AJK FLUIDS 2019

ASME — JSME — KSME
JOINT FLUIDS
ENGINEERING CONFERENCE

Conference July 28—August 1
Exhibition July 29—July 31
Hyatt Regency, San Francisco, CA

Technical Tracks

The American Society of Mechanical Engineers®
ASME®

ASME
SETTING THE STANDARD

Monday, July 29

PLENARY TALKS

TOPIC 8-1 PLENARY TALKS

8-1-1
PLENARY TALKS
Grand Ballroom A 8:00AM—9:45AM

Using Probabilistic CFD Methods for Aircraft Certification by Analysis
Plenary Presentation. AJKFLUIDS2019-5771
Juan Alonso, *Stanford University, Stanford, CA, United States*

Multi-Physics CFD Simulation of Particle Deposition With a Hybrid Grid- and Particle-Based Method
Plenary Presentation. AJKFLUIDS2019-5772
Makoto Yamamoto, *Tokyo University of Science, Tokyo, Japan*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-5 TURBULENT FLOWS

1-5-1
WALL-BOUNDED TURBULENT FLOWS
Room L
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Koji Fukagata,** *Keio University, Yokohama, Japan*
Session Co-Organizer: **Kyung Chun Kim,** *Pusan National University, Pusan, Korea (Republic)*

Contribution of Fluctuating Large-Scale Motions in Turbulent Fluid Flow Through a Channel
Technical Paper Publication (JSME). AJKFLUIDS2019-5242
Yoichi Mito, *Kitami Institute of Technology, Kitami, Hokkaido, Japan*

The Reynolds Stress in Channel Flows From a Lagrangian Treatment of the Turbulence Momentum
Technical Paper Publication (ASME). AJKFLUIDS2019-5031
Taewoo Lee, *Arizona State University, Tempe, AZ, United States*

Delta Winglet Pairs in the Core of a Pipe and its Effect on Heat Transfer and Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5382
Md Islam, *Chong Zhai, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.,* **Md Alam,** *Harbin Institute of Technology, China*

Decay of Turbulence in a Duct With Transverse Magnetic Field
Technical Paper Publication (ASME). AJKFLUIDS2019-4688
Oleg Zikanov, *University of Michigan - Dearborn, Dearborn, MI, United States,* **Dmitry Krasnov, Thomas Boeck,** *Ilmenau University of Technology, Ilmenau, Germany,* **Semion Sukoriansky,** *Ben Gurion University of the Negev, Beer Sheva, Israel*

Robustness of Turbulent Stripes in Particle-Laden Channel Flows
Technical Paper Publication (JSME). AJKFLUIDS2019-5149
Masaki Hanabusa, Takahiro Tsukahara, *Tokyo University of Science, Noda-shi, Chiba, Japan*

Vortical Structure Characteristics of Transitional Flow Through Porous Media
Technical Paper Publication (ASME). AJKFLUIDS2019-5094
Reza Ziazi, James Liburdy, *Oregon State University, Corvallis, OR, United States*

TOPIC 1-14 HIGH-SPEED FLOWS

1-14-1
HIGH-SPEED FLOWS
Room O
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **S.A. Sherif,** *University of Florida, Gainesville, FL, United States*
Session Co-Organizer: **Heuy Dong Kim,** *Andong National University, Andong, Korea (Republic),* **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany*

Visualization of Three-Dimensional Flow Structures Caused by Rotating Instability
Technical Paper Publication (ASME). AJKFLUIDS2019-4930
Julija Peter, *Technische Universität Berlin, Berlin, Germany,* **Paul Uwe Thamsen,** *Technical University Berlin, Berlin, Germany, Germany*

On the Low and High Speed Flow of Gases Through Pillow Plate Channels
Technical Paper Publication (ASME). AJKFLUIDS2019-4933
Maximilian Passmann, Stefan aus der Wiesche, *University of Applied Sciences Muenster, Steinfurt, Germany,* **Eugeny Y. Kenig,** *University of Paderborn, Paderborn, Germany*

Multiple Shock Waves and Its Unsteady Characteristics in Internal Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-5087
JINTU K JAMES, KIM HEUY DONG, *Andong National University, Andong, Gyeongbuk, Korea (Republic)*

Some Consideration on the Aerodynamic Design of Blast Wave Simulator Using a Shock Tube System
Technical Paper Publication (ASME). AJKFLUIDS2019-5133
Suguru Kushida, Kengo Asada, Kozo Fujii, Tomoaki Tatsukawa, *Tokyo University of Science, Tokyo, Japan,* **Kazuyuki Sakamoto,** *IHI Corporation, Tokyo, Japan*

Direct Numerical Simulation of Supersonic Flow Over a Counter-Rotating Vane-Type Vortex Generator Implemented on Slip Wall
Technical Paper Publication (JSME). AJKFLUIDS2019-5312
Takayuki Nagata, *Tohoku University, Sendai, Miyagi, Japan,* **Tyler Daspit,** *University of Virginia, Charlottesville, VA, United States,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Eric Loth,** *University of Virginia, Charlottesville, VA, United States*

The CFD Modeling of the Water Braking Phenomena for the Holloman High-Speed Test Track
Technical Paper Publication (ASME). AJKFLUIDS2019-5506
Jose Terrazas, V M KRUSHNARAO Kotteda, Vinod Kumar, *University of Texas at El Paso, El Paso, TX, United States,* **Robert Edmonds, Michelle Zeisset,** *Holloman Air Force Base, Alamogordo, NM, United States*

TOPIC 1-15 VORTEX DYNAMICS

1-15-1
VORTEX DYNAMICS 1
Room G
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Haibo Dong,** *University of Virginia, VA, United States*
Session Co-Organizer: **James Liburdy,** *Oregon State University, Corvallis, OR, United States*

Influence of Surface Irregularities on Hydrodynamic Instabilities in Couette-Taylor Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-4625
Lamia Gaied, *LAMIH CNRS UMR 8201/ Polytechnic University Hauts-de-France, Valenciennes, France,* **Emna Berrich,** *University of Nantes, Nantes, France,* **Fethi Aloui,** *Polytechnic University Hauts-de-France, Valenciennes, France,* **Marc Lippert, Laurent Keirsbulck, Maxence Bigerelle,** *LAMIH CNRS UMR 8201 / Polytechnic University Hauts-de-France, Valenciennes, France*

PIV and POD Investigations of Coherent Vortices Downstream Circular or Rectangular Obstacles Located Between Two Parallel Plates
Technical Paper Publication (ASME). AJKFLUIDS2019-4651
Fethi Aloui, *Polytechnic University Hauts-de-France, Valenciennes, France,* **Amal Elawady,** *Florida International University, Miami, FL, United States,* **Khaled Hammad,** *Central Connecticut State University, New Britain, CT, United States*

Experimental Study of Thermal Performance and Flow Behaviour With Winglets Vortex Generators in a Circular Tube
Technical Paper Publication (ASME). AJKFLUIDS2019-4723
Arif Nurizki, Md Islam, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.,* **Md Alam,** *Harbin Institute of Technology, China*

Flow Visualization and Drag Measurement of a Circular Cylinder in Compressible Flow at Reynolds Number Between 1000 and 5000
Technical Paper Publication (JSME). AJKFLUIDS2019-5164
Kensuke Kusama, Akito Noguchi, Takayuki Nagata, Atsushi Komuro, Taku Nonomura, Akira Ando, Keisuke Asai, *Tohoku University, Sendai, Japan*

Effect of Fineness Ratio of 0.5 - 2.0 on the Wake Structure Around a Circular Cylinder Measured Using Time-Resolved PIV
Technical Paper Publication (JSME). AJKFLUIDS2019-5530
Sho Yokota, Taku Ochiai, Takumi Ambo, Yuta Ozawa, Taku Nonomura, Keisuke Asai, *Tohoku University, Sendai, Miyagi, Japan*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-1
PUMP DESIGN 1
Seacliff A 10:00AM—12:00PM

Session Organizer: **Satoshi Watanabe,** *Kyushu University, Fukuoka, Japan*
Session Co-Organizer: **Paul Cooper,** *Flowserve Corporation, Bethlehem, PA, United States*

Thirty Years of the International Pumping Machinery Symposium (PMS)
Keynote Presentation. AJKFLUIDS2019-5781
Bruno Schiavello, *Flowserve, Millburn, NJ, United States*

Effect of Diffuser Vane Solidity on Performance of a Multistage Bowl Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5633
Paul Cooper, *Flowserve Corporation, Bethlehem, PA, United States,* **Ashvin Hosangadi,** *Craft Tech, Pipersville, PA, United States*

Effects of Volute Cross-Sectional Area Distribution on Performance of Double-Suction Volute Pump
Technical Paper Publication (JSME). AJKFLUIDS2019-5251
Szu Yung Chen, Lu Zhang, Yumiko Sekino, Hiroyoshi Watanabe, *Ebara Corporation, Futtsu-Shi Chiba, Japan*

On the Effect of Trailing Edge Under-Filing on the Apparent Slip Factor of Centrifugal Impellers
Technical Paper Publication (ASME). AJKFLUIDS2019-5610
Oliver Litfin, Antonio Delgado, *Friedrich-Alexander-University Erlangen-Nuremberg, Erlangen, Bavaria, Germany*

Multidisciplinary Optimization Design of Axial Flow Pump Blade Based on Approximate Model
Technical Presentation. AJKFLUIDS2019-5643
Lijian Shi, *Yangzhou University, Yangzhou, China*

Theoretical Optimization of Splitter Blade Geometry in High-Efficiency Centrifugal Turbopumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5616
Alessandro Apollonio, Francesco Maddaluni, Angelo Pasini, *University of Pisa, Pisa, Italy,* **Dario Valentini,** *Sitael S.p.A., Pisa, Italy,* **Luca D'agostino,** *University of Pisa, Pisa, Italy*

3-2-13
SPECIAL PUMPS
Seacliff B 10:00AM—12:00PM

Session Organizer: **Bart Van Esch,** *Eindhoven University of Technology, Eindhoven, Netherlands*
Session Co-Organizer: **Hironori Horiguchi,** *Osaka University, Toyonaka, Osaka, Japan*

Experimental Investigation of the Flow Inside the Rotor Passage of an Axial Ventricular Assist Device
Technical Paper Publication (ASME). AJKFLUIDS2019-5660
Huang Chen, *Johns Hopkins University, Baltimore, MD, United States,* **Primož Drešar,** *University of Ljubljana, Ljubljana, Slovenia,* **Bryan Lynch,** *ReliantHeart Inc., Houston, TX, United States,* **Paarth Sharma, Christopher Williams, Joseph Katz,**
Johns Hopkins University, Baltimore, MD, United States

Numerical and Experimental Investigation on the Influence of Blades Gap Flow on Axial Blood Pump Performance
Technical Paper Publication (ASME). AJKFLUIDS2019-5665
Guangmao Liu, Donghai Jin, MengYu Wang, Xingmin Gui, *Beihang University, Beijing, China*

Development of High-Speed and High-Head Centrifugal Pump Integrated With Permanent Magnet Motor
Technical Presentation. AJKFLUIDS2019-5126
Jihoon Yoon, *TRUFLO, Paju-si, Korea (Republic),* **Jang-Young Choi,** *Chungnam National University, Daejeon, Korea (Republic),* **Il Su Yoo, Won Chul Choi, Byung Ok Kim, Kyung Ho Sun,** *Korea Institute of Machinery & Materials, Daejeon, Korea (Republic)*

3D Modeling of Unsteady Flow Characteristics in ALIP Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5183
Ruijie Zhao, Heng Miao, Desheng Zhang, Jun Huang, Xiongfa Gao, *Jiangsu University, Zhenjiang, China*

Development of Starter Pump for Supercritical CO_2 Generation Cycle
Technical Presentation. AJKFLUIDS2019-5185
Won Chul Choi, Il Su Yoo, Youngchul Lim, *Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*
Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic*)

TOPIC 4-2 NONINVASIVE MEASUREMENTS IN SINGLE AND MULTIPHASE FLOWS

4-2-1
NONINVASIVE MEASUREMENTS IN SINGLE AND MULTIPHASE FLOWS - GENERAL
Room E
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States*
Session Co-Organizer: **Sang-joon Lee,** *Pohang University of Science & Tech, Pohang, Gyeongbuk, Korea (Republic)*

PIV Measurement of the Blood Flow in the Heart of Medaka Embryo
Technical Presentation. AJKFLUIDS2019-4754
Nao Ninomiya, Masaru Matsuda, Natsuo Araki, *Utsunomiya University, Utsunomiya, Tochigi, Japan*

Experimental Investigation on the Electrokinetic Motions of Colloidal Particles at an Interfacial Boundary Between Solid and Liquid
Technical Paper Publication (JSME). AJKFLUIDS2019-5006
Katsuaki Shirai, *Shibaura Institute of Technology, Koto, Tokyo, Japan,* **Shoichiro Kaji, Shigeo Hosokawa,** *Kobe University, Kobe, Hyogo, Japan,* **Tsuyoshi Kawanami,** *Meiji University, Kawasaki, Kanagawa, Japan,* **Shigeki Hirasawa,** *Kobe University, Kobe, Hyogo, Japan*

Void Fraction Estimation of Two Phases by Artificial Neural Network Using Electrical Current Response Under the Condition With Unstable Liquid Conductivity
Technical Presentation. AJKFLUIDS2019-5144
Minho Jeon, Daisuke Kawashima, Yuya Takakura, Masahiro Takei, *Chiba University, Chiba, Japan*

Phase Retrieval Holography for Particle Measurement With GPU Acceleration
Technical Paper Publication (JSME). AJKFLUIDS2019-5204
Yohsuke Tanaka, Hiroki Matsushi, Shigeru Murata, *Kyoto Institute of Technology, Kyoto, Japan*

Phase Retrieval Holography for Particle Measurement With GPU Acceleration
Technical Paper Publication (JSME). AJKFLUIDS2019-5204
Yohsuke Tanaka, Hiroki Matsushi, Shigeru Murata, *Kyoto Institute of Technology, Kyoto, Japan*

Large Scale Wettability Quantification in Porous Media Using Tracers
Technical Paper Publication (ASME). AJKFLUIDS2019-5305
Deepshikha Singh, *Indian Institute of Technology Delhi, New Delhi, Delhi, India,* **Harish J. Pant,** *Bhabha Atomic Research Centre, Mumbai, Mumbai, India,* **Shantanu Roy,** *Jyoti Phirani, Indian Institute of Technology Delhi, New Delhi, Delhi, India*

TOPIC 4-3 FLUID DYNAMICS OF WIND ENERGY

4-3-1
FLUID DYNAMICS OF WIND ENERGY - I
Room F
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Martin Wosnik,** *University of New Hampshire, Durham, NH, United States*
Session Co-Organizer: **Inanc Senocak,** *University of Pittsburgh, Pittsburgh, PA, United States*

An Experimental Study of Horizontal Axis Wind Turbine Performance in Artificial Natural Wind by an Active Control Multi-Fan Turbulent Wind Tunnel
Technical Paper Publication (ASME). AJKFLUIDS2019-4667
Kazuhiko Toshimitsu, Hiroyuki Matsubara, Haruka Kikuchi, Porntisarn Parnravee, *Fukuoka Institute of Technology, Fukuoka, Japan*

Dynamic Aeroelastic Response of Wind Turbine Rotors Under Active Flow Control
Technical Paper Publication (ASME). AJKFLUIDS2019-4731
Muraleekrishnan Menon, *ESS Engineering Software Steyr, Steyr, Upper Austria, Austria,* **Fernando Ponta,** *Michigan Technological University, Houghton, MI, United States*

Experimental, Numerical and Analytical Evaluation of a Helical-Turbine Performance
Technical Paper Publication (ASME). AJKFLUIDS2019-5004
Donghyuk Kang, Hiromasa Tsutsumi, Hiroyuki Hirahara, *Saitama University, Saitama, Japan*

Similarity of the Output Characteristics of the Small Vertical Axis Wind Turbine
Technical Paper Publication (JSME). AJKFLUIDS2019-5160
Naoki Sekiya, *Nihon University, Tokyo, Japan*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-3 EXPERIMENTAL METHODS FOR MULTIPHASE FLOWS

5-3-1
EXPERIMENTAL TECHNIQUES I
Seacliff C 10:00AM—12:00PM

Session Organizer: **Sarat Chandra Kuchibhatla,** *Dow Chemical Company, Midland, MI, United States*
Session Co-Organizer: **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic),* **Ichiro Kumagai,** *Meisei University, Tokyo, Japan*

Hydrodynamic Behavior of External Air-Lift-Loops
Invited Presentation. AJKFLUIDS2019-4707
GK Pujari, Rao SSS, *VNRVJIET, Hyderabad, Telangana, India,* **Satya Prasad Paruchuru,** *VNRVJIET, Hyderabad, India*

Experimental Investigation on Flow and Breakup of Two-Dimensional Liquid Jets
Technical Paper Publication (ASME). AJKFLUIDS2019-4642
Amin Jaberi, Mehran Tadjfar, *Amirkabir University of Technology, Tehran, Islamic Republic of Iran*

Experimental Study of Mixing of Two-Layer Density-Stratified Fluid by a Vortex Ring
Technical Paper Publication (ASME). AJKFLUIDS2019-4972
Lile Cao, Ryo Ito, Tomohiro Degawa, *Nagoya University, Nagoya, Japan,* **Yu Matsuda,** *Waseda University, Tokyo, Japan,* **Kotaro Takamure, Tomomi Uchiyama,** *Nagoya University, Nagoya, Japan*

Experimental Investigation on Influence of Inclination and Curved Surface of Ship Bottom in Air Lubrication Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5256
Chiharu Kawakita, Tatsuya Hamada, *National Maritime Research Institute, Mitaka, Tokyo, Japan*

Effects of Liquid Viscosity on Laser-Induced Shock Dynamics
Technical Paper Publication (JSME). AJKFLUIDS2019-5151
Hiroki Kurahara, Keita Ando, *Keio University, Kanagawa, Japan*

Technical Tracks

TOPIC 5-4 CAVITATION

5-4-1
CAVITATION-1: PHYSICS AND MODELING OF CAVITATION
Room D
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Yiwei Wang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*
Session Co-Organizer: **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

Two Types of Nonlinear Pressure Waves in Bubbly Liquids Incorporating Viscosity and Thermal Conductivity
Technical Paper Publication (ASME). AJKFLUIDS2019-4663
Takafumi Kamei, Tetsuya Kanagawa, *University of Tsukuba, Tsukuba, Japan*

Weakly Nonlinear and High Speed Propagation of Quasi-Monochromatic High Frequency Waves in Compressible Bubbly Liquids
Technical Paper Publication (ASME). AJKFLUIDS2019-4682
Takanori Yoshimoto, Tetsuya Kanagawa, *University of Tsukuba, Tsukuba, Japan*

Numerical Investigation on the Effect of Blade Loading on Unsteady Sheet Cavitation Patterns
Technical Paper Publication (ASME). AJKFLUIDS2019-5399
Jeremy Nahon, Mehrdad Zangeneh, *University College London, London, United Kingdom,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Hiroyoshi Watanabe,** *Ebara Corporation, Futtsu-Shi Chiba, Japan*

Experimental Investigation of Turbulent Cavitating Flows in a Small Venturi Nozzle
Technical Paper Publication (ASME). AJKFLUIDS2019-4781
Guangjian Zhang, Ilyass Khlifa, *Arts et Métiers ParisTech, Lille, France,* **Olivier Coutier-Delgosha,** *Virginia Tech, Blacksburg, VA, United States*

Numerical Study on Flow-Induced Vibration Characteristics of Three-Dimensional Hydrofoil in Cavitating Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5153
Chang Wang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China,* **Yuanqing Liu,** *Beijing Institute of Space System Engineering, Beijing, China,* **Tezhuan DU, Yiwei Wang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

