9th International Symposium on Cavitation (CAV2015)

Journal of Physics: Conference Series Volume 656

Lausanne, Switzerland 6 - 10 December 2015

ISBN: 978-1-5108-1730-2 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© (2015) 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

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 Web: www.proceedings.com

Table of contents

Volume 656

9th International Symposium on Cavitation (CAV2015) 6–10 December 2015, Lausanne, Switzerland

Accepted papers received: 21 October 2015 Published online: 3 December 2015

Preface

011001

<u>9th International Symposium on Cavitation (CAV2015)</u> OPEN ACCESS M Farhat and A Müller

011002

Peer review statement OPEN ACCESS

Papers

Biomedical applications

012001

Estimation of mechanical properties of gelatin using a microbubble under acoustic radiation force OPEN ACCESS Eriko Shirota and Keita Ando pg. 1

012002

The role of encapsulated microbubbles in the diagnosis of stenosis in arteries OPEN ACCESS Karuna Agarwal and Dhiman Chatterjee pg. 5

012003

<u>Development of a confocal ultrasound device using an inertial cavitation control for</u> <u>transfection *in-vitro* OPEN ACCESS J L Mestas, K Chettab, S Roux, F Prieur, M Lafond, C Dumontet and C Lafon pg. 9</u>

<u>Bubble Dynamics in Laser Lithotripsy</u> OPEN ACCESS Milad Mohammadzadeh, Julian Martinez Mercado and Claus-Dieter Ohl pg. 13

012005

Intensely oscillating cavitation bubble in microfluidics OPEN ACCESS Ohl Siew-Wan, Tandiono, Evert Klaseboer, Ow Dave, Andre Choo and Ohl Claus-Dieter pg. 17

012006

Tracking the deformation of a tissue phantom induced by ultrasound-driven bubble oscillations OPEN ACCESS M Tinguely, O K Matar and V Garbin pg. 21

012007

Acoustic methods for cavitation mapping in biomedical applications OPEN ACCESS M Wan, S Xu, T Ding, H Hu, R Liu, C Bai and S Lu pg. 25

012008

Photoacoustic cavitation for theranostics: mechanism, current progress and applications OPEN ACCESS Y Feng, D Qin and M Wan pg. 29

012009

Relationship between thrombolysis efficiency induced by pulsed focused ultrasound and cavitation bubble size OPEN ACCESS S Xu, X Liu, S Wang and M Wan pg. 33

Bubble dynamics and nucleation

012010

Growth and Collapse of a Single Bubble near a Plate by Spark Discharge in Water OPEN ACCESS I Akcam, K Inaba, K Takahashi and K Kishimoto pg. 37

012011

Numerical and experimental study of shock-driven cavity collapse OPEN ACCESS M R Betney, P A Anderson, H Doyle, B Tully, N A Hawker and Y Ventikos pg. 41

Dynamics of a vapor nanobubble collapsing near a solid boundary OPEN ACCESS Francesco Magaletti, Mirko Gallo, Luca Marino and Carlo Massimo Casciola pg. 45

012013

Acting Force Mechanism of a Body Crossing the Water Layer of a Cavity OPEN ACCESS Weiqi Chen, Baoshou Wang, Kai Yan and Shiming Sun pg. 49

012014

Cavitation due to an impacting sphere OPEN ACCESS K L de Graaf, P A Brandner, B W Pearce and J Y Lee pg. 53

012015

Bubble breakup in a turbulent shear layer OPEN ACCESS P A Brandner, A D Henderson, K L de Graaf and B W Pearce pg. 57

012016

<u>First Iterative Solution of the Thermal Behaviour of Acoustic Cavitation Bubbles in the</u> <u>Uniform Pressure Approximation</u> OPEN ACCESS Can F Delale and Şenay Pasinlioğlu pg. 61

012017

<u>Cavitation-induced fragmentation of an acoustically-levitated droplet</u> OPEN ACCESS Silvestre Roberto Gonzalez Avila and Claus-Dieter Ohl pg. 65

012018

<u>Transport of micro-bubbles in turbulent shear flows</u> OPEN ACCESS P Gualtieri, F Battista and C M Casciola pg. 69

012019

Numerical investigations of single bubble oscillations generated by a dual frequency excitation OPEN ACCESS Matthieu Guédra, Claude Inserra, Bruno Gilles and Jean-Christophe Béra pg. 73

012020

<u>3D crown spike of free surface induced by two bubbles</u> OPEN ACCESS R Han, X L Yao and A M Zhang pg. 77

