# XX Winter School on Continuous Media Mechanics 2017

IOP Conference Series: Materials Science and Engineering Volume 208

Perm, Russia 13 – 16 February 2017

ISBN: 978-1-5108-4223-6 ISSN: 1757-8981 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

#### 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**

### Volume 208

Winter School on Continuous Media Mechanics13–16 February 2017, Perm, Russian Federation

Accepted papers received: 1 June 2017 Published online: 8 June 2017

### Preface

011001 OPEN ACCESS Winter School on Continuous Media Mechanics

011002 OPEN ACCESS Peer review statement

### Papers

012001 OPEN ACCESS Jet formation at interaction of a vibrating plate with liquid

V A Aleksandrov, S P Kopysov and L Y Tonkov.....1

012002 OPEN ACCESS Mathematical Simulation of the Problem of the Pre-Critical Sandwich Plate Bending in Geometrically Nonlinear One Dimensional Formulation

I B Badriev, V V Banderov and M V Makarov.....9

012003 OPEN ACCESS Conversion of elastic waves as a result of diffraction in anisotropic layer

Y N Belyayev....16

012004 OPEN ACCESS On static contact of belt and different pulleys

A K Belyaev, V V Eliseev, H Irschik and E A Oborin....23

012005 OPEN ACCESS Investigation of deformation of elements of three-dimensional reinforced concrete structures located in the soil, interacting with each other through rubber gaskets

D V Berezhnoi, I S Balafendieva, A A Sachenkov and L R Sekaeva.....31

012006 OPEN ACCESS Investigation of the processes of deformation of super flywheels made by packing its layers on each other

D V Berezhnoi and L R Gajnulina.....37

012007 OPEN ACCESS Elastic properties of magnetorheological elastomer: description with the two-particle mesoscopic model

A M Biller, O V Stolbov and Yu L Raikher.....45

012008 OPEN ACCESS Influence of particle size distribution on nanopowder cold compaction processes

G Boltachev, N Volkov, K Lukyashin, V Markov and E Chingina.....53

012009 OPEN ACCESS Aeroelastic stability of cylindrical shells interacting with internal annular fluid flow

S A Bochkarev and S V Lekomtsev.....60

012010 OPEN ACCESS Exact solutions for layered large-scale convection induced by tangential stresses specified on the free boundary of a fluid layer

N.V. Burmasheva and E.Yu. Prosviryakov.....68

012011 OPEN ACCESS <u>Numerical simulation of helical flow in a cylindrical channel</u>

A Vasiliev, A Sukhanovskii and R Stepanov.....75

012012 OPEN ACCESS The study of the dissipation heat flow and the acoustic emission during the fatigue crack propagation in the metal

A N Vshivkov, A Yu Iziumova, I A Panteleev, A E Prokhorov, A V Ilinykh, V E Wildemann and O A Plekhov.....83

012013 OPEN ACCESS Experimental study of evaluation of mechanical parameters of heterogeneous porous structure

O Gerasimov, E Koroleva and O Sachenkov.....91

012014 OPEN ACCESS Investigation of epoxy matrix viscosity in the initial stage of its formation

V G Gilev, A V Kondyurin and S V Rusakov.....97

012015 OPEN ACCESS Conjecture on reflectionlessness of blood-vascular system as a wave-conducting medium

D S Goldobin and I A Mizeva.....104

012016 OPEN ACCESS Influence of geometrical parameters on convective flows in non-uniformly heated cylindrical fluid layers

A. Evgrafova, A. Sukhanovskii, M. Kuchinskii and E. Popova.....112

012017 OPEN ACCESS Spatial localization of nonlinear waves spreading in materials in the presence of dislocations and point defects

V I Erofeev, A V Leontieva and A O Malkhanov.....118

012018 OPEN ACCESS Numerical studies of the polymer melt flow in the extruder screw channel and the forming tool

S V Ershov and N M Trufanova.....126

012019 OPEN ACCESS The numerical study of the coextrusion process of polymer melts in the cable head

M V Kozitsyna and N M Trufanova.....134

012020 OPEN ACCESS Numerical modeling of mechanical behavior of multilayered composite plates with defects under static loading

V V Korepanov and G S Serovaev.....142

012021 OPEN ACCESS Some models of viscous gas dynamics

I I Lipatov.....148

012022 OPEN ACCESS UDV study of a liquid metal vortex flow

G Losev, R Khalilov and I Kolesnichenko.....154

012023 OPEN ACCESS Vibration effect on the Soret-induced convection of ternary mixture in a rectangular cavity heated from below