TOPIC 5-5 GAS-LIQUID FLOWS

5-5-1
GAS-LIQUID FLOWS 1 - SPRAYS
Seacliff D 10:00AM—12:00PM

Session Organizer: **Rigoberto Morales,** *Federal University of Technology Parana, Parana, Brazil*
Session Co-Organizer: **Tim O'Hern,** *SNL, Albuquerque, NM, United States*

Can Naturally Pulsating Prefilming Slurry Atomization Be Enhanced by Artificial External Modulation?
Technical Paper Publication (ASME). AJKFLUIDS2019-4882
Wayne Strasser, *Eastman Chemical Co., Kingsport, TN, United States*

Numerical Investigation of Internal Flow in Flow-Blurring Atomizers
Technical Presentation. AJKFLUIDS2019-5767
Delin Jiang, Yue Ling, *Baylor University, Waco, TX, United States,* **Lulin Jiang,** *University of Louisiana at Lafayette, Lafayette, LA, United States*

Numerical Simulation on Deposition of Atomization Droplet of Air-Assist Boom Spraying in Air Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-4752
Weidong Jia, Huitao Zhou, *Jiangsu University, Zhenjiang, Jiangsu Province, China*

Flow Characteristics of Rectangular Liquid Jets Injected Into Low Subsonic Crossflow
Technical Paper Publication (ASME). AJKFLUIDS2019-4861
Mehran Tadjfar, Amin Jaberi, Rojin Shokri, *Amirkabir University of Technology, Tehran, Islamic Republic of Iran*

TOPIC 5-10 INTERFACIAL PHENOMENA (WAVES, FREE SURFACE FLOWS)

5-10-1
CAPILLARY FLOW
Room M
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Ichiro Kumagai,** *Meisei University, Tokyo, Japan*
Session Co-Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Thermocapillary Flow of Moderate Prandtl Number Fluid in Annular Pools Heated From Inner Cylinder
Technical Paper Publication (ASME). AJKFLUIDS2019-4653
Sen Zhang, Li Zhang, Chunmei Wu, You-Rong Li, *Chongqing University, Chongqing, China*

Effect of Rotation on Thermal-Solutal Capillary Convection of Binary Fluid Mixture in a Czochralski Configuration
Technical Presentation. AJKFLUIDS2019-4957
Chunmei Wu, Bo Yuan, You-Rong Li, *Chongqing University, Chongqing, China*

Interfacial Dynamics of a Free Surface Upon Impact of a Drop Train
Technical Presentation. AJKFLUIDS2019-5314
Jae Hong Lee, Seungho Kim, Joonoh Kim, *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic),* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic)*

Solutocapillary Flow Induced by a Freshwater Source
Technical Presentation. AJKFLUIDS2019-5576
Islam Benouaguef, *New Jersey Institute of Technology, Harrison, NJ, United States,* **Edison Amah, Pushpendra Singh, Ian S. Fischer, Denis Blackmore,** *New Jersey Institute of Technology, Newark, NJ, United States,* **Naga Aditya Musunuri,** *New Jersey Institute of Technology, North Brunswick, NJ, United States*

Capillary Impregnation of Viscous Fluids in a Multi-Layered Porous Medium
Technical Paper Publication (ASME). AJKFLUIDS2019-5168
Shabina Ashraf, Jyoti Phirani, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

TOPIC 5-11 EROSION, SLURRY, SEDIMENTATION

5-11-1
COMPUTATIONAL STUDIES IN EROSION, SLURRY, AND SEDIMENTATION
Room N
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **John Furlan,** *Giw Industries, Grovetown, GA, United States*
Session Co-Organizer: **Jungchul Kim,** *Korea Institute of Machinery & Materials, Daejeon, Korea (Republic)*

Evaluation of the Effect of Particle Size on Erosion Calculations Utilizing CFD and Comparison With Submerged Slurry Jet Experiments
Technical Paper Publication (ASME). AJKFLUIDS2019-5587
Soroor Karimi, Jun Zhang, Siamack Shirazi, Brenton S. McLaury, *University of Tulsa, Tulsa, OK, United States*

Large Eddy Simulations of the Slurry Erosion in a 90° Elbow
Technical Paper Publication (ASME). AJKFLUIDS2019-4705
Qiuchen Wang, Qiyu Huang, Xu Sun, *China University of Petroleum-Beijing, Beijing, China*

Numerical Simulations of Turbulent Particle-Laden Flow in a 90 deg Elbow
Technical Presentation. AJKFLUIDS2019-5496
Ravon Venters, *Clarkson University, Potsdam, NY, United States,* **Brian Helenbrook,** *Clarkson University, Potsdam, NY, United States,* **Goodarz Ahmadi,** *Clarkson University, Potsdam, NY, United States*

Numerical Simulation of Deposition Phenomena on High-Pressure Turbine Vane Using UPACS
Technical Paper Publication (JSME). AJKFLUIDS2019-5612
Kenta Mizutori, Koji Fukudome, Makoto Yamamoto, *Tokyo University of Science, Tokyo, Japan,* **Masaya Suzuki,** *Japan Aerospace Exploration Agency, Tokyo, Japan*

Large Eddy Simulations of the Slurry Erosion in a 90° Elbow
Technical Presentation. AJKFLUIDS2019-5746
Qiuchen Wang, Qiyu Huang, Xu Sun, *China University of Petroleum-Beijing, Beijing, China*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-5 TURBULENT FLOWS

1-5-2
TURBULENT SHEAR FLOWS AND ROTATION EFFECTS
Room L
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Zhenhua Xia,** *Zheijiang University, Hangzhou, China*
Session Co-Organizer: **Koji Fukagata,** *Keio University, Yokohama, Japan*

Experimental Investigation of Nozzle Orientation Effects on Mixing Characteristics of Elliptic Triple Free Jets
Technical Paper Publication (ASME). AJKFLUIDS2019-5463
Ella M. Morris, Seyed Sobhan Aleyasin, *University of Manitoba, Winnipeg, MB, Canada,* **Neelakash Biswas,** *Indian Institute of Technology Kharagpur, Kharagpur, India,* **Mark Francis Tachie,** *University of Manitoba, Winnipeg, MB, Canada*

Experimental Analysis of Turbulent Wake Development Behind a Permeable Cylinder
Technical Paper Publication (ASME). AJKFLUIDS2019-4790
Yasufumi Horimoto, Yusuke Suzuki, Kazuki Hagiwara, Yasuo Kawaguchi, *Tokyo University of Science, Noda, Chiba, Japan*

Simulation of the Wake of the Flow Around Two Side-By-Side Circular Cylinders at Reynolds Number 5000
Technical Paper Publication (ASME). AJKFLUIDS2019-5442
Anna Lyhne Jensen, Henrik Sørensen, Jakob Haervig, *Aalborg Univesity, Aalborg, Denmark*

Wake Flow and Vortex Shedding Patterns Behind Rotating Finite Length Cylinders
Technical Paper Publication (ASME). AJKFLUIDS2019-5110
Amber Donaldson, John Vaccaro, David M. Rooney, *Hofstra University, Hempstead, NY, United States*

Effects of Coriolis Force on Turbulence Structure in Rotating Channels With High and Low Aspect Ratios
Technical Paper Publication (ASME). AJKFLUIDS2019-4778
Hide S. Koyama, Shoichiro Tatsuta, *Tokyo Denki University, Tokyo, Japan,* **Ema Tamura,** *Tokyo Metropolitan College of Industrial Technology, Tokyo, Japan,* **Hani H. Nigim,** *Birzeit University, Birzeit, Palestinian Territory, Occupied*

Global Stability Analysis on the Spiral-Vortex Mode in the Confined Cavity Flow Between Rotating and Stationary Disks
Technical Paper Publication (ASME). AJKFLUIDS2019-4785
Kie Okabayashi, Yuki Kodera, Shintaro Takeuchi, Takeo Kajishima, *Osaka University, Osaka, Japan,* **Byungjin An,** *,* **Motohiko Nohmi, Masashi Obuchi,** *Ebara Corporation, Fujisawa-Shi, Kanagawa, Japan*

TOPIC 1-15 VORTEX DYNAMICS

1-15-2
VORTEX DYNAMICS 2
Room G
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **James Liburdy,** *Oregon State University, Corvallis, OR, United States*
Session Co-Organizer: **Jooha Kim,** *Ulsan National Institute of Science and Technology, Ulsan, Korea (Republic)*

Experimental Study and Modelling of the Tip-Leakage Flow for an Isolated Fixed Blade
Technical Paper Publication (ASME). AJKFLUIDS2019-4710
Benjamin Deveaux, Camille Fournis, Vincent Brion, Julien Marty, *Onera, The French Aerospace Lab, Meudon, France,* **Antoine Dazin,** *LMFL Kampé de Fériet, Lille, France*

Unsteady Vortex Breakdown Phenomena in an Enclosed Cylindrical Container With a Rotating Endwall Disk
Technical Paper Publication (ASME). AJKFLUIDS2019-4751
YUKI NAKATSUKA, Reima Iwatsu, *Tokyo Denki University, Tokyo, Japan,* **Jae Min hyun,** *Korea Advanced Institute of Science and Technology, Taijon, Korea (Republic),* **Hide S. Koyama,** *Tokyo Denki University, Tokyo, Japan*

Discrete Vortex Modeling of a Flapping Foil With Activated Leading Edge Motion
Technical Paper Publication (ASME). AJKFLUIDS2019-4964
Michael Prier, James Liburdy, *Oregon State University, Corvallis, OR, United States*

Vortex Ring Formation Coupled With a Translating Upstream Body
Technical Presentation. AJKFLUIDS2019-5072
Minho Song, Hyeonseong Kim, Daegyoum Kim, *Korea Advanced Institute of Science and Technology,, Daejeon, Daejeon, Korea (Republic)*

Effects of Rectangular Column Flanges in Steel Structures on Motion-Induced Vortex Vibration
Technical Paper Publication (ASME). AJKFLUIDS2019-4620
Kazutoshi Matsuda, Kusuo Kato, Kazufumi Ejiri, Nade Cao, *Kyushu Institute of Technology, Kitakyushu, Fukuoka, Japan*

Toroid Formation and Evolution in a Two-Phase Rotating Fluid Flow
Technical Presentation. AJKFLUIDS2019-5763
Zhan Wang, Liwen Zhang, Yidi Zhang, Yanbo Liu, *Harbin Engineering University, Harbin, Heilongjiang Province, China*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-2
PUMP DESIGN 2
Seacliff A 1:30PM—3:30PM

Session Organizer: **Bruno Schiavello,** *Flowserve, Millburn, NJ, United States*
Session Co-Organizer: **Young-Seok Choi,** *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic)*

An Hydraulic Overview of Stationary Components with Multistage Pumps: Volutes, Diffusers, Return Vanes
Technical Presentation. AJKFLUIDS2019-5666
Bruno Schiavello, *Flowserve, Millburn, NJ, United States*

CFD-Based Hydraulic Design and Manufacturing of a Multistage Low Specific-Speed Diffuser Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5661
Martijn Van Der Schoot, Kevin Bruurs, Eric Van Der Zijden, *Flowserve, Etten-Leur, Noord-Brabant, Netherlands*

Multi-Objective Optimization of a High Specific Speed Centrifugal Volute Pump Using 3D Inverse Design Coupled With CFD Simulations
Technical Paper Publication (ASME). AJKFLUIDS2019-4676
Luying Zhang, *Advance Design Technology, London, United Kingdom,* **Gabriel Davila,** *Franklin Electric, Fort Wayne, IN, United States,* **Mehrdad Zangeneh,** *University College London, London, United Kingdom*

Investigation and Analysis of the Flow Field Induced by a Symmetrical Suction Elbow at the Pump Inlet
Technical Paper Publication (ASME). AJKFLUIDS2019-5066
Sebastian Muntean, *Romanian Academy - Timisoara Branch, Timisoara, Timis, Romania,* **Alin Ilie Bosioc,** *Politehnica University Timisoara, Timisoara, Timis, Romania,* **Ionel Aurel Draghici,** *AQUATIM SA, Timisoara, Romania,* **Liviu Eugen Anton,** *Politehnica University Timisoara, Timisoara, Timis, Romania*

Evaluate a New Pump Design Using CFD Simulation
Technical Paper Publication (ASME). AJKFLUIDS2019-5657
Hui Ding, *Simerics, Bellevue, WA, United States,* **Benjamin Greenfield,** *Hayward Tyler, Colchester, VT, United States*

Analysis of a Centrifugal Pump Equipped With an Axial Rotor With Variable Speed
Technical Paper Publication (ASME). AJKFLUIDS2019-5617
Alin Ilie Bosioc, Daniel Mos, *Politehnica University Timisoara, Timisoara, Timis, Romania,* **Sebastian Muntean,** *Romanian Academy - Timisoara Branch, Timisoara, Timis, Romania,* **Liviu Eugen Anton,** *Politehnica University Timisoara, Timisoara, Timis, Romania*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*
Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-2 NONINVASIVE MEASUREMENTS IN SINGLE AND MULTIPHASE FLOWS

4-2-2
NONINVASIVE MEASUREMENTS IN SINGLE AND MULTIPHASE FLOWS - BUBBLY FLOWS AND DROPLETS

Room E
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Thomas Shepard,** *University of St. Thomas, Minneapolis, MN, United States*
Session Co-Organizer: **Shigeo Hosokawa,** *Kobe University, Kobe, Hyogo, Japan*

Bubble Measurement via Hough Transform in Highly Overlapping Conditions
Technical Paper Publication (ASME). AJKFLUIDS2019-5223
Thomas Shepard, *University of St. Thomas, Minneapolis, MN, United States,* **Thomas Hoft,** *University of St. Thomas, Saint Paul, MN, United States*

Measurements of Velocity and Size in Two-Phase Flows using Volumetric PIV
Technical Presentation. AJKFLUIDS2019-5232
Ruben Hortensius, Daniel Troolin, Aaron Boomsma, Stamatios Pothos, *TSI Incorporated, Shoreview, MN, United States*

Effect of Electrolytes on the Drainage and Rupture of the Thin Liquid Film Formed Between a Bubble and a Solid Surface
Technical Presentation. AJKFLUIDS2019-5544
Toshiyuki Ogasawara, Daiki Tanaka, Yasuhiro Motonishi, Hiroyuki Takahira, *Osaka Prefecture University, Sakai, Osaka, Japan*

Local Flow Characteristics of Liquid Film and Droplets in Annular Two-Phase Flow
Technical Presentation. AJKFLUIDS2019-5603
Tatsuya Hazuku, Tomonori Ihara, *Tokyo University of Marine Science and Technology, Tokyo, Japan*

Evaluation of Drag Force Acting on Single Contaminated Drop Based on Velocity Distribution
Technical Presentation. AJKFLUIDS2019-5057
Gaku Shigekane, Shigeo Hosokawa, Kosuke Hayashi, Akio Tomiyama, *Kobe University, Kobe, Hyogo, Japan*

TOPIC 4-3 FLUID DYNAMICS OF WIND ENERGY

4-3-2
FLUID DYNAMICS OF WIND ENERGY - II

Room F
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Brent Houchens,** *Sandia National Laboratories, Livermore, CA, United States*
Session Co-Organizer: **Jangho Lee,** *Kunsan National University, Kunsan, No Selection, Korea (Republic)*

Lab-Scale Wind Tunnel Experiment Test of Wind Turbine Blades for Performance Evaluation
Technical Paper Publication (KSME). AJKFLUIDS2019-5350
Jae Sang Moon, Jangho Lee, Sangkyun Kang, Sung Soo Park, *Kunsan University, Gunsan, Korea (Republic)*

Comparison of Field Measurements and Large Eddy Simulations of the Scaled Wind Farm Technology (SWiFT) Site
Technical Paper Publication (ASME). AJKFLUIDS2019-5493
Myra Blaylock, Brent Houchens, *Sandia National Laboratories, Livermore, CA, United States,* **David Maniaci, Thomas Herges, Alan Hsieh, Robert Knaus, Philip Sakievich,** *Sandia National Laboratories, Albuquerque, NM, United States*

A Novel Energy-Conversion Device for Wind and Hydrokinetic Applications
Technical Paper Publication (ASME). AJKFLUIDS2019-5542
Brent Houchens, David Marian, *Sandia National Laboratories, Livermore, CA, United States,* **Suhas Pol,** *Texas Tech University, Lubbock, TX, United States,* **Carsten Westergaard,** *Westergaard Solutions, Inc., Houston, TX, United States*

A Tomographic PIV Study and Comparison of Vortex Identification Methods on NACa 63-215 Hydrofoil Wake Structure
Technical Paper Publication (ASME). AJKFLUIDS2019-5550
Reza Ziazi, *Oregon State University, Corvallis, OR, United States,* **Navid Goudarzi,** *UNC Charlotte, Charlotte, NC, United States*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-3 EXPERIMENTAL METHODS FOR MULTIPHASE FLOWS

5-3-2
EXPERIMENTAL TECHNIQUES II
Seacliff C 1:30PM—3:30PM

Session Organizer: **Ichiro Kumagai,** *Meisei University, Tokyo, Japan*
Session Co-Organizer: **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic),* **Sarat Chandra Kuchibhatla,** *Dow Chemical Company, Midland, MI, United States*

Tracker: An Opensource Particle Tracking Velocimetry (PTV) Application Applied to Multiphase Flow Reactors
Technical Paper Publication (ASME). AJKFLUIDS2019-5181
Justin Weber, Michael M. Bobek, Steven L. Rowan, Jingsi J. Yang, Ronald W. Breault, *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States*

Thermal and Hydraulic Characteristics of Flow-Boiling in a Rectangular Channel Filled With Metallic Porous Media
Technical Presentation. AJKFLUIDS2019-5270
Daeyeon Kim, Kyung Chun Kim, *Pusan National University, Pusan, Korea (Republic)*

Evaluation of Impeller Designs in Stirred Tank Reactors Using Electrical Resistance Tomography
Technical Presentation. AJKFLUIDS2019-5675
Sarat Chandra Kuchibhatla, Justin Walker, James Pressler, *Dow Chemical Company, Midland, MI, United States*

Complex Flow During the Rotational Stirring of a Three-Phase Liquid
Technical Presentation. AJKFLUIDS2019-5762
Zixuan Wang, Yanbo Liu, Shunxin Zheng, *Harbin Engineering University, Harbin, Heilongjaing Province, China*

TOPIC 5-4 CAVITATION

5-4-2
CAVITATION-2: PHYSICS AND MODELING OF CAVITATION
Room D
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Kazumichi Kobayashi,** *Hokkaido University, Sapporo, Japan*
Session Co-Organizer: **William Straka,** *Penn State, State College, PA, United States*

Cavitation in Co-Rotating Tip Vortices
Technical Paper Publication (ASME). AJKFLUIDS2019-5240
Jeremy Koncoski, Michael H. Krane, Joseph Welz, David Hanson, Steven M. Willits, *Pennsylvania State University, State College, PA, United States,* Robert Kunz, *Penn State University, University Park, PA, United States*

In Situ Measurement of Liberation of a Dissolved Gas in Unsteady Cavitating Flow in Water
Technical Paper Publication (JSME). AJKFLUIDS2019-5593
Daiki Makii, Hirotoshi Sasaki, Yuka Iga, *Tohoku University, Sendai, Miyagi, Japan*

Experimental Study of Free-Surface Deformation and Cavitation Bubble Dynamics in a Megasonic Cleaning Bath
Technical Paper Publication (JSME). AJKFLUIDS2019-5345
Yu Katano, Keita Ando, *Keio University, Kanagawa, Japan*

Cavitation Cloud Formation by High Intensity Focused Ultrasound Caused by Backscattering From a Laser-Induced Bubble in Glycerol-Water Solutions
Technical Presentation. AJKFLUIDS2019-5338
Yuki Susa, Taisei Horiba, Toshiyuki Ogasawara, Hiroyuki Takahira, *Osaka Prefecture University, Osaka, Japan*

Experimental and Numerical Investigation on Pressure Fluctuation of the Impeller in an Axial Flow Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5161
Xi Shen, Desheng Zhang, Bin Xu, Yongxin Jin, Xiongfa Gao, *Jiangsu University, Zhenjiang, Jiangsu Province, China*