Numerical simulation of bubble collapse and the transfer of vapor and noncondensable gas through the bubble interface using the ghost fluid method OPEN ACCESS Y Jinbo, K Kobayashi, M Watanabe and H Takahira pg. 81

012022

<u>Bubble dynamics in soft materials: Viscoelastic and thermal effects</u> OPEN ACCESS Eric Johnsen and Lauren Mancia pg. 85

012023

Study on Pressure Wave Propagation in a Liquid Containing Spherical Bubbles in a Rectangular Duct OPEN ACCESS Junya Kawahara, Masao Watanabe and Kazumichi Kobayashi pg. 89

012024

Structure dynamics of cavitative magma flow in a volcano channel at explosive eruption OPEN ACCESS V Kedrinskiy pg. 93

012025

Experimental and numerical study on the dynamic pressure caused by the bubble jet OPEN ACCESS S Li, A M Zhang and X L Yao pg. 97

012026

Effects of the Encapsulating Membranes on the Translations of Pairs of Non-spherical Bubbles OPEN ACCESS Yunqiao Liu, Kazuyasu Sugiyama and Shu Takagi pg. 101

012027

Modeling and experimental analysis of acoustic cavitation bubbles for Burst Wave <u>Lithotripsy</u> OPEN ACCESS Kazuki Maeda, Wayne Kreider, Adam Maxwell, Bryan Cunitz, Tim Colonius and Michael Bailey pg. 105

012028

<u>Diffuse interface modeling of a radial vapor bubble collapse</u> OPEN ACCESS Francesco Magaletti, Luca Marino and Carlo Massimo Casciola pg. 109

Beer tapping: dynamics of bubbles after impact OPEN ACCESS V Mantič-Lugo, A Cayron, P-T Brun and F Gallaire pg. 113

012030

Theoretical evidence for inconsistencies in experimental bubble nucleation rates of propane/CO₂ and R22/CO₂ mixtures OPEN ACCESS Tomáš Němec pg. 117

012031

Experimental and numerical investigations of the bubble collapse at the center between rigid walls OPEN ACCESS T Ogasawara, N Tsubota, H Seki, Y Shigaki and H Takahira pg. 121

012032

<u>Cloud cavitation induced by shock-bubble interaction in a viscoelastic solid</u> OPEN ACCESS Ryota Oguri and Keita Ando pg. 125

012033

Spark bubble interaction with a suspended particle OPEN ACCESS Siew-Wan Ohl, Di Wei Wu, Evert Klaseboer and Boo Cheong Khoo pg. 129

012034

Experimental evidence of nucleation from wall-bounded nuclei in a laminar flow OPEN ACCESS T F Groß, G Ludwig and P F Pelz pg. 133

012035

Interaction of two pulsating spherical bubbles in external pressure field near the contact OPEN ACCESS S V Sanduleanu and A G Petrov pg. 137

012036

<u>Study on Formation of Plasma Nanobubbles in Water OPEN ACCESS</u> Takehiko Sato, Tatsuyuki Nakatani, Takashi Miyahara, Shiroh Ochiai, Masanobu Oizumi, Hidemasa Fujita and Takamichi Miyazaki pg. 141

012037

<u>Heterogeneous nucleation of bubbles by molecular dynamics</u> OPEN ACCESS Donguk Suh, Mitsuki Nakamura and Kenji Yasuoka pg. 145

Detailed Jet Dynamics in a Collapsing Bubble OPEN ACCESS Outi Supponen, Danail Obreschkow, Philippe Kobel and Mohamed Farhat pg. 149

012039

<u>Validation of Bubble Dynamics Equation for a Nano-scale Bubble via Molecular</u> <u>Dynamics Simulation</u> OPEN ACCESS S Tsuda, H Hyodo and S Watanabe pg. 153

012040

<u>Transient bubble oscillations near an elastic membrane in water</u> OPEN ACCESS C K Turangan and B C Khoo pg. 157

012041

The condition of the resonant break-up of a gas bubble subjected to an acoustic wave in liquid OPEN ACCESS V V Vanovskiy and A G Petrov pg. 161

012042

<u>Three stages of bubble formation on submerged orifice under constant gas flow rate</u> OPEN ACCESS Xianxian Yu, Yiwei Wang, Chenguang Huang and Tezhuan Du pg. 165

012043

<u>Outcomes following single bubble collapse in a rigid tube</u> OPEN ACCESS C Ji, B Li, F Y Lin and J Zou pg. 169

Cavitation erosion

012044

Temperature considerations in non-spherical bubble collapse near a rigid wall OPEN ACCESS Shahaboddin Alahyari Beig and Eric Johnsen pg. 173