T P Lyubimova and N A Zubova.....161

012024 OPEN ACCESS Numerical modelling of meniscus deformations and flows in a liquid bridge subjected to axial vibrations

T P Lyubimova, Ya N Parshakova and R V Skuridin.....168

012025 OPEN ACCESS Structure of critical perturbations in a horizontal layer of melted water with the prescribed heat flux at the boundaries

V A Sharifulin and T P Lyubimova.....174

012026 OPEN ACCESS Transport of dissolved gases through unsaturated porous media

B S Maryshev.....180

012027 OPEN ACCESS Phase coherence of 0.1 Hz microvascular tone oscillations during the local heating

I A Mizeva.....187

012028 OPEN ACCESS Modeling of deformation of ground media on the basis of the particle method in a twodimensional formulation

D V Berezhnoi, N F Gabsalikova, V G Izotov and V V Miheev.....195

012029 OPEN ACCESS Effect of the universal acid-base indicator on the formation of the concentrationdependent diffusion instability

E A Mosheva and A V Shmyrov.....202

012030 OPEN ACCESS <u>A search for optimal parameters of resonance circuits ensuring damping of electroelastic</u> <u>structure vibrations based on the solution of natural vibration problem</u>

D Oshmarin, N Sevodina, M Iurlov and N Iurlova.....208

012031 OPEN ACCESS Eddy current flowmeter for sodium flow

A Pavlinov, R Khalilov, A Mamikyn and I Kolesnichenko.....217

012032 OPEN ACCESS Aeroacoustic investigations of subsonic jet in PNRPU anechoic chamber

V V Palchikovskiy, I V Khramtsov, V V Ershov, D A Gornova and A A Selivanova.....225

012033

OPEN ACCESS

Specific interface area in a thin layer system of two immiscible liquids with vapour generation at the contact interface

Anastasiya V Pimenova, Ilias M Gazdaliev and Denis S Goldobin.....231

012034 OPEN ACCESS The adhesive and antiadhesive non-local interaction of solids

V Presnetsova, S Romashin, L Frolenkova, V Shorkin and S Yakushina.....239

012035 OPEN ACCESS Exact Solutions for Stationary and Unsteady Layered Convection of a Viscous Incompressible Fluid with the Specified Velocities at the Bottom

E Yu Prosviryakov and L F Spevak.....246

012036 OPEN ACCESS Modeling the behaviour of shape memory materials under large deformations

A A Rogovoy and O S Stolbova.....252

012037 OPEN ACCESS Hierarchical modeling of deformation and damage of metal matrix composite under uniaxial loading conditions

S V Smirnov, A V Konovalov, M V Myasnikova, Yu V Khalevitsky and A S Smirnov.....260

012038 OPEN ACCESS Kinematic dynamo in a tetrahedron composed of helical Fourier modes

R. Stepanov and F. Plunian.....266

012039 OPEN ACCESS <u>Heat transfer in an infinite layer with fractal distribution of heating elements</u>

V Titov and R Stepanov.....271

012040 OPEN ACCESS Instability of cyclonic convective vortex

A Sukhanovskii, A Evgrafova and E Popova.....277

012041 OPEN ACCESS Thermal convection of liquid metal in the titanium reduction reactor

A Teimurazov, P Frick and F Stefani.....284

012042 OPEN ACCESS <u>A comparison of the two approaches of the theory of critical distances based on linearelastic and elasto-plastic analyses</u>

A I Terekhina, O A Plekhov, A A Kostina and L Susmel.....292

012043 OPEN ACCESS <u>A functional-type a posteriori error estimate of approximate solutions for Reissner-</u> <u>Mindlin plates and its implementation</u>

Maxim Frolov and Olga Chistiakova.....300

012044 OPEN ACCESS Natural convection in a liquid metal locally heated from above

R Khalilov, I Kolesnichenko, A Teimurazov, A Mamykin and P Frick.....308

012045 OPEN ACCESS Investigation of vortex ring formation with account of generator piston motion

I V Khramtsov, VV Palchikovskiy, A A Siner and Yu V Bersenev.....316

012046 OPEN ACCESS Numerical estimation of various influence factors on a multipoint hydrostatic leveling system

R V Tsvetkov, V V Yepin and A P Shestakov.....325

012047 OPEN ACCESS On location of piezoelectric element in a smart-structure: numerical investigation and experiment

D Oshmarin and M Iurlov.....333