TOPIC 5-5 GAS-LIQUID FLOWS

5-5-2
GAS-LIQUID FLOWS 2 - BUBBLY FLOWS
Seacliff D 1:30PM—3:30PM

Session Organizer: **Jungwoo Kim,** *Seoul National University of Science & Technology, Seoul, Korea (Republic)*
Session Co-Organizer: **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*

Flow Past Two Cylinders Arranged in Tandem Within a Microbubble Plume
Technical Paper Publication (ASME). AJKFLUIDS2019-4971
Tomomi Uchiyama, *Nagoya University, Nagoya, Japan,* **Ryota Kano,** *Brother Industries, Ltd., Nagoya, Japan,* **Tomohiro Degawa, Kotaro Takamure,** *Nagoya University, Nagoya, Japan*

Bubble Interactions With Cylinder Wakes in Adiabatic Two-Phase Flow Around Cylinders
Technical Presentation. AJKFLUIDS2019-5508
Dohwan Kim, Matthew J. Rau, *Penn State University, University Park, PA, United States*

An Effect of Flow Velocity on Propagation Properties of Weakly Nonlinear Waves in Bubbly Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-4774
Taiki Maeda, Tetsuya Kanagawa, *University of Tsukuba, Tsukuba, Japan*

Phenomenological Prediction of Convective Heat and Mass Transfer to Taylor Bubbles Rising in Vertical Pipes
Technical Paper Publication (ASME). AJKFLUIDS2019-5030
Abdullah Abbas Kendoush, *Augusta Technical College, Augusta, GA, United States*

Void Waves Developing in Gas-Liquid Two-Phase Turbulent Boundary Layers Beneath a Flat Bottom Model Ship
Technical Paper Publication (JSME). AJKFLUIDS2019-5272
Taiji Tanaka, Park Hyun Jin, Yuji Tasaka, Yuichi Murai, *Hokkaido University, Sapporo, Hokkaido, Japan*

TOPIC 5-7 GAS-SOLID FLOWS

5-7-1
GAS-SOLID FLOW APPLICATIONS
Room O
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Changhoon Lee,** *Yonsei University, Seoul, Korea (Republic)*
Session Co-Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Peyman Zahedi,** *Virtual Integrated Analytics Solutions, Houston, TX, United States*

Use of Spray-Atomization and Cyclone Collection to Generate Algae-Sized Food Particles to Deter the Spread of Invasive Carp Through US Waterways
Technical Presentation. AJKFLUIDS2019-4826
Thomas Zolper, *University of Wisconsin - Platteville, Cuba City, WI, United States,* **Jon J. Amberg,** *United States Geological Survey - Upper Midwest Environmental Sciences Center, La Crosse, WI, United States*

Experimental and Computational Studies of Particle Scavenge Flow in Direct Laser Metal Sintering
Technical Paper Publication (ASME). AJKFLUIDS2019-4965
Morgan Austin, Thao Tran-Le, Robert Kunz, Timothy Simpson, *Penn State University, University Park, PA, United States,* **Rui Ni,** *Johns Hopkins University, Baltimore, MD, United States*

Deposition of Ellipsoidal Fibers in Nasal Cavity: Influence of Non-Creeping Flow Conditions
Technical Paper Publication (ASME). AJKFLUIDS2019-5378
Mehdi Tash, Mohammad Mehdi Tavakol, *Islamic Azad University, Shiraz Branch, Shiraz, Islamic Republic of Iran,* **Omid Abouali,** *Shiraz University, Shiraz, Islamic Republic of Iran,* **Goodarz Ahmadi,** *Clarkson University, Potsdam, NY, United States*

A Numerical Study of Sand Particle Erosion in a Series of Ball Seats in Gas-Particle Two-Phase Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5497
A. Rasteh, Ali Farokhipour, M.A. Rasoulian, Zohreh Mansoori, Majid Saffar-Avval, *Amirkabir University of Technology, Tehran, Islamic Republic of Iran,* **Goodarz Ahmadi, Amir A. Mofakham,** *Clarkson University, Potsdam, NY, United States*

Shock-Induced Solid-Particle Jet Formation in a Hele-Shaw Cell
Technical Presentation. AJKFLUIDS2019-5566
Revanth Kotha, Bertrand, B Rollin, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

TOPIC 5-10 INTERFACIAL PHENOMENA (WAVES, FREE SURFACE FLOWS)

5-10-2
FREE SURFACE FLOW AND DROPLET
Room M
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*
Session Co-Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Ichiro Kumagai,** *Meisei University, Tokyo, Japan*

Modification of Air Cavity Flow Under Model Hull With Hydrodynamic Actuators
Technical Paper Publication (ASME). AJKFLUIDS2019-4632
Matthew Pace, Konstantin Matveev, *Washington State University, Pullman, WA, United States*

Theoretical and Numerical Analysis of the Pressure Distribution and Discharge Velocity in Flows Under Inclined Sluice Gates
Technical Paper Publication (ASME). AJKFLUIDS2019-5020
Philipp Epple, Michael Steppert, *Hochschule Coburg, Coburg, Germany,* **Andreas Malcherek,** *University of the German Armed Forces Munich, Neubiberg, Germany,* **Manuel Fritsche,** *Hochschule Coburg, Coburg, Germany*

Liquid Jet Impingement on a Rotating Substrate
Technical Presentation. AJKFLUIDS2019-5357
Yunsuk Jeung, Jae Hong Lee, Ho-Young Kim, *Seoul National University, Seoul, Korea (Republic)*

The Spike Dynamics Source Model for Ejecta in the FLAG Code
Technical Paper Publication (ASME). AJKFLUIDS2019-5455
Alan K. Harrison, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Energy-Free Flow Control in a Sessile Droplet
Technical Presentation. AJKFLUIDS2019-5044
Hyoungsoo Kim, Junkyu Kim, Jonghyeok Park, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-11 EROSION, SLURRY, SEDIMENTATION

5-11-2
EXPERIMENTAL STUDIES IN EROSION, SLURRIES, AND SEDIMENTATION
Room N
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Jaikrishnan Kadambi,** *Case Western Reserve University, Cleveland, OH, United States*
Session Co-Organizer: **Hadi Arabnejad Khanouki,** *Halliburton, Carrollton, TX, United States*

Erosive Wear Behavior of Fiberglass Reinforced Plastic Composite and Polyethylene
Technical Paper Publication (ASME). AJKFLUIDS2019-5537
Nafiseh Banazadeh Neishabouri, *Siamack Shirazi, University of Tulsa, Tulsa, OK, United States*

Experimental Determination of Impact Wear Coefficients for Modeling of Erosion in Highly Loaded Slurry Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-4831
John Furlan, *Giw Industries, Grovetown, GA, United States,* **Krishnan Pagalthivarthi, Harry Tian,** *GIW Minerals, Grovetown, GA, United States,* **Perry Barsh,** *GIW Industries, Grovetown, GA, United States,* **Robert Visintainer,** *GIW Minerals, Grovrtown, GA, United States*

Effect of Particle Size on Solid Particle Erosion Under Gas Dominated Flow Conditions
Technical Presentation. AJKFLUIDS2019-4885
Jun Zhang, Farzin Darihaki, Siamack Shirazi, *University of Tulsa, Tulsa, OK, United States*

Flow of a Cement Slurry Modeled as a Generalized Second Grade Fluid
Technical Presentation. AJKFLUIDS2019-4895
Chengcheng Tao, *National Energy Technology Laboratory, Pittsburgh, PA, United States*

Is Radioactive Tank Waste a Bingham Fluid?
Technical Paper Publication (ASME). AJKFLUIDS2019-5216
Leonard Pease, Arich Fuher, Judith Bamberger, Carolyn Burns, Richard Daniel, Michael Minette, *Pacific Northwest National Laboratory, Richland, WA, United States*

TOPIC 5-15 COMPRESSIBLE MULTIPHASE FLOWS (TURBULENT MIXING)

5-15-1
SHOCK-DRIVEN TURBULENT MIXING - MODELING AND SIMULATIONS

Seacliff B 1:30PM—3:30PM

Session Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Session Co-Organizer: **Oleg Schilling,** *Lawrence Livermore National Laboratory, Livermore, CA, United States*

Reynolds-Averaged Navier-Stokes Modeling of Turbulent Rayleigh-Taylor, Richtmyer-Meshkov, and Kelvin-Helmholtz Mixing Using a Higher-Order Shock-Capturing Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5235
Oleg Schilling, *Lawrence Livermore National Laboratory, Livermore, CA, United States*

Mix Width, Bubble and Spike Amplitudes in Three-Dimensional Numerical Simulations of Turbulent Mixing Driven by Spherical Implosions
Technical Paper Publication (ASME). AJKFLUIDS2019-4968
Moutassem El Rafei, Ben Thornber, *University of Sydney, Sydney, Australia*

Effects of Operator Splitting and Low Mach Number Correction in Simulations of Shock-Driven Turbulent Mixing
Technical Presentation. AJKFLUIDS2019-5105
Filipe Pereira, Fernando Grinstein, Daniel Israel, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Implicit Large-Eddy Simulation of Transition and Turbulence Decay
Technical Paper Publication (ASME). AJKFLUIDS2019-5451
Fernando Grinstein, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Dynamics of Filtered Statistics of Homogeneous Variable Density Turbulence
Technical Presentation. AJKFLUIDS2019-5206
Juan Saenz, *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Denis Aslangil,** *Lehigh University, Bethlehem, PA, United States,* **Daniel Livescu,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-1 FLUIDS ENGINEERING EDUCATION

1-1-1
FLUIDS ENGINEERING EDUCATION

Room D
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Ivana Milanovic,** *University of Hartford, West Hartford, CT, United States*
Session Co-Organizer: **Ray Taghavi,** *University of Kansas, Lawrence, KS, United States*

Gamification for Formative Assessment in the Framework of Engineering Learning
Technical Paper Publication (ASME). AJKFLUIDS2019-4601
Teresa Parra-Santos, *University of Palencia, Valladolid, Spain,* **José Molina,** *Universidad de Alicante, Alicante, Spain*

Simulation-Based Approach to Science, Technology, Engineering, and Math Challenges
Technical Paper Publication (ASME). AJKFLUIDS2019-4864
Ivana Milanovic, Tom Eppes, Kamau Wright, *University of Hartford, West Hartford, CT, United States*

Open-Source Computational Fluid Dynamics in Engineering Education
Technical Paper Publication (ASME). AJKFLUIDS2019-5475
Ivaylo Nedyalkov, *University of New Hampshire, Durham, NH, United States*

Using Jet Engine Simulator in Propulsion Education
Technical Paper Publication (ASME). AJKFLUIDS2019-4963
Ray Taghavi, Saeed Farokhi, *University of Kansas, Lawrence, KS, United States*

Theoretical and Experimental Study of Hydrophobicity of a Nanostructure Coating Using Quartz Crystal Microbalance (QCM)
Technical Paper Publication (ASME). AJKFLUIDS2019-5109
Hamed Esmaeilzadeh, Keqin Zheng, Joey Mead, Hongwei Sun, *University of Massachusetts Lowell, Lowell, MA, United States*

Technical Tracks

TOPIC 1-5 TURBULENT FLOWS

1-5-3
SURFACE EFFECTS IN TURBULENCE
Room L
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Lyes Khezzar,** *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*
Session Co-Organizer: **Kyung Chun Kim,** *Pusan National University, Pusan, Korea (Republic)*

Effect of Active Flow Control Mechanisms on the Turbulent Flow Structures
Technical Paper Publication (ASME). AJKFLUIDS2019-4798
Satoshi Tsubokura, Yasuo Kawaguchi, *Tokyo University of Science, Noda, Chiba, Japan*

Experimental Study on the Friction Drag Reduction of Hydrogel Paint in a Boundary Layer on Flat Plate
Technical Paper Publication (ASME). AJKFLUIDS2019-4746
Youhei Takagi, Takanori Hino, *Yokohama National University, Yokohama, Kanagawa, Japan,* **Masanari Nishimura, Hiromi Aso,** *Mitsubishi Chemical Corporation, Yokohama, Kanagawa, Japan*

Effect of Reynolds Number on The Turbulence Intensities Over a Superhydrophobic Surface
Technical Presentation. AJKFLUIDS2019-5687
Wagih Abu Rowin, Sina Ghaemi, *University of Alberta, Edmonton, AB, Canada*

Directional Surface Roughness Influence on Turbulent Flow Structure
Technical Paper Publication (ASME). AJKFLUIDS2019-5615
Zambri Harun, *National University of Malaysia, Bangi, Selangor, Malaysia,* **Ashraf Amer Abbas,** *Universiti Kebangsaan Malaysia, Bangi, Malaysia,* **Bagus Nugroho,** *The University of Melbourne, Melbourne, VIC, Australia*

Laser Velocity and Surface Measurements Toward the Prediction of Turbulent Frictional Resistance on Irregular Rough Surface in Higher Reynolds Number Range
Technical Paper Publication (ASME). AJKFLUIDS2019-5325
Kyohei Okubo, Shunpei Suzuki, *Tokyo University of Science, Noda, Chiba, Japan,* **Yusuke Kuwata,** *Osaka Prefecture University, Sakai, Japan,* **Yasuo Kawaguchi,** *Tokyo University of Science, Noda, Chiba, Japan*

The Influence of Flexible Strip Height on Convective Heat Transfer Enhancement
Technical Paper Publication (ASME). AJKFLUIDS2019-5229
Yang Yang, David Ting, *University of Windsor, Windsor, ON, Canada,* **Steve Ray,** *Essex Energy, Oldcastle, ON, Canada*

TOPIC 1-6 FLOW MANIPULATION

1-6-1
FLOW MANIPULATION
Room F
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Koji Fukagata,** *Keio University, Yokohama, Japan*
Session Co-Organizer: **Hassan Peerhossaini,** *University of Western Ontario, London, ON, Canada,* **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States*

Experimental Investigations on Friction Drag Reduction on an Airfoil by Passive Blowing
Technical Paper Publication (JSME). AJKFLUIDS2019-5068
Shiho Hirokawa, *Keio University, Yokohama, Japan,* **Kaoruko Eto,** *Keio University, Kanagawa, Japan,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Naoko Tokugawa,** *Japan Aerospace Exploration Agency, Mitaka, Japan*

Parametric Study for Optimization of Blowing and Suction Locations for Improving Lift-to-Drag Ratio on a Clark-Y Airfoil
Technical Paper Publication (JSME). AJKFLUIDS2019-5067
Masahiro Ohashi, Yuki Morita, Shiho Hirokawa, Koji Fukagata, *Keio University, Yokohama, Japan,* **Naoko Tokugawa,** *Japan Aerospace Exploration Agency, Mitaka, Japan*

Prediction of Drag Reduction With Liquid-Infused Micro-Grooved Surfaces in a Turbulent Channel Flow
Technical Presentation. AJKFLUIDS2019-5246
Jaehee Chang, *Seoul National University, Seoul, Korea (Republic),* **Taeyong Jung,** *LG Electronics, Seoul, Korea (Republic),* **Haecheon Choi,** *Seoul National University, Seoul, Korea (Republic),* **John Kim,** *University of California, Los Angeles, Pacific Palisades, CA, United States*

Resolvent Analysis of Turbulent Friction Drag Reduction by Manipulation of Mean Velocity Profile
Technical Paper Publication (JSME). AJKFLUIDS2019-5125
Riko Uekusa, Aika Kawagoe, Yusuke Nabae, Koji Fukagata, *Keio University, Yokohama, Kanagawa, Japan*

Flow Around a Circular Cylinder With Axially Arranged Holes
Technical Presentation. AJKFLUIDS2019-5400
Jooha Kim, Jihee Kim, Seokbong Chae, *Ulsan National Institute of Science and Technology, Ulsan, Korea (Republic)*

Using Seams to Control the Wake of a Baseball
Technical Presentation. AJKFLUIDS2019-5737
Barton Smith, *Utah State University, Logan, UT, United States*

TOPIC 1-9 TRANSPORT PHENOMENA IN ENERGY CONVERSION AND MANUFACTURING PROCESSES

1-9-1
TRANSPORT PHENOMENA IN ENERGY CONVERSION AND MANUFACTURING PROCESSES
Room G
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Khaled Hammad,** *Central Connecticut State University, Simsbury, CT, United States*
Session Co-Organizer: **MAN YEONG HA,** *Pusan National University, Pusan, Korea (Republic)*

The Effect of Model Parameters on CFD Simulation of a Thermosyphon
Technical Paper Publication (ASME). AJKFLUIDS2019-4896
Huiyu Wang, *University of Oklahoma, Norman, OK, United States,* **D. Keith Walters, Keisha Walters,** *University of Oklahoma, Norman, OK, United States*

Numerical Study for Effect of Staggered Wire Electrodes in a Electrostatic Precipitator
Technical Paper Publication (KSME). AJKFLUIDS2019-4995
Hoyeon Choi, Yong Gap Park, Man Yeong Ha, *Pusan National University, Pusan, Korea (Republic)*

Can Natural Convection on Smooth Vertical Plates in the Laminar Regime Be Improved by Adding Forward Facing Triangular Roughness Elements?
Technical Paper Publication (ASME). AJKFLUIDS2019-5441
Jakob Haervig, Anna Lyhne Jensen, Henrik Sørensen, *Aalborg University, Aalborg, Denmark*

Dynamic Performance Analysis of Large-Scale Packed Bed Truncated Conical Thermal Energy Storage
Technical Paper Publication (ASME). AJKFLUIDS2019-5680
Shobhana Singh, Kim Sørensen, *Aalborg University, Aalborg, Denmark*

Heat Transfer and Fluid Flow in Arc-Based Additive Manufacturing
Technical Paper Publication (ASME). AJKFLUIDS2019-4828
Jun Zhou, *Penn State University, Behrend College, Erie, PA, United States*

TOPIC 1-12 CFD VERIFICATION AND VALIDATION

1-12-1
CFD VERIFICATION AND VALIDATION
Room M
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Deify Law,** *California State University, Fresno, Fresno, CA, United States*
Session Co-Organizer: **Seongwon Kang,** *Sogang University, Seoul, Korea (Republic),* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan*

Consideration of CFD Analysis Accuracy of Box Fan
Technical Paper Publication (JSME). AJKFLUIDS2019-4795
Shigeyuki Tomimatsu, *DMW Corporation, Shizuoka, Japan,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan*

A Validation Experiment for Turbulent Mixing in a Collated Jet
Technical Paper Publication (ASME). AJKFLUIDS2019-4981
Ian Craig, Coleman Hoff, Paul Kristo, Mark Kimber, *Texas A&M University, College Station, TX, United States*

CFD Simulations of the Rheological Behavior of Aqueous Foam Flow Through a Half-Sudden Expansion
Technical Paper Publication (ASME). AJKFLUIDS2019-4650
Heni Dallagi, Ahmad Al Saabi, Christine Faille, Thierry Benezech, *UMET UMR 8207, National Institute for Agricultural Research, Villeneuve d'Ascq, France,* **Wolfgang Augustin,** *Technische Universität Braunschweig, Braunschweig, Germany,* **Fethi Aloui,** *Polytechnic University Hauts-de-France, Valenciennes, France*

Analysis of Turbulent Swirling Flows in Straight Annular Pipe Using an ODE-Based Model for Swirl Decay Rate
Technical Presentation. AJKFLUIDS2019-5421
Hyunjae Kim, *Sogang University, Seoul, Korea (Republic),* **Jaehoon Choi,** *Seoul National University, Seoul, Korea (Republic),* **Eunbeom Jung,** *Sogang University, Seoul, Korea (Republic),* **Hyungrok Do,** *Seoul National University, Seoul, Korea (Republic),* **Seongwon Kang,** *Sogang University, Seoul, Korea (Republic)*

Technical Tracks

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-3
HPC - CFD LES PUMP STUDY
Seacliff A 3:45PM—5:45PM