012045

Quantitative evaluation of erosive cavitation pressure field from pits in material: fact or myth? OPEN ACCESS J-K Choi and G L Chahine pg. 177

New insights into the Mechanisms of Cavitation Erosion OPEN ACCESS M Dular and M Petkovšek pg. 181

012047

<u>Cavitation erosion - scale effect and model investigations</u> OPEN ACCESS F Geiger and P Rutschmann pg. 185

012048

<u>Cavitation erosion of low-density polyethylene coatings for pipe liners</u> OPEN ACCESS S Hattori, E Benitani, W Ruan, Y Suda, R Takeuchi and T Iwata pg. 189

012049

Effect of Tensile Stress on Cavitation Erosion and Damage of Polymer OPEN ACCESS M Hibi, K Inaba, K Takahashi, K Kishimoto and K Hayabusa pg. 193

012050

Numerical simulation of cavitation erosion on a NACA0015 hydrofoil based on bubble collapse strength OPEN ACCESS V Hidalgo, X Luo, X Escaler, R Huang and E Valencia pg. 197

012051

Impact load measurements with a PVDF pressure sensor in an erosive cavitating flow OPEN ACCESS J Hujer, JB Carrat, M Müller and M Riondet pg. 201

012052

Numerical 3D flow simulation of attached cavitation structures at ultrasonic horn tips and statistical evaluation of flow aggressiveness via load collectives OPEN ACCESS S Mottyll and R Skoda pg. 205

012053

Modeling Fluid-Structure Interaction in Cavitation Erosion: Preliminary Results OPEN ACCESS Yves Paquette, Christian Pellone, Marc Fivel, Giovanni Ghigliotti, Eric Johnsen and Jean-Pierre Franc pg. 209

Numerical Modelling and Prediction of Erosion Induced by Hydrodynamic Cavitation OPEN ACCESS A Peters, U Lantermann and O el Moctar pg. 213

012055

DES Prediction of Cavitation Erosion and Its Validation for a Ship Scale Propeller OPEN ACCESS Dr Dmitriy Ponkratov pg. 217

Cavitation in fluid machinery

012056

Francis turbine draft tube modelling for prediction of pressure fluctuations on prototype OPEN ACCESS S Alligné, C Landry, A Favrel, C Nicolet and F Avellan pg. 221

012057

Identification of the wave speed and the second viscosity in cavitating flow with 2D RANS computations - Part II OPEN ACCESS S Alligné, J Decaix, C Nicolet, F Avellan and C Münch pg. 225

012058

Estimations of scale effects on blade cavitation OPEN ACCESS Eduard Amromin pg. 229

012059

<u>OpenFOAM investigations of cavitation in a flushed water-jet inlet</u> OPEN ACCESS A Gattoronchieri and R Bensow pg. 233

012060

Identification of the wave speed and the second viscosity of cavitation flows with 2D <u>RANS computations - Part I</u> OPEN ACCESS J Decaix, S Alligné, C Nicolet, F Avellan and C Münch pg. 237

012061

Analysis of the part load helical vortex rope of a Francis turbine using on-board sensors OPEN ACCESS F Duparchy, A Favrel, P-Y Lowys, C Landry, A Müller, K Yamamoto and F Avellan pg. 241

<u>Study on cavitation influence for pump head in an axial flow pump</u> OPEN ACCESS K Hosono, Y Kajie, S Saito and K Miyagawa pg. 245

012063

Experimental comparison of backflow-vortex cavitation on pump inducer between cryogen and water OPEN ACCESS Y Ito, A Tsunoda and T Nagasaki pg. 249

012064

Progress in Numerical Simulation of Turbulent Cavitating Flow in an Axial Waterjet Pump OPEN ACCESS Sung-Eun Kim pg. 253

012065

Application of a compressible flow solver and barotropic cavitation model for the evaluation of the suction head in a low specific speed centrifugal pump impeller channel OPEN ACCESS P Limbach, T Müller and R Skoda pg. 257

012066

Numerical predictions of the turbulent cavitating flow around a marine propeller and an axial turbine OPEN ACCESS M Morgut, D Jošt, E Nobile and A Škerlavaj pg. 261

012067

Numerical investigation of cavitation flow inside spool valve with large pressure drop OPEN ACCESS Jian Deng, Dingyi Pan, Fangfang Xie and Xueming Shao pg. 265

012068

<u>Hydraulic Performance Comparison for Axial Flow Impeller and Mixed Flow Impeller</u> <u>with Same Specific Speed</u> OPEN ACCESS Zhongyong Pan, Yongyan Ni, Jianping Yuan and Pei Ji pg. 269

