVALUATION THE EFFECTIVENESS OF WATER MIST FIRE EXTINGUISHING SYSTEMS AT OIL AND GAS INDUSTRY	248
<i>Nyashina G.S., Medvedev V.V., Shevyrev S.A., Vysokomornaya O.V.</i>	
THEORETICAL RATIONALE OF HEATING BLOCK FOR TESTING BENCH OF AEROSPACE CRAFTS THERMAL PROTECTION ELEMENTS	252
<i>Petrova Anna A., Reznik Sergey V.</i>	
THERMAL MODE OF TANKS FOR STORAGE FUEL OF THERMAL POWER PLANTS AND BOILER WITH THE INFLUENCE OF ENGINEERING FACILITIES IN THE AREA OF THEIR PLACEMENT.....	257
<i>Polovnikov V.Yu., Makhsutbek F.T., Ozhikenova Zh.F.</i>	
REDUCTION OF NITROGEN OXIDES EMISSIONS FROM A COAL-FIRED BOILER UNIT.....	262
<i>Zhuikov Andrey V., Feoktistov Dmitry V., Koshurnikova Natalya N., Zlenko Lyudmila V.</i>	
MATHEMATICAL MODELING OF THERMAL MODES OF CLOSED TWO-PHASE THERMOSYPHONS WITH REFRIGERANT R600A	266
<i>Krasnoshlykov A.S., Zagromov Y.A.</i>	
THE INTENSIFICATION OF HEAT AND MASS TRANSFER PROCESSES IN THE OPERATING CONDITION OF AUTOMATIC FIRE EXTINGUISHING SYSTEMS AT OBJECTS OF POWER.....	271
<i>Vysokomornaya Olga V., Kopylov Nikolay P., Lyrschikov Sergey Yu., Dmitrienko Margarita A.</i>	
THERMOPHYSICAL REACTIVITY CONTROL OF RBMK-1000	276
<i>Vorobiev Aleksander V., Antonova Aleksandra M., Vinogradov Maksim P.</i>	
GAS CLEANING SYSTEM WITH A PRE-UNLOADING FLOW	280
<i>Vasilevsky Michail, Razva Aleksandr, Roman Baev, Alibek Asan</i>	
NEW APPROACH TO STUDY THE IGNITION PROCESSES OF ORGANIC COAL-WATER FUELS IN AN OXIDIZER FLOW	283
<i>Valiullin T.R., Dmitrienko M.A., Strizhak P.A.</i>	
APPLICATION OF PULSED HEAT BALANCE METHOD FOR DETERMINING THE CHARACTERISTICS OF CONSTRUCTION MATERIALS.....	290
<i>Troitsky O.Yu., Medvedev V.V., Chernova G.S.</i>	
THERMAL ENERGY CONSUMPTION IN THE HEAT-TECHNOLOGY PRODUCTION OF SOLID COMPOSITE FUEL FROM LOW-GRADE RAW MATERIALS	294
<i>Tabakaev Roman, Astafev Alexander, Kazakov Alexander, Zavorin Alexander</i>	
TERMS AND CHARACTERISTICS OF HOMOGENEOUS IGNITION OF COAL-WATER PARTICLES COATED WITH A WATER FILM	301
<i>Syrodoy S.V., Gutareva N.Y., Taburchinov R.I., Bugaeva K.A.</i>	
ELECTRIC EQUIPMENT DIAGNOSIS BASED ON WAVELET ANALYSIS.....	305
<i>Stavitsky Sergey A., Palukhin Nikolay E., Kobenko Juri V., Riabova Elena S.</i>	
EFFECT OF THE HEAT FLUX DENSITY ON THE EVAPORATION RATE OF A DISTILLED WATER DROP.....	309
<i>Ponomarev Konstantin, Orlova Evgeniya, Feoktistov Dmitry</i>	

THE INTERACTION POTENTIAL OF AN OPEN NANOTUBE AND ITS PERMEABILITY: MOLECULAR DYNAMICS SIMULATION	313
<i>Bubenchikov Mikhail A, Potekaev Alexander I, Bubenchikov Alexey M, Usenko Olesya V, Malozemov Alexander V, Tarasov Egor A</i>	
INVESTIGATION OF THE PROCESS OF METHANE-OXYGEN COMBUSTION IN STEAM UNDER THE ATMOSPHERIC PRESSURE	322
<i>Pribaturin N.A., Bogomolov A.R., Azikhanov S.S., Shevyrev S.A</i>	
CALCULATION OF LEVEL OF COMFORT OF THE MICRO-CLIMATE IN BUILDINGS DURING THE ESTIMATION OF THE ENERGY-SAVING MEASURES	325
<i>Prorokova M.V., Bukhmirov V.V.</i>	
APPLICATION OF A CONVECTIVE-CONDUCTIVE HEAT TRANSFER MODEL IN THE HEAT LOSS ANALYSIS OF A HEAT PIPELINE UNDER FLOODING CONDITIONS	328
<i>Polovnikov V.Yu., Razumov N.V.</i>	
THE CALCULATED RATIO OF THE GAS FLOW IN A COUNTERCURRENT CYCLONE DUST CONCENTRATOR	332