Session Organizer: **Akira Goto,** *Ebara Corporation, Kanagawa, Japan*
Session Co-Organizer: **Frank Visser,** *Flowserve, Etten-Leur, Netherlands*

Applications of Very Large Scale Fluid-Flow Computations to Industrial Problems
Keynote Presentation. AJKFLUIDS2019-5757
Chisachi Kato, *University of Tokyo, Meguro-Ku, Japan*

Flow Field and Performance Analysis of a Centrifugal Pump During Unstable Operating Conditions
Technical Paper Publication (JSME). AJKFLUIDS2019-4886
Romain Prunières, *Hitachi Industrial Products, Ltd., Tsuchiura, Japan,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan*

Large Eddy Simulation of a Submerged Vortex in a Simplified Computational Model
Technical Paper Publication (ASME). AJKFLUIDS2019-5205
Yamade Yoshinobu, *Mizoho Info Res Inst, Kanda, Japan,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Takahide Nagahara,** *Hitachi, Ltd., Tsuchiura, Japan,* **Jun Matsui,** *Yokohama National University, Yokohama, Japan*

Large Eddy Simulation of Flow in a Volute-Type Centrifugal Pump and Its Control
Technical Presentation. AJKFLUIDS2019-5260
Beomjun Kye, Keuntae Park, Haecheon Choi, *Seoul National University, Seoul, Korea (Republic),* **Myungsung Lee, Joo-han Kim,** *Korea Electronics Technology Institute, Bucheon, Gyeonggi-do, Korea (Republic)*

Prediction of Flow Phenomena and Performance of Single-Stage Pump by Using LES
Technical Presentation. AJKFLUIDS2019-5332
Hiroyoshi Watanabe, *Ebara Corporation, Futtsu-Shi Chiba, Japan*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*
Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-8 EXPERIMENTAL FACILITIES IN FLUID MECHANICS

4-8-1
EXPERIMENTAL FACILITIES IN FLUID MECHANICS
Room N
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States*
Session Co-Organizer: **George Papadopoulos,** *Innoveering, LLC, Ronkonkoma, NY, United States*

Effects of Wind Environment on Propeller Performance of Multirotor Drone in Hover
Technical Paper Publication (ASME). AJKFLUIDS2019-4854
Motonao Murakami, *Tokyo University of Science, Katsushika-ku, Tokyo, Japan,* **Hiroyuki Abe,** *National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan,* **Hikaru Aono, Hitoshi Ishikawa,** *Tokyo University of Science, Katsushika-ku, Tokyo, Japan*

Plasma Driven Shock Tube for Dynamic Characterization of Sensors
Technical Paper Publication (ASME). AJKFLUIDS2019-4869
Daniel Bivolaru, George Papadopoulos, *Innoveering, LLC, Ronkonkoma, NY, United States*

Development of a Flexible Four-Camera Volumetric PIV System for Tow Tank Applications
Technical Presentation. AJKFLUIDS2019-5233
Ruben Hortensius, Stamatios Pothos, Mark Cecconi, *TSI Incorporated, Shoreview, MN, United States*

Influence of Plasma-Induced Flow Direction on the Instability of the Jet Boundary Layer
Technical Paper Publication (JSME). AJKFLUIDS2019-5377
Norimasa Miyagi, *Nihon University, Funabashi City, Chiba Pref., Japan,* **Motoaki Kimura,** *Nihon University, Tokyo, Japan*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-5 GAS-LIQUID FLOWS

5-5-3
GAS-LIQUID FLOWS 3 - APPLICATIONS

Seacliff D 3:45PM—5:45PM

Session Organizer: **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*

Session Co-Organizer: **Park Hyun Jin,** *Hokkaido University, Sapporo, Hokkaido, Japan*

Experimental Study of Bubble-Droplet Interactions in Improved Primary Oil Separation
Technical Paper Publication (ASME). AJKFLUIDS2019-5386
Joel R. Karp, Ernesto Mancilla, Paulo H.D. Santos, Moisés A.M. Neto, *Federal University of Technology - Paraná, Curitiba, PR, Brazil,* **Rigoberto Morales,** *Federal University of Technology Parana, Parana, Brazil*

Analysis on Heat Transfer and Phase Change for Two-Phase Boiling Flow in Quenching Process
Technical Paper Publication (ASME). AJKFLUIDS2019-4832
Lu Wang, *Hokkaido University/Harbin Engineering University, Sapporo, Japan,* **Nobuyuki Oshima, Sangwon Kim,** *Hokkaido University, Sapporo, Japan*

Effect of Interstage Injection on Compressor Flow Characteristic
Technical Paper Publication (ASME). AJKFLUIDS2019-4959
Inez Von Deschwanden, *University Duisburg-Essen, Duisburg, Germany,* **Stefan Braun,** *Siemens AG, Mülheim A.D. Ruhr, Germany,* **Dieter Brillert,** *University of Duisburg-Essen, Duisburg, Germany*

Two-phase Flow Pattern Classification by Convolutional Neural Network
Technical Presentation. AJKFLUIDS2019-5042
Gangjune Kim, Chaehyuk Im, Wooyoung Lee, Simon Song, *Hanyang University, Seoul, Korea (Republic)*

Experimental and Numerical Investigation of Interfacial Waviness in Two-Phase Mini-Channel Flow
Technical Presentation. AJKFLUIDS2019-5574
Hong-Cheol Shin, Jung-Youn Song, Woo-Yul Kim, Sung-Min Kim, *Sungkyunkwan University, Suwon, Korea (Republic)*

A Model for a Gas Column Oscillation Inside a Hole by Irradiating an Acoustic Wave
Technical Paper Publication (JSME). AJKFLUIDS2019-4840
Yuki Furuya, Toshiyuki Sanada, *Shizuoka University, Hamamatsu, Japan,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan*

TOPIC 5-7 GAS-SOLID FLOWS

5-7-2
GAS-SOLID FLOW THEORETICAL ANALYSIS

Room O
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan*

Session Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States*

Brownian Diffusion of Nano-Fibers: Application to Mobility Characterizations
Technical Paper Publication (ASME). AJKFLUIDS2019-4652
Lin Tian, *RMIT University, Melbourne, FL, United States,* **Goodarz Ahmadi,** *Clarkson University, Potsdam, NY, United States,* **Jiyuan Tu,** *RMIT University, Melbourne, FL, United States*

A Statistical Approach for Modeling Stochastic Rebound Characteristics of Solid Particles
Technical Paper Publication (ASME). AJKFLUIDS2019-4655
Ghulam Haider, Alireza Asgharpour, Jun Zhang, Siamack Shirazi, *University of Tulsa, Tulsa, OK, United States*

Uncertainty Quantification of a Fluidized Bed Reactor
Technical Paper Publication (ASME). AJKFLUIDS2019-4844
V.M. Krushnarao Kotteda, Anitha Kommu, Vinod Kumar, *University of Texas at El Paso, El Paso, TX, United States,* **William Spotz,** *Sandia National Laboratories, Albuquerque, NM, United States*

On Near Wall Coherent Structures in Turbulent Channel Flows
Technical Presentation. AJKFLUIDS2019-5491
Amir A. Mofakham, Goodarz Ahmadi, John McLaughlin, *Clarkson University, Potsdam, NY, United States*

An Evaluation of a Converging Divergng Nozzle in a Particle Laden Flow
Technical Presentation. AJKFLUIDS2019-5536
Michael Kinzel, *University of Central Florida, Orlando, FL, United States,* **Jeffrey Hunt, Chris Page,** *Noise Control Engineering, LLC, Billerica, MA, United States*

TOPIC 5-14 MULTIPHASE FLOWS IN NUCLEAR ENGINEERING

5-14-1
MULTIPHASE FLOWS IN NUCLEAR ENGINEERING I
Seacliff C 3:45PM—5:45PM

Session Organizer: **Byong Jo Yun,** *Pusan National University, Pusan, Korea (Republic)*
Session Co-Organizer: **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*

Experimental Investigation of Single- and Two-Phase (Bubbly) Flows in a 5 × 5 Rod-bundle
Technical Presentation. AJKFLUIDS2019-5280
Jungjin Lee, Hyungmin Park, *Seoul National University, Seoul, Korea (Republic)*

Thermal-Hydraulic Modeling of Supersonic Steam Injector as a Passive Safety System
Technical Paper Publication (JSME). AJKFLUIDS2019-5423
Shuichiro Miwa, Nozomu Akiyama, *Hokkaido University, Sapporo, Japan*

A Simulated Boiling Curve Up To DNB Using Empirical Wall Boiling Closure in Eulerian Two-Fluid Model
Technical Presentation. AJKFLUIDS2019-5726
Seung Jun Kim, Russell Johns, *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Junsoo Yoo,** *INL, Idaho Fall, ID, United States*

The Science and Technology of Void Fraction Measurements in Multiphase Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-4614
Abdullah Abbas Kendoush, *Augusta Technical College, Augusta, GA, United States*

TOPIC 5-15 COMPRESSIBLE MULTIPHASE FLOWS (TURBULENT MIXING)

5-15-2
PARTICLES AND SUBGRID SCALE MODELING
Seacliff B 3:45PM—5:45PM

Session Organizer: **Jungwoo Kim,** *Seoul National University of Science & Technology, Seoul, Korea (Republic)*
Session Co-Organizer: **Tai Jin,** *Zhejiang University, Hangzhou, China,* **Park Hyun Jin,** *Hokkaido University, Sapporo, Hokkaido, Japan,* **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Particle-Fluid-Particle Interactions in Disperse Multiphase Flow
Technical Presentation. AJKFLUIDS2019-5027
Duan Zhang, Georges Akiki, Rick Rauenzahn, Marianne Francois, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Accuracy of the CRW Models for Prediction of the Deposition and Dispersion of Particles in Inhomogeneous Turbulent Channel Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-4856
Amir A. Mofakham, Goodarz Ahmadi, *Clarkson University, Potsdam, NY, United States*

Research on the Condensation Process of Gaseous Water and Water/Ethanol Mixture in the Laval Nozzle
Technical Paper Publication (ASME). AJKFLUIDS2019-4917
Jiang Bian, Xuewen Cao, *China University of Petroleum (East China), Qingdao, Shandong, China*

Shocking Sandstorms: An Investigation of Electric Fields and Turbulent Flows in Sandstorms
Technical Presentation. AJKFLUIDS2019-5758
Mustafa Rahman, Wan Cheng, Ravi Samtaney, *King Abdullah University of Science and Technology, Thuwal, Jeddah Province, Saudi Arabia*

Subgrid-Scale Dynamics of Turbulent Mixing by Shock-Deposited Baroclinic Vorticity
Technical Presentation. AJKFLUIDS2019-5590
Sidharth GS, *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Graham Candler,** *University of Minnesota, Minneapolis, MN, United States*

PLENARY TALKS

TOPIC 8-1 PLENARY TALKS

8-1-2
PLENARY TALKS II
Grand Ballroom A 6:00PM—6:45PM

Wall Shear Stress of Hemodynamic Flow Measured by 4D Flow MRI (Toward Its Accuracy Estimation and Improvement)
Plenary Presentation. AJKFLUIDS2019-5776
Simon Song, *Hanyang University, Seoul, Korea (Republic)*

Tuesday, July 30

PLENARY TALKS

TOPIC 8-1 PLENARY TALKS

8-1-3
PLENARY TALKS
Grand Ballroom A 8:00AM—9:45AM

Challenges Towards Clinical Applications: Computational Hemodynamics for Cerebral Circulation
Plenary Presentation. AJKFLUIDS2019-5783
Marie Oshima, *University of Tokyo, Tokyo, Japan*

Past, Present and Future of Three-Dimensional Flow Control in Pumping Machinery From Perspective of a Researcher in Industry
Plenary Presentation. AJKFLUIDS2019-5785
Akira Goto, *Ebara Corporation, Kanagawa, Japan*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-7 ACTIVE FLOW CONTROL

1-7-1
PLASMA ACTUATORS
Room E
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Jaehwa Lee,** *UNIST, Ulsan, Korea (Republic)*
Session Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Hassan Peerhossaini,** *University of Western Ontario, London, ON, Canada*

Experimental Study on Suppression of Vortex Shedding Behind a Square Cylinder Using Opposed-Type Plasma Actuators
Technical Paper Publication (JSME). AJKFLUIDS2019-5065
Akira Nakazawa, Takuto Yonemichi, Koji Fukagata, *Keio University, Yokohama, Japan*

Experimental Investigation for the Better Control of Flows Over a Simplified Vehicle Configuration With Dielectric Barrier Discharge Plasma Actuator
Technical Paper Publication (ASME). AJKFLUIDS2019-5121
Satoshi Sekimoto, *Tokyo University of Science, Katsushika-Ku, Japan,* Keigo Shimizu, Takuji Nakashima, *Hiroshima University, Higashi-Hiroshima, Hiroshima, Japan,* Kozo Fujii, *Tokyo University of Science, Tokyo, Japan,* Takenori Hiraoka, Takahide Nouzawa, *Mazda Motor Corporation, Aki-gun, Hiroshima, Japan*

Ionic Wind Application to Vortex Ring Generator and Its Transportation Efficiency
Technical Paper Publication (ASME). AJKFLUIDS2019-5141
Kengo Fukunaga, Masayoshi Satake, Noboru Maeda, *Soken, Inc., Nissin, Japan,* Kazushi Shikata, Tomohisa Ezaka, *Denso Corp., Kariya, Aichi, Japan*

Investigation of Active Flow Control by Fluidic and Plasma Actuators
Invited Presentation. AJKFLUIDS2019-4734
Shawn Aram, *Naval Surface Warfare Center, McLean, VA, United States*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*
Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-8 OPTIMIZATION, DATA-BASED SIMULATIONS, AND MACHINE LEARNING

2-8-1
OPTIMIZATION
Room G
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Elia Merzari,** *Argonne National Laboratory, Lemont, IL, United States*
Session Co-Organizer: **Justin Weber,** *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States*

Optimization of a Cyclone Using Multiphase Flow Computational Fluid Dynamics
Technical Paper Publication (ASME). AJKFLUIDS2019-5182
Justin Weber, *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States,* William Fullmer, *Leidos, Morgantown, WV, United States,* Aytekin Gel, *ALPEMI Consulting, LLC, Tempe, AZ, United States,* Jordan M. Musser, *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States*

A Robust Aerodynamic Optimization Design for Airfoil Based on Interval Uncertainty Analysis Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5426
Xin Song, Guannan Zheng, *Chinese Academy of Sciences, Beijing, Beijing, China,* Guowei Yang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

Optimization of Wind Energy Harvesting By Controlling Hub Height
Technical Presentation. AJKFLUIDS2019-5532
Seyed Mostafa Ghoreyshi, Shima Hajimirza, *Texas A&M University, College Station, TX, United States,* Navid Goudarzi, *UNC Charlotte, Charlotte, NC, United States*

Toward Shape Optimization of Twisted Tube Heat Exchangers
Technical Presentation. AJKFLUIDS2019-5622
Elia Merzari, Oana Marin, Dillon Shaver, *Argonne National Laboratory, Lemont, IL, United States*

TOPIC 2-12 MULTI-PHYSICS SIMULATION

2-12-1
MULTI-PHYSICS SIMULATION I
Room L
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Junji Shinjo,** *Shimane University, Matsue, Japan*
Session Co-Organizer: **Bo Yin,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China,* **Jungwoo Kim,** *Seoul National University of Science & Technology, Seoul, Korea (Republic)*

Effects of Inclination on MHD Natural Convection in an Nanofluid Filled Cavity Using Double MRT Thermal Lattice Boltzmann Method
Technical Paper Publication (ASME). AJKFLUIDS2019-4661
Tao Zhang, *Shanghai Power Equipment Research Institute, Shanghai, China,* **Defu Che,** *Xi'An Jiaotong University, Xi'An, China*

Numerical Simulation of Supercritical Octane Flows in a Heated Circular Tube With Simple Thermal Cracking Model
Technical Paper Publication (ASME). AJKFLUIDS2019-4797
Takashi Furusawa, Noriyuki Taki, Shuto Yatsuyanagi, Satoru Yamamoto, Takuto Miyaura, *Tohoku University, Sendai, Miyagi, Japan,* **Sadatake Tomioka,** *Japan Aerospace Exploration Agency, Sendai, Miyagi, Japan*

Design and Development of a Small Multistage Flash Desalination System Using Aspen HYSYS
Technical Paper Publication (ASME). AJKFLUIDS2019-4975
Md Islam, Fawzi Banat, Abdul Baba, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.,* **Salaheddin Abuyahya,** *Jordan University of Science and Technology, Jordan, Jordan*

Numerical Investigation of Liquid Jet Atomization and Droplets Evaporation in Crossflow
Technical Presentation. AJKFLUIDS2019-5179
Jian Wen, Akihiro Nakanishi, Ryoichi Kurose, *Kyoto University, Kyoto, Japan*

Measurement and Simulation of Large Laser-Heated Water Drops
Technical Presentation. AJKFLUIDS2019-5226
Stefano Pineda, S.R. Blair, Evelyn Lunasin, Cody Brownell, *US Naval Academy, Annapolis, MD, United States*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-4
TWO-PHASE FLOW PUMPS : LIQUID-GAS
Seacliff A 10:00AM—12:00PM

Session Organizer: **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States*
Session Co-Organizer: **Bruno Schiavello,** *Flowserve, Millburn, NJ, United States*

Experimental Visualization of Gas-Liquid Flow Patterns in a Centrifugal Rotor
Technical Paper Publication (ASME). AJKFLUIDS2019-5029
Henrique Stel, Edgar M. Ofuchi, Rafael F. Alves, *Federal University of Technology, Curitiba, Brazil,* **Sergio Chiva,** *Universitat Jaume I, Castellón de la Plana, Spain,* **Rigoberto Morales,** *Federal University of Technology Parana, Parana, Brazil*

On the Influence of Gas Content on the Rotordynamic Force Coefficients of a Three-Wave (Air in Oil) Annular Seal for Multiple Phase Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-4938
Luis San Andres, Xueliang Lu, Tingcheng Wu, *Texas A&M University, College Station, TX, United States*

Predictive Model for Two-Phase Flow Performance of Mixed Flow Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5486
Abhay Patil, Burak Ayyildiz, Adolfo Delgado, Gerald Morrison, *Texas A&M University, College Station, TX, United States,* **Sahand Pirouzpanah,** *Solar, San Diego, CA, United States*

Multiphase Boosting Offers Significant Benefits for Conventional Pumps Used in Artificial Lift Systems
Technical Presentation. AJKFLUIDS2019-5664
Sven Olson, *Leistritz Advanced Technologies Corp., Allendale, NJ, United States*

The Effects of Multiphase, Multi-Viscosity Fluids on Axial Thrust and Cooling Flow Performance of a Canned Motor Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4829
Eric Conaway, Jose Matos, Ryan Mesiano, *Curtiss-Wright, Mt. Pleasant, PA, United States*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-12
PUMP TURBINES - SYSTEM INTERACTION
Seacliff B 10:00AM—12:00PM

Session Organizer: **Young-Do Choi,** *Mokpo National University, Muan, Korea (Republic)*
Session Co-Organizer: **Paul Cooper,** *Flowserve Corporation, Bethlehem, PA, United States*

Effect of Interface Condition on the Hydraulic Performance of a Pump-Turbine at Various Guide Vane Opening Conditions in Pumping Mode
Technical Paper Publication (ASME). AJKFLUIDS2019-4800
Young-Seok Choi, *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic),* **Jun-Won Suh,** *KITECH/Yonsei University, Cheonan, Korea (Republic),* **Seung-Jun Kim, Jin-Hyuk Kim,** *Korea Institute of Industrial Technology, Cheonan-si, Chungcheongnam-do, Korea (Republic),* **Won-gu Joo,** *Yonsei University, Seoul, Korea (Republic),* **Jun-Gwan Park,** *Korea Hydro & Nuclear Power Co. Ltd., Daejeon, Korea (Republic)*

