

7th International Conference on Pumps and Fans (ICPF 2015)

IOP Conference Series: Materials Science and Engineering
Volume 129

Hangzhou, China
18 - 21 October 2015

ISBN: 978-1-5108-2449-2
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© (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: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of contents

Volume 129

**7th International Conference on Pumps and Fans (ICPF2015)
18–21 October 2015, Hangzhou, China**

**Accepted papers received: 12 April 2016
Published online: 19 May 2016**

Preface

011001
OPEN ACCESS
[Foreword](#)

011002
OPEN ACCESS
[Peer review statement](#)

Papers

012001
OPEN ACCESS
[Comparison of rotordynamic fluid forces in axial inducers and centrifugal turbopump impellers](#)

Luca d'Agostino.....1

012002
OPEN ACCESS
[Design method of supercavitating pumps](#)

V Kulagin, D Likhachev and F C Li.....19

012003

OPEN ACCESS

[Research on energy conversion mechanism of rotodynamic pump and design of non-overload centrifugal pump](#)

X L Zhang, S B Hu, Z Z Shen, S P Wu and K Li.....25

012004

OPEN ACCESS

[Numerical analysis of flow interaction of turbine system in two-stage turbocharger of internal combustion engine](#)

Y B Liu, W L Zhuge, Y J Zhang and S Y Zhang.....39

012005

OPEN ACCESS

[CFD simulation on the turbulent mixing flow performance of the liquid-liquid ejector](#)

W Z An, H Y Bie, C C Liu and Z R Hao.....52

012006

OPEN ACCESS

[Experimental research on pressure loss of rotary pressure exchanger](#)

L Jiao, Y Shi, Z C Liu, L Li, Z M Feng, C F Zhao and Y Wei.....60

012007

OPEN ACCESS

[Investigation on the gas pockets in a rotodynamic multiphase pump](#)

J Y Zhang, Y J Li, S J Cai, H W Zhu and Y X Zhang.....70

012008

OPEN ACCESS

[Quasi-three dimensional hydraulic design and performance calculation of high specific speed mixed-flow pump](#)

M Su, Y X Zhang, J Y Zhang and H C Hou.....79

012009

OPEN ACCESS

[The eddy-eliminating method of guide cone in the closed sump](#)

Y J Wang, L Cheng, C Z Xia, J R Zhou, H Q Yan and H Y Jiang.....88

012010

OPEN ACCESS

[Numerical simulation on geometrical parameters for closed sump](#)

Y X Wang, L Cheng, C Z Xia, J R Zhou, H Q Yan and H Y Jiang.....96

012011

OPEN ACCESS

[Numerical simulation on the cavitation of waterjet propulsion pump](#)

C Z Xia, L Cheng, Y N Shang, J R Zhou, F Yang and Y Jin.....106

012012

OPEN ACCESS

[Numerical simulation on macro-instability of coupling flow field structure in jet-stirred tank](#)

D Y Luan, J P Lu, Q X Bu, S F Zhang and S X Zheng.....114

012013

OPEN ACCESS

[Experimental research on internal flow in impeller of a low specific speed centrifugal pump by PIV](#)

J F Zhang, Y F Wang and S Q Yuan.....122

012014

OPEN ACCESS

[Numerical study on the performance of rotational supercavitating evaporator with optimized blade shape](#)

Z Y Zheng, Q Li, F C Li and V A Kulagin.....131

012015

OPEN ACCESS

[Design of a new type vapor recovery system nozzle](#)

S H Fu, G J Cao and D S Zhang.....138

012016

OPEN ACCESS

[Research on liquid sloshing performance in vane type tank under microgravity](#)

Q Hu, Y Li, J T Liu and J Q Liang.....142

012017

OPEN ACCESS

[Effects of radial diffuser hydraulic design on a double-suction centrifugal pump](#)

H C Hou, Y X Zhang, C Xu, J Y Zhang and Z L Li.....150

012018

OPEN ACCESS

[Numerical simulation on the performance of the vortex pump for transporting solid-liquid two-phase with light particles](#)

W Y Mao, P Y Song, Q G Deng and H J Xu.....158

012019

OPEN ACCESS

[A numerical study of liquid film distribution in wet natural gas pipelines](#)

X Q Gao, Y L Zhao, W W Xu, X R Guan, J J Wang and Y H Jin.....165

012020

OPEN ACCESS

[Influence of clearance model on numerical simulation of centrifugal pump](#)

Z Wang, B Gao, L Yang and W Q Du.....175

012021

OPEN ACCESS

[Analysis of silt abrasion of the impeller ring in a centrifugal pump with J-grooves](#)