<i>Vasilevsky Michail, Razva Aleksandr, Pleschko Alissa, Kadurkin Ivan</i>	
ENERGY EFFICIENCY IMPROVEMENT SYSTEMS WITH PNEUMATIC CHAMBER PUMP	336
<i>Rodionov G.A., Buhmirov V.V.</i>	
NUMERICAL ANALYSIS OF HEAT TRANSFER IN FIRE-PROTECTIVE COATINGS DEFORMABLE UPON HEATING	341
<i>Rudzinsky V.P., Garashchenko A.N.</i>	
ANALYSIS OF THE PROPERTIES OF WORKING SUBSTANCES FOR THE ORGANIC RANKINE CYCLE BASED DATABASE "REFPROP"	346
<i>Galashov Nikolay, Tsubulskiy Svyatoslav, Serova Tatiana</i>	
SAVING OF HEATING IN A HOUSE BY MEANS OF OPTIMUM GEOMETRICAL PARAMETERS AND MATERIALS. ENERGY SAVING HOUSE PROJECT	352
<i>Tolstoukhova Valeria, Lapteva Olga</i>	
NUMERICAL MODELING OF TURBULENT SWIRLING TWO-PHASE FLOW IN A CENTRIFUGAL CLASSIFIER	356
<i>Shvab Alexander, Zyatikov Pavel, Goyko Marina</i>	
INFLUENCE OF CONDITIONS OF HEATING UP ON INTEGRAL CHARACTERISTICS OF HEAT TRANSFER IN THE SENSITIVE ELEMENT OF THE THERMOCONJUGATE SENSOR	360
<i>Atroshenko Yuliana K., Abramova Anna V.</i>	
INFLUENCE OF THE WALL ON THE BOILING REGIME	366
<i>Misyura S. Y.</i>	
NUMERICAL INVESTIGATION OF THE MAIN CHARACTERISTICS OF HEAT AND MASS TRANSFER WHILE HEATING THE HETEROGENEOUS WATER DROPLET IN THE HOT GASES	369
<i>Piskunov Maxim V., Shcherbinina Anastasia A., Vysokomornaya Olga V.</i>	
DISPOSAL OF LIQUID COMBUSTIBLE WASTES USING FLAMELESS BURNERS WITH POROUS CARBON MATRIX	373
<i>Dolgov Sergei, Savchenko Evgenii, Khaustov Sergei, Tabakaev Roman, Zavorin Alexander</i>	
SPATIAL MATHEMATICAL MODEL OF HEAT TRANSFER IN HUMAN SKIN INFLUENCED BY HEATED UP TO HIGH TEMPERATURES PARTICLE	378
<i>Baranovskiy Nikolay V., Solodkin Andrey S., Stuparenko Alexandr A.</i>	
SEPARATION OF PARTICLES IN SWIRLING FLOW IN COAXIAL CHANNEL	384
<i>Vasilevsky Michail, Zyatikov Pavel, Deeva Vera, Kozyrev Ilya</i>	
ABILITY OF FULLERENE TO ACCUMULATE HYDROGEN	388
<i>Bubenchikov Mikhail A, Bubenchikov Alexey M, Usenko Olesya V, Tsyrenova Valentina B, Budaev Sanghi O</i>	
PERMEABILITY OF ULTRA-THIN AMORPHOUS CARBON FILMS	395
<i>Bubenchikov Mikhail A., Bubenchikov Aleksey M., Usenko Olesya V., Ukolov Anton V.</i>	
EXPERIMENTAL ANALYSIS OF THE FEASIBILITY OF POLYDISPERSE DROPLET WATER FLOW USING AT FIRE EXTINGUISHING	401
<i>Voitkov Ivan S., Zabelin Maxim V., Zhdanova Alena O.</i>	
NUMERICAL ANALYSIS OF INTEGRAL CHARACTERISTICS FOR THE CONDENSER SETUPS OF INDEPENDENT POWER-SUPPLY SOURCES WITH THE CLOSED-LOOPED THERMODYNAMIC CYCLE	405
<i>Vysokomorny Vladimir S., Vysokomornaya Vladimir S.</i>	
PROPAGATION OF THE ULTRA-SHORT LASER PULSES THROUGH THE HELICAL 1D PHOTONIC CRYSTAL STRUCTURE WITH TWIST DEFECT	414
<i>Antonov Dmitrii V., Iegorov Roman</i>	

DETERMINING RELIABILITY PARAMETERS FOR A CLOSED-CYCLE SMALL COMBINED HEAT AND POWER PLANT	418
<i>Vysokomorny Vladimir S., Vysokomornaya Olga V., Piskunov Maxim V.</i>	
INVESTIGATION OF THE EXTINGUISHING FEATURES FOR LIQUID FUELS AND ORGANIC FLAMMABLE LIQUIDS ATOMIZED BY A WATER FLOW	423
<i>Voytkov Ivan V., Zabelin Maksim V., Vysokomornaya Olga V.</i>	
MATHEMATICAL SIMULATION OF HEAT FLOWS IN A BUILDING IN CASE OF HEAT SUPPLY FAILURE	429
<i>Morozov Maxim N.</i>	
Author Index	