Stabilizing Pump-Turbine Operations Using Water Injection Passive Control
Technical Paper Publication (ASME). AJKFLUIDS2019-4866
Muhannad Altimemy, Bashar Attiya, *Lehigh University, Bethlehem, PA, United States,* **Cosan Daskiran,** *Center for Natural Resources, Newark, NJ, United States,* **I-Han Liu,** *Argonne National Laboratory, Naperville, IL, United States,* **Alparslan Oztekin,** *Lehigh University, Bethlehem, PA, United States*

Investigation of the Pump, Dissipation and Inverse Turbine Operating Modes Using the CATHARE-3 One-Dimensional Rotodynamic Pump Model
Technical Paper Publication (ASME). AJKFLUIDS2019-4961
Laura Matteo, *CEA, Gif-sur-Yvette, France,* **Fabien Cerru,** *CETIM, Nantes, France,* **Antoine Dazin,** *LMFL Kampé de Fériet, Lille, France,* **Nicolas Tauveron,** *CEA, Grenoble, France*

Capturing S-Shape of Pump-Turbines by CFD Simulations Using an Anisotropic Turbulence Model
Technical Paper Publication (ASME). AJKFLUIDS2019-5663
Ernesto Casartelli, Luca Mangani, *Hochschule Luzern Technik & Architektur, Horw, Switzerland,* **Armando del Rio, Angelika Schmid,** *Hochschule Luzern, Horw, Switzerland*

Flow Visualization at the Inlet and Outlet of an Radial Impeller Operating in Part Load
Technical Presentation. AJKFLUIDS2019-5407
Mark Guggenberger, *Andritz AG, Graz, Austria,* **Helmut Jaberg,** *TU Graz, Graz, Austria,* **Arno Gehrer,** *Andritz AG, Graz, Austria,* **Manfred Sallaberger,** *Andritz Hydro AG, Kriens, Switzerland,* **Helmut Benigni,** *University of Technology Graz, Graz, Austria*

The Transient Characteristics Analysis of Pump During Rapid Valve Opening and Closing
Technical Paper Publication (ASME). AJKFLUIDS2019-5180
Yang Shuai, Li Shiyang, Wu Dazhuan, Kai Zhang, Qiao Li, Zhongtian Xu, *Zhejiang University, Hangzhou, Zhejiang, China*

TOPIC 3-3 AUTOMOTIVE FLOWS

3-3-1
AUTOMOTIVE FLOWS I
Room O
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Bahram Khalighi,** *General Motors Global R&D, Birmingham, MI, United States*
Session Co-Organizer: **Makoto Tsubokura**, *Kobe University, Kobe, Hyogo, Japan,* **Sa Ryang Kim,** *Gangneung-Wonju National University, Wonju, Gangwon-do, Korea (Republic)*

Improved Estimation of Subcooled Flow Boiling Heat Flux for Automotive Engine Cooling Applications
Technical Paper Publication (ASME). AJKFLUIDS2019-4753
Sudharsan Vasudevan, *Chalmers University of Technology, Gothenburg, Sweden,* **Sassan Etemad,** *Volvo Group Trucks Technology, Gothenburg, Sweden,* **Lars Davidson,** *Chalmers University of Technology, Gothenburg, Sweden*

An Adapative Time Scheme for Aeroacoustic Computations
Technical Presentation. AJKFLUIDS2019-4973
ChungGang Li, Makoto Tsubokura, *Kobe University, Kobe, Hyogo, Japan,* **Keiji Onishi,** *RIKEN Center for Computational Science, Kobe, Japan*

Toward Realization of Real-Time Vehicle Aerodynamics Simulation
Technical Presentation. AJKFLUIDS2019-5162
Keiji Onishi, *RIKEN Center for Computational Science, Kobe, Japan,* **Makoto Tsubokura,** *Kobe University, Kobe, Hyogo, Japan*

Numerical Investigation of Fluctuating Aerodynamic Lift Acting on the Road Vehicle Which Affects Drivability
Technical Paper Publication (ASME). AJKFLUIDS2019-5253
Jun Ikeda, Javier S. Rios, *Kobe University, Kobe, Hyogo, Japan,* **Naoshi Kuratani, Kenta Ogawa,** *Honda R&D Co., Ltd., Haga-gun, Tochigi, Japan,* **Makoto Tsubokura,** *Kobe University, Kobe, Hyogo, Japan*

TOPIC 3-7 FLUID POWER SYSTEMS

3-7-1
FLUID POWER SYSTEMS I
Room M
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Session Co-Organizer: **Bok Jik Lee,** *Gwangju Institute of Science and Technology, Gwangju, Korea (Republic),* **George Chamoun,** *Eastman, Gray, TN, United States*

Development of S-CO_2 Turbomachinery Off-Design Performance Model Using 1D Mean-Line Method and Deep Neural Network
Technical Presentation. AJKFLUIDS2019-5012
Seongmin Son, Yongju Jeong, Seong Kuk Cho, Jeongik Lee, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

A Comparison Study for off-Design Performance Prediction of a Supercritical CO_2 Compressor With Similitude Analysis
Technical Paper Publication (ASME). AJKFLUIDS2019-5017
Yongju Jeong, Seongmin Son, Seong Kuk Cho, Seungjoon Baik, Jeongik Lee, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Research on the Dynamic Characteristics of a No-load Running Check Valve by Numerical Simulation
Technical Presentation. AJKFLUIDS2019-5347
Jie Jian, Xiang-Yuan Zhang, Tao Yu, Zhi-Jun Shuai, Wan-You Li, Chenxing Jiang, *Harbin Engineering University, Harbin, Heilongjiang, China*

Experimental Study of Tip clearance in the Radial Out-flow Turbine (ROT) Utilized by Low Grade Heat Source
Technical Presentation. AJKFLUIDS2019-5585
Jung Wan Kim, *University of Science and Technology, Daejeon, Korea (Republic),* **Yong-Bok Lee,** *Korea Institute of Science and Technology, Seoul, Korea (Republic)*

Effects of Shaft-Bore Water Flow Cooling of High-Speed Spindle Supported With Water-Lubricated Hydrostatic Bearings on Thermal Stability
Technical Paper Publication (JSME). AJKFLUIDS2019-5651
Yohichi Nakao, Tsubasa Yaguchi, Dmytro Fedorynenko, Junpei Kusuyama, *Kanagawa University, Yokohama, Japan*

TOPIC 3-9 PROPULSION

3-9-1
PROPULSION I
Room N
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*
Session Co-Organizer: **Kui-Soon Kim,** *Pusan National University, Busan, Korea (Republic)*

Multi-Objective Hydraulic Optimization on Intake Duct of Water-Jet Propulsion Using NSGA-II
Technical Paper Publication (ASME). AJKFLUIDS2019-4757
Rui Zhu, Puyu Cao, Yang Wang, Chao Ning, *Jiangsu University, Zhenjiang, Jiangsu, China*

Water Piston Engine for Marine Vehicle Propulsion
Technical Paper Publication (ASME). AJKFLUIDS2019-4824
Khaled Asfar, *Jordan University of Science & Technology, Irbid, Jordan,* **Eyad Al Smadi,** *Royal Scientific Society, Amman, Amman, Jordan*

Performance Prediction Model of a Ducted Fan Under Ground Effect and Geometry Optimization
Technical Paper Publication (ASME). AJKFLUIDS2019-4985
Ye Li, Yuzhi Jin, Yangjun Zhang, Chaofan Dong, Yuping Qian, *Tsinghua University, Beijing, China*

The Minimum Flow Rate of Liquid-Oxygen When Considering a Throttling of a Gas Generator Cycle Engine
Technical Paper Publication (ASME). AJKFLUIDS2019-5621
Daisuke Nakata, Ryojiro Minato, Inaho Yoshikawa, Hiromitsu Yagihashi, Koki Arimatsu, Masaharu Uchiumi, *Muroran Institute of Technology, Muroran, Hokkaido, Japan*

Fundamental Study on Injector Flow Characteristics of Self-Pressurizing Fluid for Small Rocket Engines
Technical Paper Publication (ASME). AJKFLUIDS2019-5625
Kazuki Yasuda, Daisuke Nakata, Masaharu Uchiumi, Kugo Okada, Ryoji Imai, *Muroran Institute of Technology, Muroran, Hokkaido, Japan*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-1
ROTATING MACHINERY I -SEALS
Seacliff C 10:00AM—12:00PM

Session Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Session Co-Organizer: **Yutaka Ohta,** *Waseda University, Tokyo, Japan*

Operational Performance and Locally Resolved Outflow of Brush Seals
Technical Paper Publication (ASME). AJKFLUIDS2019-4877
Fabian Schur, Jens Friedrichs, *TU Braunschweig, Braunschweig, Lower Saxony, Germany*

Technical Publication Comparison of Computational Fluid Dynamics (CFD) and Experimental Results for Smooth and Hole-Pattern Liquid Annular Seals
Technical Presentation. AJKFLUIDS2019-5561
Cori Watson, Houston G. Wood, *University of Virginia, Charlottesville, VA, United States*

Theoretical and Computational Fluid Dynamics (CFD) Predictions of Annular Seal Inlet Loss and Exit Recovery Coefficients
Technical Presentation. AJKFLUIDS2019-5770
Cori Watson, Houston G. Wood, *University of Virginia, Charlottesville, VA, United States*

Leakage Rate Performance Mapping of Smooth Stator/Grooved Rotor Labyrinth Seals Using Statistical Tools
Technical Paper Publication (ASME). AJKFLUIDS2019-5429
Hanxiang Jin, *Virginia Tech, Blacksburg, VA, United States,* **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-5 GAS-LIQUID FLOWS

5-5-4
GAS-LIQUID FLOWS 4 - APPLICATIONS
Seacliff D 10:00AM—12:00PM

Session Organizer: **Tim O'Hern,** *Sandia National Laboratories, Albuquerque, NM, United States*
Session Co-Organizer: **Jungwoo Kim,** *Seoul National University of Science & Technology, Seoul, Korea (Republic)*

Experimental Investigation of Choked Flow Conditions for Bubbly Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5225
Thomas Shepard, *University of St. Thomas, Minneapolis, MN, United States,* **Aleksey Garbaly,** *University of St. Thomas, Saint Paul, MN, United States*

Numerical Simulation of Airflow and Ellipsoidal Particle Deposition in Human Upper and Central Respiratory Tract
Technical Paper Publication (ASME). AJKFLUIDS2019-4966
Zahra Dehghani, Arash Naseri, Morteza Kiasadegh, Omid Abouali, *Shiraz University, Shiraz, Islamic Republic of Iran,* **Goodarz Ahmadi,** *Clarkson University, Potsdam, NY, United States*

Detailed Numerical Simulation of Two Impinging Jets With Moderate Injection Velocities
Technical Paper Publication (ASME). AJKFLUIDS2019-5221
Yue Ling, *Baylor University, Waco, TX, United States,* **Weixiao Shang, Jun Chen,** *Purdue University, West Lafayette, IN, United States*

Air Entrainment and Bubble Generation by a Hydrofoil in a Turbulent Channel Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5457
Ichiro Kumagai, *Meisei University, Tokyo, Japan,* **Kakeru Taguchi,** *Meisei University, Hino, Tokyo, Japan,* **Chiharu Kawakita, Tatsuya Hamada,** *National Maritime Research Institute, Mitaka, Tokyo, Japan,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*

Experiments on Turbulent Air-Water Swirling Flow in a Pipe With a Circular Disc
Technical Paper Publication (ASME). AJKFLUIDS2019-4685
Zhang Tianxing, Ayesha Almheiri, Lyes Khezzar, Mohamed Alshehhi, Saqib Salam, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

TOPIC 5-6 LIQUID-SOLID FLOWS

5-6-1
SEPARATION, SETTLING, SPHERICAL AND NON-SPHERICAL PARTICLE FLOWS

Room D
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Mark R Duignan,** *Savannah River National Laboratory, Aiken, SC, United States*
Session Co-Organizer: **Vaclav Matousek,** *The Czech Academy of Sciences, Institute of Hydrodynamics, Prague 6, Czech Republic*

Velocity Measurements in a Hydrocyclone Separator Using Particle Image Velocimetry (PIV)
Technical Presentation. AJKFLUIDS2019-4789
Jaikrishnan Kadambi, *Case Western Reserve University, Cleveland, OH, United States,* **John Furlan,** *Giw Industries, Grovetown, GA, United States,* **Chinmay Shingote, Renjie Ke,** *Case Western Reserve University, Cleveland, OH, United States,* **Mohamed Garman, Robert Visintainer,** *GIW Minerals, Grovetown, GA, United States*

Effects of Mass Eccentricity on the Motion of Spherical Particles in Shear Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-5013
Mitsuru Tanaka, Akira Matsuura, Kyohei Tajiri, Hidetoshi Nishida, Masashi Yamakawa, *Kyoto Institute of Technology, Kyoto, Japan*

Numerical Investigation of The Interaction Between Finite-Size Non-Spherical Particles and Fluid Flows
Technical Presentation. AJKFLUIDS2019-5069
Juwon Jang, Changhoon Lee, *Yonsei University, Seoul, Seoul, Korea (Republic)*

Effect of Mass Distribution on Falling Cylindrical Particles at Intermediate Reynolds Numbers
Technical Paper Publication (ASME). AJKFLUIDS2019-5458
Brandon R. Angle, Matthew J. Rau, Margaret Byron, *Penn State University, University Park, PA, United States*

Characterization of Aggregate Disruption Using Organic Marine Particles and Particle Tracking Measurements in Rotating/Oscillating Aggregation Tanks
Technical Paper Publication (ASME). AJKFLUIDS2019-5499
Yixuan Song, Matthew J. Rau, *Penn State University, University Park, PA, United States*

Inclusion of Heat Transfer on Settling Behavior of Elliptical Particles: Immersed Boundary-Thermal Lattice Boltzmann Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5676
Sajjad Karimnejad, *Shahrood University of Technology, Shahrood, Islamic Republic of Iran,* **Amin Amiri Delouei,** *University of Bojnord, Bojnord, Islamic Republic of Iran,* **Mohsen Nazari, Mohammad Mohsen Shahmardan,** *Shahrood University of Technology, Shahrood, Islamic Republic of Iran,* **Goodarz Ahmadi, Amir A. Mofakham,** *Clarkson University, Potsdam, NY, United States*

TOPIC 5-9 BUBBLE, DROPLET, AND AEROSOL DYNAMICS

5-9-1
BUBBLE, DROPLET, AND AEROSOL DYNAMICS I

Room F
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Thomas Shepard,** *University of St. Thomas, Minneapolis, MN, United States*
Session Co-Organizer: **Duck-Gyu Lee,** *KIMM, Daejeon, Korea (Republic)*

Visualization of Microbubble Distribution Inside Turbulent Boundary Layer Along Flat and Curved Solid Surfaces
Technical Paper Publication (JSME). AJKFLUIDS2019-4647
Yuichi Murai, Daiki Ushiyama, Daichi Saito, Park Hyun Jin, Yuji Tasaka, *Hokkaido University, Sapporo, Japan*

Numerical Simulation of a Gas Bubble Rising in Power-Law Fluids Using a Sharp Surface Force Implementation
Technical Paper Publication (JSME). AJKFLUIDS2019-4769
Purushotam Kumar, *Corning Incorporated, Corning, NY, United States,* **Kai Jin,** *Gamma Technologies, Westmont, IL, United States,* **Surya Vanka,** *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Derivation of an Amplitude Equation for Weakly Nonlinear Pressure Waves of a Very High Frequency in a Compressible Liquid Containing Many Microbubbles
Technical Paper Publication (ASME). AJKFLUIDS2019-4776
Ryosuke Akutsu, Tetsuya Kanagawa, Yusuke Uchiyama, *University of Tsukuba, Tsukuba, Japan*

A Computational Estimation of Velocity Distribution of Boundary Layer on a Spherical Bubble
Technical Paper Publication (JSME). AJKFLUIDS2019-5290
Hiroaki Kusuno, Toshiyuki Sanada, *Shizuoka University, Hamamatsu, Japan*

A Numerical Study on The Drag Force Acting on a Rising Bubble By Using Level Set/Finite Element Method
Technical Presentation. AJKFLUIDS2019-5309
Cu Long Ngo, Hyoung Gwon Choi, *Seoul National University of Science and Technology, Seoul, Korea (Republic)*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co, Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-7 ACTIVE FLOW CONTROL

1-7-2
DRAG REDUCTION AND SEPARATION CONTROL

Room E
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Hassan Peerhossaini,** *University of Western Ontario, London, ON, Canada*

Session Co-Organizer: **Jaehwa Lee,** *Unist, Ulsan, Korea (Republic),* **Mehran Tadjfar,** *Amirkabir University of Technology, Tehran, Islamic Republic of Iran*

Experimental Study on Drag Reduction Effect With Traveling Wave Control Using PIV Measurement
Technical Paper Publication (JSME). AJKFLUIDS2019-4855
Ichiro Suzuki, Shimura Takaaki, Akihiko Mitsuishi, Kaoru Iwamoto, Akira Murata, *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan*

LDV Measurement of Turbulent Pipe Flow With Traveling Wavy Elastic Wall for Drag Reduction
Technical Paper Publication (JSME). AJKFLUIDS2019-5691
Seiya Nakazawa, Shimura Takaaki, Akihiko Mitsuishi, Kaoru Iwamoto, Akira Murata, *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan*

Coupled Blowing and Suction for Flow Separation Control
Technical Paper Publication (ASME). AJKFLUIDS2019-5384
Mehran Tadjfar, Djavad Kamari, *Amirkabir University of Technology, Tehran, Islamic Republic of Iran*

Experimental Evaluation of Wind Tunnel Test Apparatus for Active Flow Control
Technical Paper Publication (ASME). AJKFLUIDS2019-5462
Alexander Pesch, *Hofstra University, Mineola, NY, United States,* **Diana V. Hess,** *Hofstra University, Hempstead, NY, United States*

Experimental Characterization of a Micro-Blower for Flow Control
Technical Paper Publication (ASME). AJKFLUIDS2019-4772
Maria Wu, Pierre Sullivan, *University of Toronto, Toronto, ON, Canada*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*

Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-8 OPTIMIZATION, DATA-BASED SIMULATIONS, AND MACHINE LEARNING

2-8-2
DATA BASED METHODS AND REDUCED ORDER MODELING

Room G
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Donghyun You,** *POSTECH, Pohang, Korea (Republic)*

Session Co-Organizer: **Elia Merzari,** *Argonne National Laboratory, Lemont, IL, United States*

CNN-SINDy Based Reduced Order Modeling of Unsteady Flow Fields
Technical Paper Publication (JSME). AJKFLUIDS2019-5056
Takaaki Murata, Kai Fukami, Koji Fukagata, *Keio University, Yokohama, Japan*

Comparison of Point-Collocation Non-Intrusive Polynomial (NIPC) and Non-Intrusive Spectral Projection (NISP) for Transitional Model in CFD
Technical Presentation. AJKFLUIDS2019-5060
Thanh Nguyen Hoai, Kyoungsik Chang, *University of Ulsan, Ulsan, Korea (Republic)*

Branch and Bound Analysis to Characterize Phase Variations in Laser Propagation Through Deep Turbulence
Technical Paper Publication (ASME). AJKFLUIDS2019-5567
Luis F. Rodriguez, Vinod Kumar, Jose F. Espiritu, Arturo Bronson, Krushnarao Kotteda, Diego Lozano, Arturo Rodriguez, *University of Texas at El Paso, El Paso, TX, United States*

Data-Driven Reduced Order Modeling of Flows Around Two-Dimensional Bluff Bodies of Various Shapes
Technical Paper Publication (JSME). AJKFLUIDS2019-5079
Kazuto Hasegawa, Kai Fukami, *Keio University, Yokohama-shi, Kanagawa, Japan,* **Takaaki Murata, Koji Fukagata,** *Keio University, Yokohama, Japan*