Z D Qian, Z Y Wang, Z W Guo, J Dong and J Lu.....183

012022

OPEN ACCESS

[Numerical study of particle deposition and scaling in dust exhaust of cyclone separator](#)

W W Xu, Q Li, Y L Zhao, J J Wang and Y H Jin.....192

012023

OPEN ACCESS

[The stress analysis of a heavy liquid metal pump impeller](#)

X D Ma, X L Li, Z Q Zhu, C J Li and S Gao.....200

012024

OPEN ACCESS

[Performance test of electromagnetic pump on heavy liquid metal in PREKY-I facility](#)

X L li, X D Ma, Z Q Zhu, Y Li and K F Lv.....208

012025

OPEN ACCESS

[Transient thermal-mechanical coupling behavior analysis of mechanical seals during start-up operation](#)

B C Gao, X K Meng, M X Shen and X D Peng.....216

012026

OPEN ACCESS

[Impeller entrance pre whirl characteristics research](#)

W WU, Y Wang and Y W Han.....227

012027

OPEN ACCESS

[Quantitative analysis of backflow of reversible pump-turbine in generating mode](#)

K H Liu, Y N Zhang, J W Li and H Z Xian.....237

012028

OPEN ACCESS

[Numerical analysis on the cavitation and unsteady flow in a scroll hydraulic pump](#)

S H Sun, P C Guo, Y Huang, J L Zuo and X Q Luo.....244

012029

OPEN ACCESS

[Numerical simulation of effects of sand grain diameters and volume fractions on mass transferring from the water-liquid to the water-vapor](#)

Weiguo Zhao, Xiangdong Han, Ming Liu and Yingjie Zheng.....253

012030

OPEN ACCESS

[Numerical research on hydrodynamic characteristics of end cover of pressure exchanger](#)

L Jiao, H T Lin, Y Shi, Z C Liu, Z M Feng and G S Li.....261

012031

OPEN ACCESS

[Study on water lubricated bearings of high speed pump based on numerical simulation](#)

Y X Bai, F Y Kong, J R Sun and X Yuan.....275

012032

OPEN ACCESS

[Theoretical analysis on flow characteristics of melt gear pump](#)

R J Zhao, J Q Wang and F Y Kong.....282

012033

OPEN ACCESS

[Numerical simulation and factor analysis of petrochemical pipe erosion-corrosion failure](#)

G F XU, G F OU, T Chen, P X Li and H Z JIN.....288

012034

OPEN ACCESS

[Temperature field study of hot water circulation pump shaft system](#)

Y Y Liu, F Y Kong, X H Daun, R J Zhao and Q L Hu.....296

012035

OPEN ACCESS

[Characteristic analysis on the pressure fluctuation in the impeller of a low specific speed mixed flow pump](#)

W W Zhang, Z Y Yu and B S Zhu.....302

012036

OPEN ACCESS

[Characteristics analysis for different water heads on the efficiency hill chart of Francis turbine](#)

Z N Wang, P C Guo, X Q Luo, Y L Wang and S H Sun.....311

012037

OPEN ACCESS

[Cavitation study of a pump-turbine at turbine mode with critical cavitation coefficient condition](#)

J Wang, D Yang, J W Xu, J T Liu and L Jiao.....319

012038

OPEN ACCESS

[Flow characteristics on the blade channel vortex in the Francis turbine](#)

P C Guo, Z N Wang, X Q Luo, Y L Wang and J L Zuo.....329

012039

OPEN ACCESS

[Numerical investigation of cavitation performance on bulb tubular turbine](#)

L G Sun, P C Guo, X B Zheng and X Q Luo.....337

012040

OPEN ACCESS

[Numerical simulation analysis and optimum design for combined type pressure reducing valves](#)

D M Gou, P C Guo, X B Zheng, X Q Luo and L G Sun.....346

012041

OPEN ACCESS

[Study on the effect of the impeller and diffuser blade number on reactor coolant pump performances](#)

Y Long, J L Yin, D Z Wang and T B Li.....355

012042

OPEN ACCESS

[The numerical simulation based on CFD of hydraulic turbine pump](#)

X H Duan, F Y Kong, Y Y Liu, R J Zhao and Q L Hu.....364

012043

OPEN ACCESS

[Suitability research on the cavitation model and numerical simulation of the unsteady pulsed cavitation jet flow](#)

S Y Chen, X F Yu, D Y Luan, Y P Qu and C Zhou.....370

012044

OPEN ACCESS

[Numerical study on thermodynamic characteristics of rotational supercavitating evaporator](#)

