

# **Joint 12th International Conference: Two-Phase Systems for Space and Ground Applications and 2nd International School of Young Scientists “Interfacial Phenomena and Heat Transfer” 2017**

Journal of Physics: Conference Series Volume 925

Novosibirsk, Russia  
11 - 16 September 2017

## **Editors:**

**Oleg Kabov  
Yuriy Lyulin  
Dmitry Zaitsev**

ISBN: 978-1-5108-5272-3  
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© (2017) 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. (2017)

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

## Volume 925

**Joint 12th International Conference: "Two-Phase Systems for Space and Ground Applications" and 2nd International School of Young Scientists "Interfacial Phenomena and Heat Transfer" 11–16 September 2017, Novosibirsk, Russian Federation**

**Accepted papers received: 1 November 2017**

**Published online: 9 November 2017**

### **Preface**

[Joint 12th International Conference: "Two-Phase Systems for Space and Ground Applications" and 2nd International School of Young Scientists "Interfacial Phenomena and Heat Transfer"](#)

[Peer review statement](#)

### **Papers**

[Convective fluid flows in a horizontal channel with evaporation: analytical and experimental investigations](#)

Y V Lyulin and E V Rezanova.....1

[Experimental determination of the hydraulic resistance coefficient at the microchannel inlet](#)

V M Aniskin.....5

[Model and on-orbit study of the International space station contamination processes by jets of its orientation thrusters](#)

V N Yarygin, Yu I Gerasimov, A N Krylov, V G Prikhodko, A Yu Skorovarov and I V Yarygin.....9

[Drying droplet deposited on poor wetting substrate: beyond the lubrication approximation](#)

P Lebedev-Stepanov, S Efimov and A Kobelev.....15

[Equilibrium shape of dry spot in isothermal liquid film on a horizontal substrate](#)

L I Maltsev, Y S Podzharov and O A Kabov.....20

[Fluid flow inside and outside an evaporating sessile drop](#)

C Bouchenna, M Aitsaada, S Chikh and L Tadriss.....25

[Cooling of a microchannel with thin evaporating liquid film sheared by dry gas flow](#)

Yu O Kabova and V V Kuznetsov.....30

[Experimental-calculated study of the forced convection magnetic nanofluids](#)

D V Guzei, A V Minakov and M I Pryazhnikov.....36

[Damage to formation surrounding flooding wells: modelling of suspension filtration with account of particle trapping and mobilization](#)

S A Boronin, K I Tolmacheva, A A Osipov, A N Sitnikov, A A Yakovlev, B V Belozarov, E V Belonogov and R R Galeev.....42

[Varieties of the gas driven water rivulet flow regimes in the minichannels](#)

O V Svetlichnaya, V V Cheverda and E. O. Kirichenko.....48

[Experimental study and empirical prediction of fuel flow parameters under air evolution conditions](#)

E E Kitanina, E L Kitanin, D A Bondarenko, P A Kravtsov, M M Peganova, S G Stepanov and V L Zherebzov.....53

[Thermocapillary structures in a heated liquid film](#)

S P Aktershev and E A Chinnov.....59

[Evaporation and condensation of rarefied gas between two parallel condensed phases](#)

A Polikarpov and I Graur.....63

[Thermography of flame during diesel fuel combustion with steam gasification](#)

I S Anufriev, S S Arsenyev, M V Agafontsev, E P Kopyev, E L Loboda, E Yu Shadrin and O V Sharypov.....67

[Numerical simulation of heat transfer at unsteady heat generation in falling wavy liquid films](#)

A N Chernyavskiy and A N Pavlenko.....73

[Contact line motion over heated substrates with spatially nonuniform wetting properties](#)

V S Ajaev and E Ya Gatapova.....77

[Structure of gels layers with cells](#)

B G Pokusaev, S P Karlov, A V Vyazmin, D A Nekrasov, N S Zakharov, D P Khramtsov, D A Skladnev and D V Tyupa.....83

[Synthesis of silicon oxide micropores on the copper substrate with SiO<sub>2</sub> interlayer](#)

E Baranov, S Khmel, A Zamchiy and E Shatskiy.....89

[Comparison study on the calculation formula of evaporation mass flux through the plane vapour-liquid interface](#)

L Zhang, Y R Li, L Q Zhou and C M Wu.....93

[Investigation of high frequency external perturbation effects on flow in a T-shape microchannel by  \$\mu\$ LIF technique](#)

A Yu Kravtsova, Yu E Meshalkin and A V Bilsky.....99

[Numerical investigation of thin film of polar liquid with added surfactant](#)

V Y Gordeeva and A V Lyushnin.....104

[Features of liquid fuel burning in a narrow channel](#)

V V Zamaschikov and E A Chinnov.....110

[Numerical modelling and experimental study of liquid evaporation during gel formation](#)

B G Pokusaev and D P Khramtsov.....115

[Experimental and theoretical investigation of the mechanism of flame propagation above the surface of combustible liquid moving under the action of an oxidant in microchannels](#)

Yu O Kabova, V V Kuznetsov, V V Zamashchikov, E A Chinnov and O A Kabov.....120

[Foam flows through a local constriction](#)

T Chevalier, J Koivisto, N Shmakova, M J Alava, A Puisto, C Raufaste and S Santucci.....126

[Experimental investigation of picoliter liquid drops evaporation on a heated solid surface](#)

D P Kirichenko, D V Zaitsev and O A Kabov.....132

[Experimental study of cleaning aircraft GTE fuel injectors using a vortex ejector](#)

O A Evdokimov, Sh A Piralishvili, S V Veretennikov and A A Elkes.....136

[The thermocapillary deformations in the locally heated shear-driven liquid film flowing in minichannel](#)

V V Cheverda.....142

[Study of pool boiling of distilled water on SiO<sub>2</sub> nanoparticle-coated wire](#)

M I Pryazhnikov and A V Minakov.....147

[The effect of dry spots on heat transfer in a locally heated liquid film moving under the action of gas flow in a channel](#)

D V Zaitsev, E M Tkachenko and E F Bykovskaya.....153

[Numerical investigation of flow dynamics and scalar transport in a wall-bounded turbulent jet](#)

M Hrebtov, A Bazhenov and K Borynyak.....158

[Research on droplets growth of Marangoni condensation during the time-series process](#)

Y Li, J Wang, K Xia, N Chen and J Yan.....164

[Enhancement of heat transfer at pool boiling on surfaces with silicon oxide nanowires](#)

E A Chinnov, E N Shatskiy, S Ya Khmel, E A Baranov, A O Zamchiy, V V Semionov and O A Kabov.....169

[Two-phase flow regimes in a horizontal microchannel with the height of 50  \$\mu\text{m}\$  and width of 10 mm](#)

V P Fina and F V Ronshin.....173

[Study of microwave drying of wet materials based on one-dimensional two-phase model](#)

VI V Salomatov and V A Karelin.....179

[The drop evaporation on a heated substrate with single wall nanotubes coating](#)

A A Semenov and D V Zaitsev.....184