Data-Based Modeling of Local Bubble Size in Turbulent Bubbly Flows Inside Pipes
Technical Presentation. AJKFLUIDS2019-5364
Youngjae Kim, Hokyo Jung, Serin Yoon, *Sogang University, Seoul, Korea (Republic),* **Jungwoo Kim,** *Seoul National University of Science & Technology, Seoul, Korea (Republic),* **Seongwon Kang,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 2-10 OPEN SOURCE CFD APPLICATIONS

2-10-1
UTILITY OF OPEN SOURCE CFD PACKAGES FOR INVESTIGATING PROPELLER HYDRODYNAMICS
Seacliff D 1:30AM—3:30PM

Session Organizer: **Muhammad Sajid,** *National University of Sciences and Technology, Islamabad, Pakistan*
Session Co-Organizer: **Tsukasa Hori,** *Osaka University, Osaka, Japan*

Computational Fluid Dynamic Analysis of a Marine Hydrokinetic Crossflow Turbine in Low Reynolds Number Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-4698
Minh Doan, Ivan H. Alayeto, Kana Kumazawa, Shinnosuke Obi, *Keio University, Yokohama, Kanagawa-ken, Japan*

Comparison of PANS and RANS Models for Flows Around a Marine Propeller
Technical Presentation. AJKFLUIDS2019-5427
Woochan Seok, *Seoul National University, Seoul, Korea (Republic),* **Sang Bong Lee,** *Dong-a University, Busan, Korea (Republic),* **Shin Hyung Rhee,** *Seoul National University, Seoul, Korea (Republic)*

Modeling and CFD Analyses of Gear Pump in OpenFOAM
Technical Paper Publication (ASME). AJKFLUIDS2019-5435
Gohar Shoukat, *Weatherford, Karachi, Pakistan,* **Kamran Siddique,** *P.A.C, Islamabad, Pakistan,* **Muhammad Sajid,** *National University of Sciences and Technology, Islamabad, Pakistan*

An Evaluation of Open Source CFD for Study of Aerodynamics of Vehicle Platooning
Technical Paper Publication (ASME). AJKFLUIDS2019-5130
Taha Farid, Abdur Rehman Shakeel, Muhammad Sajid, *National University of Sciences and Technology, Islamabad, Pakistan*

TOPIC 2-12 MULTI-PHYSICS SIMULATION

2-12-2
MULTI-PHYSICS SIMULATION II
Room L
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Jungwoo Kim,** *Seoul National University of Science & Technolgy, Seoul, Korea (Republic)*
Session Co-Organizer: **Bo Yin,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China,* **Junji Shinjo,** *Shimane University, Matsue, Japan*

The Effect of Mixing Promoters on the Performance of Forward Osmosis Membrane Systems: Computational Fluid Dynamics Simulations
Technical Paper Publication (ASME). AJKFLUIDS2019-4862
Ahmed Alshwairekh, Abdullah A. Alghafis, Anas M. Alwatban, *Lehigh University, Bethlehem, PA, United States,* **Umar Alqsair,** *Lehigh University, Whitehall, PA, United States,* **Alparslan Oztekin,** *Lehigh University, Bethlehem, PA, United States*

Study of Enhanced Self Mixing in Ferrofluid Flow in an Elbow Channel Under the Influence of Non-Uniform Magnetic Field
Technical Paper Publication (ASME). AJKFLUIDS2019-5546
Nadish Anand, *North Carolina State University, Raleigh, NC, United States,* **Richard Gould,** *North Carolina State University, Fuquay Varina, NC, United States*

Numerical Simulation of Proppant Transportation in Hydraulic Fracture Based on DDPM-KTGF Model
Technical Paper Publication (ASME). AJKFLUIDS2019-5613
Yan Zhang, Xiaobing Lu, Xuhui Zhang, Peng Li, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

Ionized Air Flow Properties on the Surface of a Plane with Electrode
Technical Presentation. AJKFLUIDS2019-5769
Noboru Maeda, Kengo Fukunaga, *Soken, Inc., Nissin, Japan*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*

Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato**, *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-5
UNSTEADY FLOWS - OFF DESIGN
Seacliff A 1:30PM—3:30PM

Session Organizer: **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan*

Session Co-Organizer: **Kazuyoshi Miyagawa,** *Waseda University, Tokyo, Tokyo, Japan*

Tip Leakage Flows and Stall Suppression in Axial Turbomachines
Keynote Presentation. AJKFLUIDS2019-5751
Huang Chen, Yuanchao Li, Subhra Shankha Koley, Joseph Katz, *Johns Hopkins University, Baltimore, MD, United States*

Theoretical Analyses of the Number of Backflow Vortices on an Axial Pump or Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-4970
Yu Ito, *Tokyo Institute of Technology, Yokohama, Kanagawa, Japan,* **Yuhei Sato,** *Tokyo Institute of Technology (currently, Nippon Steel), Yokohama, Kanagawa, Japan,* **Takao Nagasaki,** *Tokyo Institute of Technology, Yokohama, Kanagawa, Japan*

Numerical Investigation of the Influence of Impeller-Diffuser Gap (A- and B-Gaps) on Unsteady Flow in a Centrifugal Pump at Part Flows
Technical Paper Publication (JSME). AJKFLUIDS2019-5372
Taiki Takamine, Satoshi Watanabe, *Kyushu University, Fukuoka, Japan*

Unsteady Flow in the Vaned Diffuser of a Low Specific Speed Centrifugal Pump With an Unshrouded Impeller
Technical Paper Publication (ASME). AJKFLUIDS2019-5599
Asuma Ichinose, Tomoki Takeda, Kazuyoshi Miyagawa, *Waseda University, Tokyo, Japan,* **Yohei Ogawa, Hideyo Negishi,** *Japan Aerospace Exploration Agency, Ibaraki-ken, Japan,* **Kazuki Niiyama,** *IHI Corporation, Tokyo, Japan*

TOPIC 3-3 AUTOMOTIVE FLOWS

3-3-2
AUTOMOTIVE FLOWS II
Room O
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany*

Session Co-Organizer: **Sa Ryang Kim,** *Gangneung-Wonju National University, Wonju, Gangwon-do, Korea (Republic),* **Bahram Khalighi,** *General Motors Global R&D, Birmingham, MI, United States*

Numerical Study on Unsteady Wake Characteristics of an Urban Maglev Train
Technical Paper Publication (ASME). AJKFLUIDS2019-5041
Zhenxu Sun, Yongfang Yao, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China,* **Fanbing Kong,** *CRRC Tangshan Co., Ltd., Tangshan, China,* **Guowei Yang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

IC Engine Simulation by Fully Compressible Flow Framework and Cartesian Mesh System
Technical Presentation. AJKFLUIDS2019-5152
Wei-Hsiang Wang, *RIKEN-CCS, Japan, Kobe, Hyogo, Japan,* **ChungGang Li, Makoto Tsubokura,** *Kobe University, Kobe, Hyogo, Japan*

Effects of Cyclist Size and Position Within Formations on Drag and Side Force in the Presence of Cross Winds
Technical Paper Publication (ASME). AJKFLUIDS2019-5476
Ivaylo Nedyalkov, Alec Cunningham, Adam Lovell, *University of New Hampshire, Durham, NH, United States*

Multi-Phase Gearbox Modelling Using GPU-Accelerated Smoothed Particle Hydrodynamics Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5592
Muraleekrishnan Menon, *ESS Engineering Software Steyr, Steyr, Upper Austria, Austria,* **Kamil Szewc,** *Integrable, Torun, Steyr, Austria,* **Vishal Maurya,** *ESS India LLC, Bengaluru, Karnataka, India*

TOPIC 3-7 FLUID POWER SYSTEMS

3-7-2
FLUID POWER SYSTEMS II
Room M
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Bok Jik Lee**, *Gwangju Institute of Science and Technology, Gwangju, Korea (Republic)*
Session Co-Organizer: **Emma Frosina,** *University of Naples, Naples, Italy*

Human-Machine Cooperation Control of Exoskeleton Robot Driven by Electrohydraulic Actuator With External Load
Technical Presentation. AJKFLUIDS2019-4668
Qing Guo, Fan Guo, Dan Jiang, *University of Electronic Science and Technology of China, Chengdu, China*

Performance Improvement of Electro-Hydraulic Servo Valve Using a Feed-Forward Control and an Input Shaping Filter
Technical Paper Publication (ASME). AJKFLUIDS2019-4801
Lee Illyeong, Iwan Istanto, Choi Saeryung, *Pukyong National University, Busan, Korea (Republic),* **Huh Junyoung,** *Korea University of Technology and Education, Cheonan, Korea (Republic)*

On Developing a System Model for Water Recovery Device With Hollow Fiber Cartridges in a Cooling Tower
Technical Presentation. AJKFLUIDS2019-5424
Youngmoon Cho, Seongwon Kang, *Sogang University, Seoul, Korea (Republic),* **Jaedeok Jeon, Gilbong Lee,** *Korea Institute of Energy Research, Daejeon, Korea (Republic)*

Computational Fluid Dynamics to Assess the Blade Effect of a New Savonius Rotor for Improvement of the Output Power Coefficient
Technical Paper Publication (JSME). AJKFLUIDS2019-5001
Takanori Matsui, Tomohiro Fukui, Koji Morinishi, *Kyoto Institute of Technology, Kyoto, Japan*

Influence of Twist Angle on the Application of Synthetic Jet on the Wind Turbine Performance
Technical Presentation. AJKFLUIDS2019-5051
Melika Maysoori, Mehran Tadjfar, *Amirkabir University of Technology, Tehran, Tehran, Islamic Republic of Iran,* **Morteza Bayati,** *Urmia University of Technology, Urmia, Islamic Republic of Iran*

TOPIC 3-9 PROPULSION

3-9-2
PROPULSION II
Room N
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Kui-Soon Kim,** *Pusan National University, Busan, Korea (Republic)*
Session Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*

Inviscid, Axisymmetric, Annular Wall Jet Impingement as an Idealization of Cascade Thrust Reversers
Technical Paper Publication (ASME). AJKFLUIDS2019-4641
R. Chilukuri, *UTAS Aerostructures, Chula Vista, CA, United States*

Experimental Study of Temperature and Phase Transition of Liquid Oxygen at Ignition in Impinging Injector of Gas Generator
Technical Paper Publication (ASME). AJKFLUIDS2019-4935
Hiromitsu Yagihashi, Daisuke Nakata, Ryojiro Minato, Inaho Yoshikawa, Koki Arimatsu, Masaharu Uchiumi, *Muroran Institute of Technology, Muroran, Hokkaido, Japan*

Numerical Investigation of an Intake Duct for a Waterjet Propulsion System Using Modified Partially Averaged Navier-Stokes Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5059
Renfang Huang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China,* **Xianwu Luo,** *Tsinghua University, Beijing, China*

A Numerical Study on Flow Characteristics of Super Sonic Diffuser for the Position and Nose Cone Angles of Center Body
Technical Paper Publication (KSME). AJKFLUIDS2019-5430
Sung-Hun Lee, Hongjip Kim, Myeongwon Lee, Jin Park, *Chungnam National University, Daejeon, Korea (Republic)*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-2
ROTATING MACHINERY II - PUMPS AND COMPRESSORS
Seacliff C 1:30AM—3:30PM

Session Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States*
Session Co-Organizer: **Jin-Hyuk Kim,** *Korea Institute of Industrial Technology, Cheonan, Korea (Republic),* **Kazutoyo Yamada,** *Iwate University, Morioka, Japan*

Redesign and Performance Analysis of Medium Flow Coefficient Centrifugal Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-4903
Khaled Yousef, *Menoufia University, Shibin El Kom, Menoufia, Egypt,* **Abraham Engeda,** *Michigan State University, East Lansing, MI, United States,* **Ahmed Hegazy,** *Menoufia University, Shibin El Kom, Menoufia, Egypt*

Numerical Design of a Partial-Support Axial Blood Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4916
Guangmao Liu, Donghai Jin, MengYu Wang, Xingmin Gui, *Beihang University, Beijing, China*

Numerical Investigation of Tip Leakage Vortex Cavitation in Axial Waterjet Pump With Different Tip Gap Sizes
Technical Paper Publication (ASME). AJKFLUIDS2019-4990
Shun Xu, Bin Ji, Xin P. Long, Zhong D. Qian, *Wuhan University, Wuhan, China,* **Gui B. Li, Jia J. Zhou,** *Marine Design and Research Institute of China, Shanghai, China*

Numerical Simulation of Torque Converter With Different Pump Blade Camber
Technical Presentation. AJKFLUIDS2019-4991
Qingdong Yan, Zhifang Ke, Wei Wei, Xianglu Meng, Cheng Liu, *Beijing Institute of Technology, Beijing, China*

Experimental Tests With Centrifugal Pumps: Degradation of Performance, Instability and Dynamic Phenomena With Non-Newtonian Suspensions of Kaolin in Water
Technical Paper Publication (ASME). AJKFLUIDS2019-4939
Matteo Occari, Enrico Munari, Valentina Mazzanti, Michele Pinelli, Francesco Mollica, Alessio Suman, *University of Ferrara, Ferrara, Italy*

Visualization of Oil Droplets Distribution in a Rotary Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-5207
Puyuan Wu, Jun Chen, Paul E. Sojka, *Purdue University, West Lafayette, IN, United States*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-6 LIQUID-SOLID FLOWS

5-6-2
PUMP AND PIPE FLOWS
Room D
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Joon Sang Lee,** *Yonsei University, Seoul, Korea (Republic)*
Session Co-Organizer: **Gocha Chochua,** *Schlumberger, Sugar Land, TX, United States*

Visualizing Test on the Distribution Rule of Coarse Particles in a Double Blade Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4622
Xianfang Wu, Xiao Tian, Minggao Tan, Houlin Liu, *Jiangsu University, Zhenjiang, China*

Frictional Head Loss of Various Bimodal Settling Slurry Flows in Pipe
Technical Paper Publication (ASME). AJKFLUIDS2019-5395
Vaclav Matousek, *The Czech Academy of Sciences, Prague, Czech Republic,* **Robert Visintainer, John Furlan,** *GIW Industries, Grovetown, GA, United States,* **Anders Sellgren,** *Lulea University of Technology, Lulea, Sweden*

Effect of Pipe Inclination on Solids Distribution in Partially Stratified Slurry Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5397
Vaclav Matousek, Jan Krupicka, Jiri Konfrst, Pavel Vlasak, *The Czech Academy of Sciences, Prague, Czech Republic*

Investigation of Hydrate Plugging in a Liquid-Solid Multiphase Flow Pipeline
Technical Presentation. AJKFLUIDS2019-5653
Wuchang Wang, *China University of Petroleum, Qingdao, China,* **Yuxing Li,** *China University of Petroleum, Shandong, China,* **Guangchun Song, Qihui Hu, Xiaoyu Wang,** *China University of Petroleum, Qingdao, China*

TOPIC 5-9 BUBBLE, DROPLET, AND AEROSOL DYNAMICS

5-9-2
BUBBLE, DROPLET, AND AEROSOL DYNAMICS II
Room F
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Haiwen Zhu,** *University of Tulsa, Tulsa, OK, United States*
Session Co-Organizer: **Duck-Gyu Lee,** *KIMM, Daejeon, Korea (Republic)*

Numerical Simulation of Droplet Impact Onto a Curved Liquid Film
Technical Paper Publication (ASME). AJKFLUIDS2019-4726
Weihao Chen, Xingsen Mu, Shengqiang Shen, *Dalian University of Technology, Dalian, Liaoning, China*

Droplet Motion in Microfluidic Channels due to Thermocapillary Effect
Technical Paper Publication (ASME). AJKFLUIDS2019-4941
Julie Melbye, Yechun Wang, *North Dakota State University, Fargo, ND, United States*

Comparison in High-Speed Droplet Impact Between Single and Multiple Collisions Against a Wall Covered With a Liquid Film
Technical Paper Publication (JSME). AJKFLUIDS2019-5200
Yoichiro Fukuchi, Tomoki Kondo, *Keio University, Yokohama, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan*

Formation Characteristics of Two-Phase Drops From Coaxial Nozzles
Technical Paper Publication (ASME). AJKFLUIDS2019-5306
Naoya Kamatani, Satoshi Ogata, *Tokyo Metropolitan University, Tokyo, Japan*

3D Numerical Study of the Transport Characteristics of an Evaporating Water Droplet Sessile on Heated Superhydrophobic Substrates
Technical Paper Publication (ASME). AJKFLUIDS2019-5355
Yikun Peng, Shanghai *Jiao Tong University, Shanghai, Shanghai, China,* **ShanShan Li,** *Shanghai Institute of Technology, Shanghai, China,* **Zhenhai Pan,** *Shanghai Jiao Tong University, Shanghai, Shanghai, China*

IN COMMEMORATION OF DR. MALCOLM J. ANDREWS FOR HIS CONTRIBUTIONS TO THE FLUIDS COMMUNITY

Track Organizer: **Arindam Banerjee,** *Lehigh University, Bethlehem, PA, United States*
Track Co-Organizer: **Francine Battaglia,** *University at Buffalo, Buffalo, NY, United States,* **Oleg Schilling,** *Lawrence Livermore National Laboratory, Livermore, CA, United States,* **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States,* **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Mark R. Duignan,** *Savannah River National Laboratory, Aiken, SC, United States*

TOPIC 7-1 CELEBRATING DR. ANDREWS' LIFE AND RESEARCH CONTRIBUTIONS

7-1-1
PANEL CELEBRATING DR. ANDREW'S LIFE AND RESEARCH CONTRIBUTIONS
Seacliff B 1:30PM—3:30PM

Session Organizer: **Arindam Banerjee,** *Lehigh University, Bethlehem, PA, United States*
Session Co-Organizer: **Francine Battaglia,** *University at Buffalo, Buffalo, NY, United States,* **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States*

Dr. Malcolm J. Andrews and His Contributions to the Fluids Community, ASME, and JFE
Technical Presentation. AJKFLUIDS2019-5713
Joseph Katz, *Johns Hopkins University, Baltimore, MD, United States,* **Francine Battaglia,** *University at Buffalo, Buffalo, NY, United States*

In Commemoration of Dr. Malcolm J. Andrews for His Contributions to the Fluids Community: Malcolm's Impact on Fluid Dynamics at Los Alamos National Laboratory
Technical Presentation. AJKFLUIDS2019-5740
Nicholas Denissen, Robert Gore, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Part 1. The Scientific Contributions of Dr. Malcolm J. Andrews to Turbulent Mixing; Part 2. A Review and Synthesis of Experiments, Simulation, and Modeling of Rayleigh-Taylor Mixing in a Water Channel
Technical Presentation. AJKFLUIDS2019-5718
Oleg Schilling, *Lawrence Livermore National Laboratory, Livermore, CA, United States*

Towards Statistically Steady Measurements in Rayleigh Taylor Turbulence: Dr. Malcolm J. Andrews and the Water and Gas Channel Facilities at Texas A&M University
Technical Presentation. AJKFLUIDS2019-5773
Arindam Banerjee, *Lehigh University, Bethlehem, PA, United States*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-7 ACTIVE FLOW CONTROL

1-7-3
ACTIVE FLUIDS AND FLOW CONTROL BY PULSATION
Room E
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Koji Fukagata,** *Keio University, Yokohama, Japan*

Session Co-Organizer: **Mehran Tadjfar,** *Amirkabir University of Technology, Tehran, Islamic Republic of Iran,* **Jaehwa Lee,** *UNIST, Ulsan, Korea (Republic)*

Phototactic Behaviour of Active Fluids: Effects of Light Perturbation on Diffusion Coefficient of Bacterial Suspensions
Invited Paper Publication. AJKFLUIDS2019-4904
Thomas Vourc'h, *Institute Curie, Paris, France,* **Julien Leopoldes,** *Institute Paul Langevin, Paris, France,* **Hassan Peerhossaini,** *Université Paris Diderot, Nantes, France*

Concentration Distribution of Photosensitive Liquid in a Droplet Under UV Light
Technical Paper Publication (ASME). AJKFLUIDS2019-5519
Tianyi Li, Aravinda Kar, Ranganathan Kumar, *University of Central Florida, Orlando, FL, United States*