012069

<u>Pressurized air injection in an axial hydro-turbine model for the mitigation of tip leakage</u> <u>cavitation</u> OPEN ACCESS A Rivetti, M Angulo, C Lucino and S Liscia pg. 273

Detailed investigation of cavitation and supercavitation around different geometries using various turbulence and mass transfer models OPEN ACCESS M R Pendar and E Roohi pg. 277

012071

<u>Cavitation measurements on a pump-turbine model</u> OPEN ACCESS H Schmidt, O Kirschner and S Riedelbauch pg. 281

012072

On Rayleigh-Plesset based cavitation modelling of fluid film bearings using the Reynolds equation OPEN ACCESS Troy A Snyder, Minel J Braun and Kristopher Pierson pg. 285

012073

Prediction of Performance of a Cavitating Propeller in Oblique Inflow OPEN ACCESS Ye Tian and Spyros A. Kinnas pg. 289

012074

Numerical simulations of the cavitation phenomena in a Francis turbine at deep part load conditions OPEN ACCESS J Wack and S Riedelbauch pg. 293

012075

Numerical Investigation of Cavitation Improvement for a Francis Turbine OPEN ACCESS Zhifeng Yao, Ruofu Xiao, Fujun Wang and Wei Yang pg. 297

012076

The numerical research of runner cavitation effects on spiral vortex rope in draft tube of Francis turbine OPEN ACCESS J Yang, L J Zhou and Z W Wang pg. 301

012077

<u>Predicting the Inception Cavitation of a Reversible Pump- Turbine in Pump Mode</u> OPEN ACCESS Ran Tao, Ruofu Xiao, Di Zhu and Weichao Liu pg. 305

012078

Blade Section Design of Marine Propellers with Minimum Cavitation Induced Pressure Fluctuations OPEN ACCESS Zhibo Zeng and Gert Kuiper pg. 309

Cavitation in fuel injection systems, fuels and lubricants

012079

<u>On instationary mechanisms in cavitating micro throttles</u> OPEN ACCESS B Beban, S Legat, S J Schmidt and N A Adams pg. 313

012080

Dynamic cavitation inside a high performance diesel injector - an experimental and CFD investigation OPEN ACCESS Daniel Bush, Celia Soteriou, Mark Winterbourn and Christian Daveau pg. 317

012081

Large Eddy Simulation of a Cavitating Multiphase Flow for Liquid Injection OPEN ACCESS M Cailloux, J Helie, J Reveillon and F X Demoulin pg. 321

012082

<u>Cavitation Inside High-Pressure Optically Transparent Fuel Injector Nozzles</u> OPEN ACCESS Z Falgout and M Linne pg. 325

012083

<u>Evaluation of friction heating in cavitating high pressure Diesel injector nozzles</u> OPEN ACCESS R Salemi, P Koukouvinis, G Strotos, R McDavid, Lifeng Wang, Jason Li, M Marengo and M Gavaises pg. 329

012084

<u>A comprehensive Two-Fluid Model for Cavitation and Primary Atomization Modelling</u> <u>of liquid jets - *Application to a large marine Diesel injector* OPEN ACCESS Chawki Habchi, Julien Bohbot, Andreas Schmid and Kai Herrmann pg. 333</u>

012085

<u>An Investigation of Flow in Nozzle Hole of Dimethyl Ether</u> OPEN ACCESS M Kato, T Yokota, J Weber and D Gill pg. 337

012086

Simulation of throttle flow with two phase and single phase homogenous equilibrium model OPEN ACCESS P Koukouvinis and M Gavaises pg. 341

<u>Compressible bubble dynamic simulations with central-upwind schemes</u> OPEN ACCESS P Koukouvinis, M Gavaises, A Georgoulas and M Marengo pg. 345

012088

Large Eddy Simulation of diesel injector opening with a two phase cavitation model OPEN ACCESS P Koukouvinis, M Gavaises, J Li and L Wang pg. 349

012089

<u>Visualisation of diesel injector with neutron imaging</u> OPEN ACCESS E Lehmann, C Grünzweig, S Jollet, M Kaiser, H Hansen and F Dinkelacker pg. 353

012090

Cavitation Inception in Immersed Jet Shear Flows OPEN ACCESS R D Lockett, N Ndamuso and R Price pg. 357

012091

An Investigation into the Effect of Hydrodynamic Cavitation on Diesel using Optical Extinction OPEN ACCESS R D Lockett, Z Fatmi, O Kuti and R Price pg. 361

012092

Numerical Simulation of the Effect of 3D Needle Movement on Cavitation and Spray Formation in a Diesel Injector OPEN ACCESS B Mandumpala Devassy, W Edelbauer and D Greif pg. 365