Q Li, Z Y Zheng, F C Li and V A Kulagin.....378

012045

OPEN ACCESS

[Micro-grid platform based on NODE.JS architecture, implemented in electrical network instrumentation](#)

M Duque, E Cando, A Aguinaga, F Llulluna, N Jara and T Moreno.....386

012046

OPEN ACCESS

[The heat transfer characteristic of the reactor coolant pump canned motor](#)

X Y Gu, R Xu, G Tao, Y L Yang and D Z Wang.....394

012047

OPEN ACCESS

[Experiments on the magnetic coupling in a small scale counter rotating marine current turbine](#)

I C Kim, N J Lee, J Wata, B S Hyun and Y H Lee.....401

012048

OPEN ACCESS

[Numerical simulation of flow past a circular base on PANS methods](#)

J T Liu, Y Li, Y Gao, Q Hu and Y L Wu.....407

012049

OPEN ACCESS

[Critical cavitation coefficient analysis of a space low specific centrifugal pump with micro gravity](#)

J T Liu, Y Li, Y Gao, Q Hu, C Zhou and Y L Wu.....414

012050

OPEN ACCESS

[Numerical prediction of pressure fluctuations in a prototype pump turbine base on PANS methods](#)

J T Liu, Y Li, Y Gao, Q Hu and Y L Wu.....421

012051

OPEN ACCESS

[Simple, stable and reliable modeling of gas properties of organic working fluids in aerodynamic designs of turbomachinery for ORC and VCC](#)

T Kawakubo.....427

012052

OPEN ACCESS

[The research on particle trajectory of solid-liquid two-phase flow and erosion predicting in screw centrifugal pump](#)

Z J Shen, R N Li, W Han, W G Zhao and X H Wang.....436

012053

OPEN ACCESS

[Heat transfer analysis of compound multi-layer insulation for cryogenic tank under different service conditions](#)

H L Zhu, C Yao, Y Li and H L Pan.....445

012054

OPEN ACCESS

[Experimental study of liquid-solid two phase flow over a step using PIV](#)

E H Cando, X W Luo, V H Hidalgo, L Zhu and A G Aguinaga.....449

012055

OPEN ACCESS

[Effects of shaft supporting structure on performance test of axial flow fan](#)

R Ma, S L Liu, M X Li and S Y Zheng.....460

012056

OPEN ACCESS

[Flow field distribution of liquid film of water lubricated bearing-rotor coupling systems](#)

Q L Hu, J N Hu, X Y Ye, D S Zhang and J B Zheng.....467

012057

OPEN ACCESS

[Development of a model counter-rotating type horizontal-axis tidal turbine](#)

B Huang, K Yoshida and T Kanemoto.....475

012058

OPEN ACCESS

[Study on the influence of back blade shape on the wear characteristics of centrifugal slurry pump](#)

X Cai, S P Zhou and S Li.....482

012059

OPEN ACCESS

[Effect of attack angle on flow characteristic of centrifugal fan](#)

Y Wu, H S Dou, Y K Wei, X P Chen, Y N Chen and W B Cao.....490

012060

OPEN ACCESS

[Numerical simulation and analysis of the flow in a two-staged axial fan](#)

J Q Xu, H S Dou, H X Jia, X P Chen, Y K Wei and M W Dong.....510

012061

OPEN ACCESS

[Experimental study on gas-liquid flow characteristics of submerged air jets](#)

S J Qin, J T Liu, T C Miao and D Z Wu.....523

012062

OPEN ACCESS

[Performance analysis on solid-liquid mixed flow in a centrifugal pump](#)

C Ning and Y Wang.....535

012063

OPEN ACCESS

[The application of dichotomy in equilibrium position of journal bearing](#)

G K Wu and X Q Luo.....542

012064

OPEN ACCESS

[Stability and bifurcation analysis of rotor-bearing-seal system](#)

G Y Ying, S L Liu, R Ma and S Y Zheng.....548

012065

OPEN ACCESS

[Theoretical study on a water muffler](#)

T Du, Y W Chen, T C Miao and D Z Wu.....555

012066

OPEN ACCESS

[Numerical study on the effect of a lobed nozzle on the flow characteristics of submerged exhaust](#)

T C Miao, T Du, D Z Wu and L Q Wang.....562

012067

OPEN ACCESS

[Design method of water jet pump towards high cavitation performances](#)

L L Cao, B X Che, L J Hu and D Z Wu.....569

012068

OPEN ACCESS

[Fundamental studies on cavitation melt processing](#)

I Tzanakis, M Hodnett, G S B Lebon, D G Eskin and K Pericleous.....578