Control of Particle Distribution at the Outlet of a Double Y-Microchannel Using Pulsatile Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-5219
Chau Nguyen Minh, *University of Paris-Diderot, Paris, France,* **Hassan Peerhossaini,** *Université Paris Diderot, Nantes, France,* **Mohammad Mehdi Salek,** *ETH Zurich, Zurich, Switzerland,* **Mojtaba Jarrahi,** *University of Paris-Sud - LIMSI, Orsay, France*

Prediction of Drag Reduction Effect of Pulsating Control in Turbulent Pipe Flow by Machine Learning
Technical Paper Publication (JSME). AJKFLUIDS2019-5681
Wataru Kobayashi, Shimura Takaaki, Akihiko Mitsuishi, Kaoru Iwamoto, Akira Murata, *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*

Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-5 FLUID STRUCTURE INTERACTION (INCLUDING IBM)

2-5-1
BLUFF BODY SYSTEMS
Room M
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Meihua Zhang,** *University of Kansas, Lawrence, KS, United States*

Session Co-Organizer: **Bo Yin,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

Numerical Simulation and Neural Network Study Using an Upstream Cylinder for Flow Control of an Airfoil
Technical Paper Publication (ASME). AJKFLUIDS2019-4724
Meihua Zhang, Z. Zheng, *University of Kansas, Lawrence, KS, United States,* **Yangliu Liu,** *Katherine Automotive, Rochester Hills, MI, United States,* **Xiaoyu Jiang,** *Zhejiang University of Technology, Hangzhou, Zhenjiang, China*

Vortex-Induced Vibration and Energy Harvesting of a Isosceles Trapezoid Cylinder With Different Gradient
Technical Presentation. AJKFLUIDS2019-4923
Lin Ding, Lin Yang, Li Zhang, Zhongqing Yang, Chunmei Wu, *Chongqing University, Chongqing, China*

Numerical Simulation of Flow Over a Stationary/Rotating Golf Ball on Cartesian Meshes
Technical Presentation. AJKFLUIDS2019-5344
Gwangsoo Go, Hyung Taek Ahn, *University of Ulsan, Ulsan, Korea (Republic)*

Numerical Investigation of Vortex-Induced Vibration of a Cylinder With Dented Surface
Technical Presentation. AJKFLUIDS2019-5388
Bo Yin, Guowei Yang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

TOPIC 2-8 OPTIMIZATION, DATA-BASED SIMULATIONS, AND MACHINE LEARNING

2-8-3
MACHINE LEARNING
Room G
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Donghyun You,** *POSTECH, Pohang, Korea (Republic)*
Session Co-Organizer: **Takahiro Tsukahara,** *Tokyo University of Science, Noda-shi, Chiba, Japan*

Unsupervised Learning for Turbulent Inflow Generation
Technical Presentation. AJKFLUIDS2019-5318
Junhyuk Kim, Changhoon Lee, *Yonsei University, Seoul, Korea (Republic)*

Reconstruction of RANS Model and Cross-Validation of Flow Field Based on Tensor Basis Neural Network
Technical Paper Publication (ASME). AJKFLUIDS2019-5572
Xudong Song, *Peking University, Beijing, China,* **Zhen Zhang, Yiwei Wang, Shuran Ye, Chenguang Huang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

Predictability Study of Viscoelastic Turbulent Channel Flow Using Deep Learning
Technical Paper Publication (JSME). AJKFLUIDS2019-5261
Atsushi Nagamachi, Takahiro Tsukahara, *Tokyo University of Science, Noda-shi, Chiba, Japan*

Curvature Estimation Modeling Using Machine Learning for CLSVOF Method: Comparison With Conventional Methods
Technical Paper Publication (ASME). AJKFLUIDS2019-5415
Majid Haghshenas, Ranganathan Kumar, *University of Central Florida, Orlando, FL, United States*

TOPIC 2-10 OPEN SOURCE CFD APPLICATIONS

2-10-2
MULTI-PHYSICS MODELLING USING OPEN SOURCE SOFTWARES
San Francisco, Hyatt Regency
Seacliff D 3:45PM—5:45PM

Session Organizer: **Majid Haghshenas,** *UCF, Orlando, FL, United States*
Session Co-Organizer: **Aytekin Gel,** *ALPEMI Consulting, LLC, Tempe, AZ, United States*

Hydrodynamic Evaluation of Microtiter Plate Assay Using Computational Fluid Dynamics for Biofilm Formation
Technical Paper Publication (ASME). AJKFLUIDS2019-5425
Rabaab Zahra, Amir A. Khan, *Quaid-i-Azam University, Islamabad, Pakistan,* **Muhammad Sajid,** *National University of Sciences and Technology, Islamabad, Pakistan*

DSMC Simulation of Rarefied Gas Flow Over a Wall Mounted Cube
Technical Paper Publication (ASME). AJKFLUIDS2019-5447
Deepak Nabapure, Ram Chandra Murthy, *Birla Institute of Technology & Science, Pilani - Hyderabad Campus, Hyderabad, Telangana, India*

Computational Evaluation of Stability in Slosh Dynamics of Tank Vehicles Using Zero Moment Point
Technical Paper Publication (ASME). AJKFLUIDS2019-5611
Muhammad Usman, Muhammad Sajid, *National University of Sciences and Technology (NUST),, Islamabad, Pakistan*

Two-Phase Flow Simulation of High-Pressure Gas Atomization: Effect of Molten Metal and Atomizing Gas Properties on Droplet Size Distribution
Technical Paper Publication (ASME). AJKFLUIDS2019-5454
Kalpana Hanthanan Arachchilage, Majid Haghshenas, Ranganathan Kumar, *University of Central Florida, Orlando, FL, United States*

Improvement of Hopper Discharge Process Modeling Through Uncertainty Quantification
Technical Presentation. AJKFLUIDS2019-5456
Jordan M. Musser, *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States,* **Aytekin Gel, Aytekin Gel,** *ALPEMI Consulting, LLC, Tempe, AZ, United States,* **Avinash Vaidheeswaran, Justin Weber,** *US Department of Energy, National Energy Technology Laboratory, Morgantown, WV, United States,* **Jean Dietiker,** *WVU Research Corporation, Pittsburgh, WV, United States*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-6
VIRTUAL MODELS - CFD SIMULATION
Seacliff A 3:45PM—5:45PM

Session Organizer: **Giancarlo Cicatelli,** *Flowserve Corp., Desio 20033, Italy*
Session Co-Organizer: **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan*

Study on the Influence of Centrifugal Pump Inlet Flow Field Instability and Methods of Adjustment
Technical Paper Publication (ASME). AJKFLUIDS2019-4687
Bo Qian, *Zhejiang University, Hangzhou, China,* **Jinping Chen,** *Jiangsu Zhenhua Pump Corporation, Taizhou, China,* **Peng Wu, Bin Huang, Wu Dazhuan,** *Zhejiang University, Hangzhou, China*

Effect of Rotating Speed on Performance of Electrical Submersible Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5093
Yang Yang, Ling Zhou, *National Research Center of Pumps, Jiangsu University, Zhenjiang, Jiangsu, China,* **Weidong Shi,** *Nantong University, Nantong, China,* **Chuan Wang, Wei Li,** *National Research Center of Pumps, Jiangsu University, Zhenjiang, Jiangsu, China,* **Ramesh Agarwal,** *Washington University, Saint Louis, MO, United States*

Transient Characteristics of a Centrifugal Pump at Rapid Startup
Technical Paper Publication (ASME). AJKFLUIDS2019-4648
Teiichi Tanaka, Michiya Tabaru, *National Institute of Technology, Kumamoto College, Yatsushiro, Kumamoto, Japan*

Study on The Cyclostationarity of Flow-Induced Vibration From Centrifugal Pumps
Technical Presentation. AJKFLUIDS2019-4888
Li Shiyang, Yang Shuai, Chu Ning, Wu Dazhuan, *Zhejiang University, Hangzhou, Zhejiang, China*

Particle Transport and Erosion in Particle-Laden Multiphase Mixed Pump Based on CFD-DEM Coupling Simulation
Technical Presentation. AJKFLUIDS2019-5178
Ruijie Zhao, Desheng Zhang, Chen Xia, Wenbo Shao, *Jiangsu University, Zhenjiang, China*

TOPIC 3-3 AUTOMOTIVE FLOWS

3-3-3
AUTOMOTIVE FLOWS III
Room O
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Makoto Tsubokura,** *Kobe University, Kobe, Hyogo, Japan*
Session Co-Organizer: **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany,* **Bahram Khalighi,** *General Motors Global R&D, Birmingham, MI, United States*

Wavenumber-Frequency Spectrum Analysis of Pressure Fields Around an Automobile
Technical Paper Publication (ASME). AJKFLUIDS2019-4806
Xifeng Wang, Kenta Mizushiri, Hiroshi Yokoyama, Akiyoshi Iida, *Toyohashi University of Technology, Toyohashishi, Aichi, Japan*

Evaluations of Shape Parameter of Groove for Reducing Noise Generated From Rotating Tires
Technical Paper Publication (ASME). AJKFLUIDS2019-5138
Junya Ishiyama, Kozo Fujii, Kengo Asada, *Tokyo University of Science, Tokyo, Japan,* **Satoshi Sekimoto,** *Tokyo University of Science, Katsushika-Ku, Japan,* **Masataka Koishi, Toshiyuki Ikeda,** *The Yokohama Rubber Co., Ltd., Tokyo, Japan*

Wake Flow Visualization of a Simplified Vehicle Model During Flow State Change
Technical Paper Publication (JSME). AJKFLUIDS2019-5404
Takuji Nakashima, Takashi Moriuchi, Yan Chao, *Hiroshima University, Higashi-Hiroshima City, Hiroshima, Japan,* **Itsuhei Kohri,** *Tokyo City University, Setagaya-ku, Tokyo, Japan*

Measurement of Wavenumber-Frequency Spectrum Around a Rear View Mirror With MEMS Microphone Array
Technical Presentation. AJKFLUIDS2019-5650
Akiyoshi Iida, Hiroshi Yokoyama, Kenta Mizushiri, Wang Xifeng, *Toyohashi University of Technology, Aichi, Japan*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-3
ROTATING MACHINERY III - HYDROPOWER
Seacliff C 3:45PM—5:45PM

Session Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States*
Session Co-Organizer: **Jin-Hyuk Kim,** *Korea Institute of Industrial Technology, Cheonan, Korea (Republic),* **Kazutoyo Yamada,** *Iwate University, Morioka, Japan*

Inter-Blade Vortex Characteristics With the Blockage Effects of Runner Blade in a Francis Hydro Turbine Model
Technical Paper Publication (ASME). AJKFLUIDS2019-4805
Jin-Hyuk Kim, Seung-Jun Kim, Young-Seok Choi, *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic),* **Yong Cho, Jong-Woong Choi,** *K-water Convergence Institute, Korea Water Resources Corporation, Daejeon, Korea (Republic)*

Mitigation of Flow-Induced Pressure Fluctuations in a Francis Turbine Using Water Injection
Technical Paper Publication (ASME). AJKFLUIDS2019-4867
Muhannad Altimemy, Bashar Attiya, *Lehigh University, Bethlehem, PA, United States,* **Cosan Daskiran,** *Center for Natural Resources, Newark, NJ, United States,* **I-Han Liu,** *Argonne National Laboratory, Naperville, IL, United States,* **Alparslan Oztekin,** *Lehigh University, Bethlehem, PA, United States*

Flow Visualization Study of Jet and Bucket Interactions in Traditional and Hooped Pelton Runner
Technical Paper Publication (ASME). AJKFLUIDS2019-4974
Gaurangkumar Chaudhari, *C K Pithawalla College of Engineering and Technology, Surat, Gujarat, India,* **Salim Channiwala,** *Sardar Vallabhbhai National Institute, Surat Gujarat, India,* **Samip Shah, Digvijay Kulshreshtha,** *C K Pithawalla College of Engineering and Technology, Surat, Gujarat, India*

Pump-Turbine Design for Small Ocean Renewable Energy Storage System
Technical Presentation. AJKFLUIDS2019-5103
Patrick M. Singh, *Fiji National University, Suva, Fiji,* **Young-Do Choi,** *Mokpo National University, Muan, Korea (Republic)*

Effect of Stator Geometry on the Performance of a Positive Displacement Hydraulic Turbine
Technical Paper Publication (ASME). AJKFLUIDS2019-5283
Arihant Sonawat, *Korea University of Science and Technology, Daejeon, Chungcheongnam-do, Korea (Republic),* **Jin-Hyuk Kim, Seung-Jun Kim, Young-Seok Choi, Hyeon-Mo Yang,** *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic),* **Yong Kab Lee,** *Anflux Co. Ltd., Seoul, Korea (Republic),* **Kyung Min Kim,** *Korea District Heating Corporation, Gyeonggi-do, Korea (Republic)*

Experimental Investigations of a Comb-Like Film Cooling Scheme
Technical Paper Publication (ASME). AJKFLUIDS2019-4695
Ibrahim Hassan, *Texas A&M University at Qatar, Dohar, Qatar,* **Wahid Ghaly, H. Ming Li,** *Concordia University, Montreal, QC, Canada*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-6 LIQUID-SOLID FLOWS

5-6-3
STUDIES IN RHEOLOGY
Room D
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan*
Session Co-Organizer: **Jaikrishnan Kadambi,** *Case Western Reserve University, Cleveland, OH, United States*

Experimental Study on the Effects of Radial Dispersion of Spherical Particles on the Suspension Rheology
Technical Paper Publication (JSME). AJKFLUIDS2019-5322
Misa Kawaguchi, Tomohiro Fukui, *Kyoto Institute of Technology, Kyoto, kyoto, Japan,* **Kenichi Funamoto, Suguru Miyauchi, Toshiyuki Hayase,** *Tohoku University, Sendai, Miyagi, Japan*

Relationship Between Macroscopic Rheological Properties and Microstructure of a Dilute Suspension by a Two-Way Coupling Numerical Scheme
Technical Paper Publication (ASME). AJKFLUIDS2019-5449
Tomohiro Fukui, Misa Kawaguchi, Koji Morinishi, *Kyoto Institute of Technology, Kyoto, Kyoto, Japan*

Direct Numerical Simulations of Electrorheological Fluids
Technical Presentation. AJKFLUIDS2019-5452
Suchandra Das, *New Jersey Institute of Technology, Newark, NJ, United States,* **Shriram Pillapakkam,** *Temple University, Philadelphia, PA, United States,* **Naga Aditya Musunuri,** *New Jersey Institute of Technology, North Brunswick, NJ, United States,* **Edison Amah, Pushpendra Singh, Ian S. Fischer,** *New Jersey Institute of Technology, Newark, NJ, United States*

Rheological Characterizations of Zequanox, a Biological Agent Used to Control Invasive Dreissenid Mussels
Technical Presentation. AJKFLUIDS2019-5722
Thomas Zolper, *University of Wisconsin - Platteville, Cuba City, WI, United States*

TOPIC 5-9 BUBBLE, DROPLET, AND AEROSOL DYNAMICS

5-9-3
BUBBLE, DROPLET, AND AEROSOL DYNAMICS III
Room F
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*
Session Co-Organizer: **Park Hyun Jin,** *Hokkaido University, Sapporo, Hokkaido, Japan*

Interfacial Instability and Atomization Dynamics of Acoustically Levitated Droplet
Technical Presentation. AJKFLUIDS2019-5142
Koji Hasegawa, Kohei Aoki, *Kogakuin University, Tokyo, Japan*

Visualization of Bubble Dissolution as a Means to Measure Dissolved Nitrogen Concentration
Technical Paper Publication (JSME). AJKFLUIDS2019-5166
Taisuke Sato, Keita Ando, *Keio University, Kanagawa, Japan*

Visualization of Internal Flow on Mixing Manipulation of an Acoustically Levitated Droplet
Technical Presentation. AJKFLUIDS2019-5573
Suguru Komaya, Kenji Kobayashi, Takumi Ito, Yuya Sasaki, *University of Tsukuba, Tsukuba, Ibaraki Japan,* **Koji Hasegawa,** *Kogakuin University, Tokyo, Japan,* **Akiko Kaneko, Yutaka Abe,** *University of Tsukuba, Tsukuba, Ibaraki Japan,*

Transition of Internal and External Flow Structures of Acoustically Levitated Droplets with Evaporation
Technical Presentation. AJKFLUIDS2019-5595
Yuya Sasaki, Yutaka Abe, Akiko Kaneko, Kenji Kobayashi, Takumi Ito, Suguru Komaya, *University of Tsukuba, Tsukuba, Ibaraki Japan,* **Koji Hasegawa,** *Kogakuin University, Tokyo, Japan*

Air Bubble Dissolution at Solid Surfaces with Dissolved Air Transport
Technical Presentation. AJKFLUIDS2019-5201
Ikumi Takemura, *Keio University, Kanagawa, Japan,* **Tatsuya Yamashita,** *Japan Keio University, Kanagawa, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan*

IN COMMEMORATION OF DR. MALCOLM J. ANDREWS FOR HIS CONTRIBUTIONS TO THE FLUIDS COMMUNITY

Track Organizer: **Arindam Banerjee,** *Lehigh University, Bethlehem, PA, United States*

Track Co-Organizer: **Francine Battaglia,** *University at Buffalo, Buffalo, NY, United States,* **Oleg Schilling,** *Lawrence Livermore National Laboratory, Livermore, CA, United States,* **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States,* **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Mark R. Duignan,** *Savannah River National Laboratory, Aiken, SC, United States*

TOPIC 7-1 CELEBRATING DR. ANDREWS' LIFE AND RESEARCH CONTRIBUTIONS

7-1-2
CONTEMPORARY RESEARCH TO HONOR MALCOLM J. ANDREW'S LEGACY

Seacliff B 3:45PM—5:45PM

Session Organizer: **Oleg Schilling,** *Lawrence Livermore National Laboratory, Livermore, CA, United States*

Session Co-Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Mark R. Duignan,** *Savannah River National Laboratory, Aiken, SC, United States*

A Non-Equilibrium Turbulence Model
Technical Presentation. AJKFLUIDS2019-5745
Jesse Canfield, Marianne Francois, Susan Kurien, Nairita Pal, Rick Rauenzahn, Juan Saenz, *Los Alamos National Laboratory, Los Alamos, NM, United States*

On the Breakup of Crude Oil Patches by Surface Waves and Subsurface Plumes
Technical Presentation. AJKFLUIDS2019-5750
Joseph Katz, *Johns Hopkins University, Baltimore, MD, United States*

The LANL LDRD: Turbulence by Design
Technical Presentation. AJKFLUIDS2019-5721
Bertrand B. Rollin, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

Early Time Nonlinear Fluid Interface Growth Models
Technical Presentation. AJKFLUIDS2019-5744
Jesse Canfield, Nicholas Denissen, Marianne Francois, Robert Gore, Susan Kurien, Rick Rauenzahn, Jon Reisner, *Los Alamos National Laboratory, Los Alamos, NM, United States,* **Steve Shkoller,** *UC Davis, Davis, CA, United States*

Dynamic Bridging Modeling for Coarse Grained Simulations of Shock Driven Turbulent Mixing
Technical Presentation. AJKFLUIDS2019-5739
Fernando Grinstein, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Wednesday, July 31

PLENARY TALKS

TOPIC 8-1 PLENARY TALKS

8-1-4
PLENARY TALKS IV
Grand Ballroom A 8:00AM—9:45AM

Analysis and Design of Membraneless Microfluidic Fuel Cells
Plenary Presentation. AJKFLUIDS2019-5775
Kwang-Yong Kim, *Inha University, Incheon, Korea (Republic)*

Development of Floating Type Ocean Current Turbine for Kuroshio Current
Plenary Presentation. AJKFLUIDS2019-5774
Masafumi Kawai, *IHI Corporation, Koto-ku, Tokyo, Japan*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-3 FLUID POWER