012093

Influence of cavitation on near nozzle exit spray OPEN ACCESS M Mirshahi, Y Yan and J M Nouri pg. 369

012094

Application of cone-beam micro-CT on high-speed Diesel flows and quantitative cavitation measurements OPEN ACCESS N Mitroglou, M Lorenzi, M Santini, M Gavaises and D Assanis pg. 373

Evaluation of Turbulence Models Performance in Predicting Incipient Cavitation in an Enlarged Step-Nozzle OPEN ACCESS H Naseri, P Koukouvinis and M Gavaises pg. 377

012096

<u>Large-eddy simulation of cavitating nozzle and jet flows</u> OPEN ACCESS F Örley, T Trummler, S Hickel, M S Mihatsch, S J Schmidt and N A Adams pg. 381

012097

LES of cavitating flow inside a Diesel injector including dynamic needle movement OPEN ACCESS F Örley, S Hickel, S J Schmidt and N A Adams pg. 385

012098

Modelling of single bubble-dynamics and thermal effects OPEN ACCESS D Papoulias and M Gavaises pg. 389

012099

String cavitation formation inside fuel injectors OPEN ACCESS B A Reid, M Gavaises, N Mitroglou, G K Hargrave, C P Garner and R M McDavid pg. 393

012100

Numerical simulation of internal and near-nozzle flow of a gasoline direct injection fuel injector OPEN ACCESS Kaushik Saha, Sibendu Som, Michele Battistoni, Yanheng Li, Shaoping Quan and Peter Kelly Senecal pg. 397

Cavitation induced noise and vibration

012101

On the relation between tonal and broadband content of hull pressure spectra due to cavitating ship propellers OPEN ACCESS J Bosschers pg. 401

012102

Research on the noise induced by cavitation under the asymmetric cavitation condition in a centrifugal pump OPEN ACCESS J X Lu, S Q Yuan, J P Yuan, X D Ren, J Pei and Q R Si pg. 405

Dynamics and acoustics of a cavitating Venturi flow using a homogeneous air-propylene glycol mixture OPEN ACCESS M Navarrete, J Naude, F Mendez and F A Godínez pg. 409

012104

Mechanism of noise generation by cavitation in hydraulic relief valve OPEN ACCESS K Okita, Y Miyamoto, T Kataoka, S Takagi and H Kato pg. 413

012105

Experimental investigation of the flow-induced vibration of hydrofoils in cavitating flows OPEN ACCESS Guoyu Wang, Qin Wu, Biao Huang and Yuan Gao pg. 417

012106

<u>Study on Prediction of Underwater Radiated Noise from Propeller Tip Vortex Cavitation</u> OPEN ACCESS Takuyoshi Yamada, Kei Sato, Chiharu Kawakita and Akira Oshima pg. 422

Cleaning and surface treatment

012107

Effect of cavitation on removal of alkali elements from coal OPEN ACCESS H Srivalli, L Nirmal and R Nagarajan pg. 426

012108

Mechanical Surface Treatment of Duralumin Plate by Bubble Induced by Pulse Laser OPEN ACCESS H Soyama, H Sasaki, S Endo and Y Iga pg. 430

Experimental techniques

012109

<u>The acoustic signatures of cavitation erosion on grade DH36 steel</u> OPEN ACCESS I Armakolas, J Carlton, M Vidakovic, T Sun and K T V Grattan pg. 434

012110

X-ray Diagnostics for Cavitating Nozzle Flow OPEN ACCESS Daniel J Duke, Andrew B Swantek, Alan L Kastengren and Christopher F Powell pg. 438

Hydrodynamic Nuclei Concentration Technique in Cavitation Research and Comparison to Phase-Doppler Measurements OPEN ACCESS Eric Ebert, Willfried Kröger and Nils Damaschke pg. 442

012112

<u>A novel ultrasonic cavitation enhancer</u> OPEN ACCESS D Fernandez Rivas, B Verhaagen, Andres Galdamez Perez, Elena Castro-Hernandez, Ralph van Zwieten and Karin Schroen pg. 446

012113

Air release measurements of V-oil 1404 downstream of a micro orifice at choked flow conditions OPEN ACCESS H-A Freudigmann, U Iben and P F Pelz pg. 450

012114

Laser diagnostics for characterization of sprays formed by a collapsing non-equilibrium bubble OPEN ACCESS Y S Kannan, S Balusamy and B Karri pg. 454

012115

<u>Visualization and image processing of spray structure under the effect of cavitation</u> <u>phenomenon</u> OPEN ACCESS M Ghorbani, G Alcan, D Yilmaz, M Unel and A Kosar pg. 458

012116

Multidimensional tensor array analysis of multiphase flow during a hydrodynamic ram event OPEN ACCESS A Lingenfelter and D Liu pg. 462

012117

<u>A novel particle separation technique using 20-kHz-order ultrasound irradiation in water</u> OPEN ACCESS Hiroya Muramatsu, Sayuri Yanai, Yuki Mizushima and Takayuki Saito pg. 466

012118

<u>Cavitation for improved sludge conversion into biogas</u> OPEN ACCESS A H Stoop, T W Bakker and H J M Kramer pg. 470

<u>Optical Measurements of Cavitation in Tribological Contacts</u> OPEN ACCESS Tian Tang, Nick Morris and Jeremy Coupland pg. 474

012120

<u>Comparison of cavitation intensity in water and in molten aluminium using a high-</u> <u>temperature cavitometer</u> OPEN ACCESS I Tzanakis, G S B Lebon, D G Eskin and K Pericleous pg. 478

Numerical methods

012121

<u>Numerical Simulation of Supercavitating Flows using a Viscous-Potential Method</u> OPEN ACCESS Ji-Hye Kim and Byoung-Kwon Ahn pg. 482

012122

Numerical investigation of shedding partial cavities over a sharp wedge OPEN ACCESS B Budich, S Neuner, S J Schmidt and N A Adams pg. 486

012123

The non-linear response of bubble clouds to pressure excitations OPEN ACCESS D Fuster and L Bergamasco pg. 490

012124

How to control bubble nucleation from superhydrophobic surfaces OPEN ACCESS Alberto Giacomello, Matteo Amabili and Carlo Massimo Casciola pg. 494

012125

A four-way coupled Euler—Lagrange approach using a variational multiscale method for simulating cavitation OPEN ACCESS Georg Hammerl and Wolfgang A Wall pg. 498

012126

The numerical study of the cavitation-structure interaction around 3D flexible hydrofoil OPEN ACCESS Hu Shi-liang, Chen Ying and Lu Chuan-jing pg. 502

Numerical evaluation of cavitation shedding structure around 3D Hydrofoil: Comparison of PANS, LES and RANS results with experiments OPEN ACCESS B Ji, X X Peng, X P Long, X W Luo and Y L Wu pg. 506

012128

<u>Shock-Induced Bubble Collapse versus Rayleigh Collapse</u> OPEN ACCESS Anil Kapahi, Chao-Tsung Hsiao and Georges L Chahine pg. 510

012129

<u>Consideration of a Phase Change Model Based on Apparent Phase Equilibrium</u> OPEN ACCESS S Kashiwada and Y Iga pg. 515

012130

<u>Compressible Turbulent Flow Numerical Simulations of Tip Vortex Cavitation</u> OPEN ACCESS F Khatami, E van der Weide and H Hoeijmakers pg. 519

012131

<u>Numerical simulations of cryogenic cavitating flows</u> OPEN ACCESS Hyunji Kim, Hyeongjun Kim, Daeho Min and Chongam Kim pg. 523

012132

Numerical Simulation of Cavitation Phenomena for Hybrid Contra-Rotating Shaft <u>Propellers</u> OPEN ACCESS Sung-Hoon Kim, Sung-Han Choo, Jeong-Yong Park and Gil-Hwan Choi pg. 527

012133

Jet-Supercavity Interaction: Insights from CFD OPEN ACCESS M Kinzel, M Moeny, M Krane and I Kirschner pg. 531

012134

<u>Comparison between low-order and high-order acoustic pressure solvers for bubbly</u> <u>media computations</u> OPEN ACCESS G S Bruno Lebon, I Tzanakis, K A Pericleous and D G Eskin pg. 535

Large eddy simulation of turbulent cavitating flows OPEN ACCESS A Gnanaskandan and K Mahesh pg. 539

012136

Evaluation of finite rate homogenous mixture model in cavitation bubble collapse OPEN ACCESS M Bhatt, A Gnanaskandan and K Mahesh pg. 543

012137

<u>Prediction of cavitation erosion for marine applications</u> OPEN ACCESS T Maquil, S Yakubov and T Rung pg. 547

012138

Numerical Optimization of converging diverging miniature cavitating nozzles OPEN ACCESS Kanchan Chavan, B Bhingole, J Raut and A B Pandit pg. 551

012139

<u>CFD</u> analysis of cloud cavitation on three tip-modified propellers with systematically varied tip geometry OPEN ACCESS K W Shin and P Andersen pg. 555

012140

Application of a Panel Method in Performance Prediction of Cavitating and Noncavitating Tip Loaded Propellers OPEN ACCESS Yiran Su and Spyros A Kinnas pg. 559

012141

Development of Numerical Simulation Method for Compressible Gas-Liquid Two-Phase Flows OPEN ACCESS Y Tamura pg. 563

012142

<u>Prediction and analysis of jet pump cavitation using Large Eddy Simulation</u> OPEN ACCESS Hai Zi, Lingjiu Zhou and Long Meng pg. 567

012143

An algorithm for fast DNS cavitating flows simulations using homogeneous mixture approach OPEN ACCESS A Žnidarčič, O Coutier-Delgosha, M Marquillie and M Dular pg. 571

Sheet, cloud and supercavitation

012144

<u>A dynamic testbed for supercavitating vehicle control</u> OPEN ACCESS David Escobar, Devin Vollmer and Roger Arndt pg. 575

012145

<u>Closure mechanisms of ventilated supercavities under steady and unsteady flows</u> OPEN ACCESS Ashish Karn, Rohan De, Jiarong Hong and Roger E A Arndt pg. 579

012146

Numerical 3D analysis of cloud cavitation shedding frequency on a circular leading edge hydrofoil with a barotropic cavitation model OPEN ACCESS M Blume and R Skoda pg. 583

012147

<u>Comparative CFD Investigation on the Performance of a New Family of Super-</u> <u>Cavitating Hydrofoils</u> OPEN ACCESS S Brizzolara and L Bonfiglio pg. 587

012148

Study of the dynamics of a sheet cavitation OPEN ACCESS Boris Charrière and Eric Goncalves pg. 591

012149

On the non-equilibrium dynamics of cavitation around the underwater projectile in variable motion OPEN ACCESS Y Chen, C J Lu, J Li, X Chen and Z X Gong pg. 595

012150

Review of parameters influencing the structural response of a submerged body under cavitation conditions OPEN ACCESS X Escaler, O De La Torre and M Farhat pg. 599

Interaction of a Compressible Bubbly Flow With an Obstacle Placed Within a Shedding Partial Cavity OPEN ACCESS Harish Ganesh, Simo A Mäkiharju and Steven L Ceccio pg. 603

012152

The performance of the water-entry cavity on a high-pressure gas-driven projectile OPEN ACCESS Z X Gong, L Ma, Y L Fang, H Liu and Y Chen pg. 607

012153

Dynamics of a Bubble Cloud near a Rigid Wall OPEN ACCESS J Ma, C-T Hsiao and G L Chahine pg. 611

012154

Observations and Measurements on Unsteady Cloud Cavitation Flow Structures OPEN ACCESS L X Gu, G J Yan and B Huang pg. 615

012155

Cavitation on hydrofoils with sinusoidal leading edge OPEN ACCESS H Johari pg. 619

012156

<u>Jet-Supercavity Interaction: Insights from Physics Analysis</u> OPEN ACCESS I N Kirschner, M J Moeny, M H Krane and M P Kinzel pg. 623

012157

<u>A numerical study of unsteady cavitation on a hydrofoil by LES and URANS method</u> OPEN ACCESS Zi-ru Li, Guang-ming Zhang, Wei He and Tom van Terwisga pg. 627

012158

<u>Finite Volume Computation of the Mitigation of Cavity Pulsation</u> OPEN ACCESS J Lindau, G Skidmore, T Brungart, M Moeny and M Kinzel pg. 631

012159

Numerical evaluation of cavitation void ratio significance on hydrofoil dynamic response OPEN ACCESS Xin Liu, Zhengwei Wang, Xavier Escaler and Lingjiu Zhou pg. 635

<u>Modelling Cavitating Flows using an Eulerian-Lagrangian Approach and a Nucleation</u> <u>Model</u> OPEN ACCESS Jingsen Ma, Chao-Tsung Hsiao and Georges L Chahine pg. 639

012161

Effect of Non-Condensable Gas Injection on Cavitation Dynamics of Partial Cavities OPEN ACCESS Simo A Mäkiharju, Harish Ganesh and Steven L Ceccio pg. 643

012162

<u>Jet-Supercavity Interaction: Insights from Experiments</u> OPEN ACCESS M J Moeny, M H Krane, I N Kirschner and M P Kinzel pg. 647

012163

Cavity Dynamics behind a 2-D Wedge Analyzed by Incompressible and Compressible Flow Solvers OPEN ACCESS Sunho Park, Heebum Lee, Hak-Kyu Choi, Shin Hyung Rhee, Yohan Choe, Hyeongjun Kim, Chongam Kim, Ji-Hye Kim, Byoung-Kwon Ahn and Hyoung-Tae Kim pg. 651

012164

<u>Ventilated cavity flow over a backward-facing step</u> OPEN ACCESS B W Pearce, P A Brandner and S J Foster pg. 655

012165

<u>U-shaped Vortex Structures in Large Scale Cloud Cavitation</u> OPEN ACCESS Yantao Cao, Xiaoxing Peng, Lianghao Xu and Fangwen Hong pg. 659

012166

Cavitation on a scaled-down model of a Francis turbine guide vane: high-speed imaging and PIV measurements OPEN ACCESS K S Pervunin, M V Timoshevskiy, S A Churkin, A Yu Kravtsova, D M Markovich and K Hanjalić pg. 663

012167

On the calculation of forces in case of planar and axially symmetric flow around the cavitating body OPEN ACCESS A G Petrov pg. 667

<u>Spatio-temporal description of the cavitating flow behavior around NACA 2412</u> <u>hydrofoil</u> OPEN ACCESS P Rudolf, D Štefan, M Sedlář, J Kozák, V Habán and R Huzlík pg. 671

012169

Supercavitation: Theory, experiment and scale effects OPEN ACCESS V V Serebryakov, R E A Arndt and J E Dzielski pg. 675

012170

<u>A Method of Mitigating Pulsation in Ventilated Supercavities</u> OPEN ACCESS Grant M Skidmore, Timothy A Brungart, Jules W Lindau and Michael J Moeny pg. 679

012171

POD study of aerated cavitation in a venturi nozzle OPEN ACCESS P Tomov, A Danlos, S Khelladi, F Ravelet, C Sarraf and F Bakir pg. 683

012172

Bubble-induced sheet cavitation inception on an isolated roughness element OPEN ACCESS Martijn van Rijsbergen and Jesse Slot pg. 687

012173

Cavity geometry in real conditions OPEN ACCESS Y F Zhuravlev and A N Varyukhin pg. 691

012174

On the flow structure of cloud cavitating flow around an axisymmetric body near the free surface OPEN ACCESS Yiwei Wang, Xiaocui Wu, Chenguang Huang and XianXian Yu pg. 695

012175

An experimental study on characteristics of cavitation and ballistic of axisymmetric slender body underwater movement OPEN ACCESS Cheng-Gong Zhao, Cong Wang, Ying-Jie Wei and Xiao-Shi Zhang pg. 699

012176

<u>A model for water-entry projectile with an open cavity</u> OPEN ACCESS W Zou and H Liu pg. 703

Sonoluminescence and sonochemistry

012177

A cavity-mediated collective quantum effect in sonoluminescing bubbles OPEN ACCESS Almut Beige and Oleg Kim pg. 707

012178

<u>High speed synchrotron X-ray imaging of ultrasonic bubble cloud in liquid metal</u> OPEN ACCESS C Wang, D Tang, W Zhang, W Du, T Connolley and J Mi pg. 711

Thermodynamic effects

012179

Experimental study of the thermodynamic effect in a cavitating flow on a simple Venturi geometry OPEN ACCESS M Petkovšek and M Dular pg. 715

012180

Prediction of cryogenic cavitation around hydrofoil by an extensional Schnerr-Sauer cavitation model OPEN ACCESS T Z Sun, Y J Wei and C Wang pg. 719

012181

Effects of physical properties on thermo-fluids cavitating flows OPEN ACCESS T R Chen, G Y Wang, B Huang, D Q Li, X J Ma and X L Li pg. 723

Tip vortex cavitation

012182

Evaluation of the radial pressure distribution of vortex models and comparison with experimental data OPEN ACCESS T Hommes, J Bosschers and H W M Hoeijmakers pg. 727

012183

<u>RANS computations of tip vortex cavitation</u> OPEN ACCESS Jean Decaix, Guillaume Balarac, Matthieu Dreyer, Mohamed Farhat and Cécile Münch pg. 731

Numerical Analysis of Tip Cavitation on Marine Propeller with Wake Alignment Using a Simple Surface Panel Method "SQCM" OPEN ACCESS T Kanemaru and J Ando pg. 735

012185

<u>Vortex singing in tip vortex cavitation under the effect of water quality</u> OPEN ACCESS Xiaoxing Peng, Lianghao Xu, Mingtai Song and Yantao Cao pg. 739

012186

Sound signature of propeller tip vortex cavitation OPEN ACCESS Pepijn Pennings, Jerry Westerweel and Tom van Terwisga pg. 743

012187

<u>Simulations of tip vortex cavitation flows with nonlinear *k*-ε model</u> OPEN ACCESS Benlong Wang, Zhihui Liu, Xiaoxing Peng and Dengcheng Liu pg. 747