1-3-1
SESSION 1
Room O
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Javid Bayandor,** *The State University of New York at Buffalo, Buffalo, NY, United States*
Session Co-Organizer: **Arvind Jayaprakash,** *A.O. Smith Corp., Johnson City, TN, United States*

Experimental Study on Abrasion and Cavitation Resistance of Non-Metallic Coating Materials for Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5003
Houlin Liu, Man-hui Cao, Jie Chen, Yong Wang, Cheng-bin Wang, *Jiangsu University, Zhenjiang, China*

Effect of Bionic Groove Surface Blade on Cavitation Characteristics of Centrifugal Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5119
Zicheng Zhang, Yun Dai, Yunqing Gu, Zhengzan Shi, Jiegang Mou, *Zhejiang University of Technology, Hangzhou, Zhejiang, China*

Experimental and Numerical Analysis of an Axial Piston Pump: a Comparison Between Lumped Parameter and 3D CFD Approaches
Technical Paper Publication (ASME). AJKFLUIDS2019-5406
Emma Frosina, Gianluca Marinaro, Adolfo Senatore, *University of Naples "Federico II", Naples, Italy*

Modelling and Validation of Tooth Tip Leakages in Gerotor Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5531
Fnu Rituraj, Andrea Vacca, *Maha Fluid Power Research Center, Lafayette, IN, United States*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*
Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-2
APPLIED CFD II
Room E
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*
Session Co-Organizer: **Kyoungsik Chang,** *University of Ulsan, Ulsan, Korea (Republic)*

Theoretical and Numerical Studies on the Performance of Shock Vector Control
Technical Paper Publication (ASME). AJKFLUIDS2019-4691
Kexin Wu, Heuy Dong Kim, *Andong National University, Andong, Korea (Republic)*

Analysis of the Flow Through a Francis' Turbine Runner Using CFD
Technical Paper Publication (ASME). AJKFLUIDS2019-4694
William Anthony, *Petroleum Commission, Accra, Ghana*

Comparison of a Singularity and an Inverse Design Method for Axial Flow Fans Based on Numerical Simulations
Technical Paper Publication (ASME). AJKFLUIDS2019-4713
Anika Theis, Martin Boehle, *T.U. Kaiserslautern, Kaiserslauten, Germany*

Research on the Vibrational Characteristics of a High-Speed Train Based on the Tight Coupling Between Aerodynamics and Multi-Body Dynamics
Technical Paper Publication (ASME). AJKFLUIDS2019-4763
Zhanling Ji, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

A Numerical Analysis of the Hemodynamic Functionality of Human Coronary Stenosis Under Different Physiologic Conditions and Boundary Condition Formulations
Technical Paper Publication (ASME). AJKFLUIDS2019-4820
Iyad Fayssal, *Rafik Hariri University, Mechref, Lebanon,* **Fadl Moukalled,** *American University of Beirut, Beirut, Lebanon*

Computational Study of the Downpull Force on High-Head Slide Gates
Technical Paper Publication (ASME). AJKFLUIDS2019-4881
Juan C. Arango Escobar, David Calderon Villegas, *Integral S.A., Medellin, Colombia,* **Aldo Benavides Moran,** *Universidad Nacional de Colombia, Bogota, Colombia,* **Alejandro Molina Ochoa,** *Universidad Nacional de Colombia, Medellin, Colombia*

TOPIC 2-5 FLUID STRUCTURE INTERACTION (INCLUDING IBM)

2-5-2
BIOLOGICAL APPLICATIONS
Room M
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Chengyu Li,** *Villanova University, King of Prussia, PA, United States*
Session Co-Organizer: **Yechun Wang,** *North Dakota State University, Fargo, ND, United States*

Passive Pitching Mechanism of Three-Dimensional Flapping Wings in Hovering Flight
Technical Paper Publication (ASME). AJKFLUIDS2019-4639
Chengyu Li, *Villanova University, King of Prussia, PA, United States,* **Junshi Wang,** *University of Virginia, Charlottesville, VA, United States,* **Geng Liu,** *University of Maine, Orono, ME, United States,* **Xiaolong Deng, Haibo Dong,** *University of Virginia, Charlottesville, VA, United States*

A Reduced-Order Fluid-Structure Interaction Model for Estimation of The Tissue Properties in Vocal Fold Vibration
Technical Presentation. AJKFLUIDS2019-5213
Zheng Li, Ye Chen, Haoxiang Luo, *Vanderbilt University, Nashville, TN, United States*

A Partitioned FSI Algorithm for Simulating a Pulsatile Turbulent Flow Interacting With An Aortic Valve
Technical Presentation. AJKFLUIDS2019-5321
Sang T. Ha, Seoul National University of Science and Technology, Seoul, Nowon, Korea (Republic), **Sang-Wook Lee,** University of Ulsan, Ulsan, Korea (Republic), **Hyoung Gwon Choi,** Seoul National University of Science and Technology, Seoul, Korea (Republic)

Computational Fluid-Structure Interaction of the Aortic Valve Using an Immersed-Boundary Method
Technical Presentation. AJKFLUIDS2019-5529
Ye Chen, Haoxiang Luo, Vanderbilt University, Nashville, TN, United States

TOPIC 2-7 COMPUTATIONAL TURBULENT COMBUSTION

2-7-1
COMPUTATIONAL TURBULENT COMBUSTION
Room D
Pacific Concourse 10:00AM - 12:00PM

Session Organizer: **Chaitanya Ghodke,** *Convergent Science Inc, Madison, WI, United States*
Session Co-Organizer: **Kun Luo,** *Zhejiang University, Hangzhou, China*

Mechanism of Wall Turbulence Modulation With Premixed Hydrogen Combustion
Technical Paper Publication (JSME). AJKFLUIDS2019-5075
Takashi Ohta, Yuta Onishi, Yasuyuki Sakai, *University of Fukui, Fukui, Japan*

Numerical Investigation of Nox Formation With a Derived Global Reaction Mechanism on a Turbulent Pulverized Coal Combustion Furnace
Technical Presentation. AJKFLUIDS2019-5147
Seongyool Ahn, Kouki Maeda, Hiroaki Watanabe, Toshiaki Kitagawa, *Kyushu University, Fukuoka, Fukuoka, Japan*

Large Eddy Simulation of Pulverized Coal Combustion in Multi-Burner System: Effect of In-Furnace Blending Method on Unburnt Carbon Distribution-
Technical Presentation. AJKFLUIDS2019-5558
Masaya Muto, *Meijo University, Nagoya, Japan,* **Hiroaki Watanabe,** *Kyushu University, Fukuoka, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan*

Thermo-Fluid Dynamic Design Exploration of a Double Pipe Heat Exchanger
Technical Paper Publication (ASME). AJKFLUIDS2019-4998
Tomohiro Hirano, Mitsuo Yoshimura, Koji Shimoyama, Atsuki Komiya, *Tohoku University, Sendai, Japan*

TOPIC 2-9 EMERGING CFD TOPICS

2-9-1
EMERGING CFD METHODS
Seacliff B 10:00AM—12:00PM

Session Organizer: **Javid Bayandor,** *The State University of New York at Buffalo, Buffalo, NY, United States*
Session Co-Organizer: **Yiwei Wang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China,* **Sina Stapelfeldt,** *Imperial College London, London, United Kingdom*

Uncertainty Quantification of Molten Hafnium Infusion Into a B4C Packed-Bed
Technical Paper Publication (ASME). AJKFLUIDS2019-5281
Arturo Schiaffino, V.M. Krushnarao, Kotteda, Vinod Kumar, Arturo Bronson, Sanjay Shantha-Kumar, University of Texas at El Paso, El Paso, TX, United States

Analysis of Computational Fluid Dynamics Software and Respective Cloud Computing Platforms for Engineering Applications
Technical Presentation. AJKFLUIDS2019-5648
Tatiana Mironova, *Samara National Research University, Samara, Russia,* **William Foltz, Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*

Cavitation-Induced Interface Instability of Droplet Between Plates
Technical Paper Publication (ASME). AJKFLUIDS2019-5360
Hongchen Li, Jingzhu Wang, Yiwei Wang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

Effect of Non-Conservative Forces on Computational Accuracy in Dissipative Particle Dynamics With Using Lennard-Jones Potential for Different Number Densities
Technical Presentation. AJKFLUIDS2019-5741
Toru Yamada, Sota Hibi, Shinji Tamano, Yohei Morinishi, *Nagoya Institute of Technology, Nagoya, Aichi, Japan*

Hydraulic Simulation for Calcasieu Lake Area With Small Rivers Using an Immersed Boundary Method
Technical Paper Publication (ASME). AJKFLUIDS2019-4675
Arun Yadav, Ning Zhang, *McNeese State University, Lake Charles, LA, United States*

TOPIC 2-11 APPLICATIONS OF CFD IN MEDICINE AND BIOMEDICAL SYSTEMS

2-11-1
CFD IN MEDICINE AND BIO-SYSTEMS I
Room L
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Sanghun Choi,** *Kyungpook National University, Daegu, Korea (Republic)*
Session Co-Organizer: **Kazuyasu Sugiyama,** *Osaka University, Toyonaka, Osaka, Japan,* **Yechun Wang,** *North Dakota State University, Fargo, ND, United States*

Shape Optimization of a Trumpet-Tipped LVAD Inflow Cannula to Reduce Blood Damage Using a Genetic Algorithm
Technical Paper Publication (ASME). AJKFLUIDS2019-4690
Christopher Nassau, Ramesh Agarwal, *Washington University in St. Louis, Saint Louis, MO, United States*

Numerical Simulation and Optimization of Blalock-Taussig Shunt
Technical Paper Publication (ASME). AJKFLUIDS2019-4784
Thomas Hess, Ramesh Agarwal, *Washington University in St. Louis, Saint Louis, MO, United States,* **David Hoganson,** *Boston Children's Hospital, Boston, MA, United States*

CFD Study of Implanted-Stent Impacts on Blood Flows in Left Coronary Artery Branch Models
Technical Paper Publication (JSME). AJKFLUIDS2019-5250
Kazushi Fujimoto, Takahiro Tsukahara, *Tokyo University of Science, Noda-shi, Chiba, Japan,* **Ken Yamamoto, Masahiro Motosuke,** *Tokyo University of Science, Katsushika-ku, Tokyo, Japan,* **Hiroyoshi Kawamoto, Satoko Tahara, Kentaro Tanaka, Sunao Nakamura,** *New Tokyo Hospital, Matsudo-shi, Chiba, Japan*

A Numerical Design Optimization of a Hybrid Blood Pump for an Extra-Corporeal Blood Circulation Device
Technical Presentation. AJKFLUIDS2019-5324
Jongrak Choi, Nahmkeon Hur, Seongwon Kang, Wonjung Kim, Sogang *University, Seoul, Korea (Republic)*

Inflow Conditions and the Mass Transfer Behavior of Non-Newtonian Fluids in Separated Flows
Technical Presentation. AJKFLUIDS2019-5440
Khaled Hammad, *Central Connecticut State University, Simsbury, CT, United States*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-1 FLUID MACHINERY SYMPOSIUM

3-1-1
FLUID MACHINERY I
Room F
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Hans Josef Dohmen,** *University of Duisburg-Essen, Duisburg, Germany*
Session Co-Organizer: **Desheng Zhang,** *Jiangsu University, Zhenjiang, China,* **Kazuyoshi Miyagawa,** *Waseda University, Tokyo, Tokyo, Japan*

Investigation of Unsteady Performance Characteristics of a Submersible Axial-Flow Pump for Different IGV and Blade Pitch Angles
Technical Paper Publication (ASME). AJKFLUIDS2019-4860
Youn-Sung Kim, Hyeon-Seok Shim, Kwang-Yong Kim, *Inha University, Incheon, Korea (Republic)*

Gas-Liquid Two-Phase Flow in the Axial Clearance of Liquid-Ring Pumps
Technical Paper Publication (KSME). AJKFLUIDS2019-5271
Zhang Renhui, Tian Lei, Guang Qiang Guo, Xuebing Chen, *Lanzhou University of Tehnology, Lanzhou, China*

Development of Rotating Stall Cell Under Coexisting Phenomena of Surge and Rotating Stall in an Axial-Flow Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-5310
Yuu Sakata, *Waseda University, Shinjuku, Japan,* Shuji Ando, Nobumichi Fujisawa, Yutaka Ohta, *Waseda University, Tokyo, Japan*

Suppression of Secondary Flows in a Transonic Centrifugal Compressor Impeller Using an Inverse Design Method Based on Meridional Viscous Flow Analysis
Technical Paper Publication (ASME). AJKFLUIDS2019-5319
Sasuga Ito, *Kyushu University, Fukuoka, Japan,* Shin Okada, *ANA Holdings Inc., Minato-ku, Tokyo, Japan,* Yuki Kawakami, Kaito Manabe, Masato Furukawa, *Kyushu University, Fukuoka, Japan,* Kazutoyo Yamada, *Iwate University, Morioka, Japan*

Simultaneous Optimization of Impeller Blade Loading Distribution and Meridional Geometry for Aerodynamic Design of Centrifugal Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-5358
Kaito Manabe, Sasuga Ito, Masato Furukawa, *Kyushu University, Fukuoka, Japan,* Kazutoyo Yamada, *Iwate University, Morioka, Japan,* Nobuhito Oka, *Mitsubishi Heavy Industries Engine & Turbocharger, Ltd., Sagamihara, Japan,* Isao Tomita, Yoshihiro Hayashi, *Mitsubishi Heavy Industries, Ltd., Nagasaki, Japan*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-7
CAVITATION
Seacliff A 10:00AM—12:00PM

Session Organizer: **Donald P. Sloteman,** *Curtiss-Wright Corporation, Bethlehem, PA, United States*
Session Co-Organizer: **Yuka Iga,** *Tohoku University, Miyagi, Japan*

Assessment of Noise Signature for a Cavitating Centrifugal Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5132
Christopher Stephen, *Vel Tech Rangarajan Dr. Sagunthala Institute of Science and Technology, Chennai, Tamil Nadu, India,* Kumaraswamy Sivasailam, *Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

Effects of the Circulating Jet Flow on the Suction Flow Field and Cavitation in a Canned Motor Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4879
Laizuo Chen, Minguan Yang, Wei Cui, Bo Gao, Ning Zhang, Dan Ni, *Jiangsu University, Zhenjiang, Jiangsu, China*

Experimental Investigation on Cavitation Performance of Torque Converter Using Transparent Model
Technical Paper Publication (JSME). AJKFLUIDS2019-4906
Yusuke Katayama, Yuki Hosoi, Yuta Fukuda, Satoshi Watanabe, Shin-ichi Tsuda, *Kyushu University, Fukuoka, Japan,* Yoshihide Mori, Kazuyoshi Ito, *Aisin AW Co., Ltd., Anjo, Aichi, Japan*

Dynamic Characteristics of Blade Surface Cavitation on Various Types of Hydrofoils
Technical Paper Publication (ASME). AJKFLUIDS2019-5402
Hironori Horiguchi, Masakazu Toyoshima, Takuya Matsuda, Kazuyasu Sugiyama, *Osaka University, Toyonaka, Osaka, Japan*

Numerical Analysis of Contraction Geometry Effects on Cavitation Choking in a Piping System
Technical Paper Publication (JSME). AJKFLUIDS2019-5359
Motohiko Nohmi, *Ebara Corporation, Fujisawa-Shi, Japan,* Shusaku Kagawa, *Ebara Corporation, Futtu, Japan,* Tomoki Tsuneda, *Ebara Corporation, Fuijsawa-shi, Japan,* Wakana Tsuru, Kazuhiko Yokota, *Aoyama Gakuin University, Sagamihara, Japan*

Insight on The Blade Leading Edge Design of a Centrifugal Pump Impeller
Technical Presentation. AJKFLUIDS2019-4893
Giuseppe Rocco, *Flowserve, Desio - Monza, Italy,* Bruno Schiavello, *Flowserve, Millburn, NJ, United States,* Davide Pirola, Giancarlo Cicatelli, *Flowserve, Desio - Monza, Italy*

TOPIC 3-4 COMBUSTION

3-4-1
COMBUSTION I
Seacliff D 10:00AM—12:00PM

Session Organizer: **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany*
Session Co-Organizer: **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Daesik Kim,** *Gangneung-Wonju National University, Wonju, Korea (Republic)*

Effect of DC Electric Fields on Flame Spread Over Twin Electrical Wires
Technical Paper Publication (KSME). AJKFLUIDS2019-4693
Jeong Park, Sun Ho Park, *Pukyong National University, Busan, Korea (Republic),* Suk Ho Chung, Min Suk Cha, *King Abdullah University of Science and Technology, Jeddah, Saudi Arabia*

LES Modeling and Simulation of Coal Gasification on an O_2-CO_2 Gasifier in the Oxy-Fuel IGCC System
Technical Presentation. AJKFLUIDS2019-5348
Hiroaki Watanabe, *Kyushu University, Fukuoka, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Kenji Tanno,** *Central Research Institute of Electric Power Industry, Yokosuka, Kanagawa, Japan*

Effect of Fuel Temperature on Spray Characteristics Discharging From Pressure Swirl Atomizer With Jet-A1 Aviation Fuel
Technical Paper Publication (ASME). AJKFLUIDS2019-5351
Shahnaz Rezaei, Foad Vashahi, Mohammad Mehedi Hasan, Jeekeun Lee, *Chonbuk National University, Jeonju, Jollabukdo, Korea (Republic)*

Impact of Combustion Models on Emissions Predictions From a Piloted Methane-Air Diffusion Flame
Technical Paper Publication (ASME). AJKFLUIDS2019-5521
Chitralkumar Naik, *ANSYS Inc., San Diego, CA, United States,* **Hossam Elasrag,** *ANSYS Inc., Escondido, CA, United States,* **Rakesh Yadav, Ahad Validi, Ellen Meeks,** *ANSYS, Inc., San Diego, CA, United States*

Thermoacoustic Instability Prediction Using Network Model in a Gas Turbine Combustor
Technical Presentation. AJKFLUIDS2019-5597
Yeongmin Pyo, Jeongun Park, Daesik Kim, *Gangneung-Wonju National University, Wonju, Gangwon, Korea (Republic)*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-4
ROTATING MACHINERY IV - FANS
Seacliff C 10:00AM—12:00PM

Session Organizer: **Jin-Hyuk Kim,** *Korea Institute of Industrial Technology, Cheonan, Korea (Republic)*
Session Co-Organizer: **Yutaka Ohta,** *Waseda University, Tokyo, Japan*

Prediction of Aerodynamic Noise for Centrifugal Fan of Air-Conditioner by Tetra-Prism Grids
Technical Paper Publication (JSME). AJKFLUIDS2019-4638
Taku Iwase, *Hitachi, Ltd., Hitachi Research Laboratory, Hitachinaka, Ibaraki, Japan,* **Daiwa Sato,** *Hitachi, Ltd., Hitachinaka-City Ibaraki, Japan,* **Hideshi Obara,** *Hitachi-Johnson Controls Air Conditioning, Inc., Shizuoka, Japan,* **Yoshinobu Yamade,** *Mizuho Information & Research Institute, Inc., Tokyo, Japan,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan*

Predicting Cooling Fan Noise of Electric Motor Using Compressible Large Eddy Simulation
Technical Paper Publication (ASME). AJKFLUIDS2019-4699
Kimihisa Kaneko, *Fuji Electric Co., Ltd, Hino, Tokyo, Japan,* **Tsutomu Yamamoto,** *Fuji Electric Co., Ltd., Hino, Tokyo, Japan*

Development of High-Efficiency Half-Ducted Propeller Fan for Air-Conditioners by Blade Tip Shape Modification
Technical Paper Publication (ASME). AJKFLUIDS2019-4908
Masashi Yoshikawa, Hiroyuki Toyoda, *Hitachi, Ltd., Hitachi Research Laboratory, Hitachinaka, Ibaraki, Japan,* **Hisashi Daisaka,** *Hitachi-Johnson Controls Air Conditioning, Inc., Tochigi-shi, Tochigi, Japan*

Suppression of the Surging Phenomenon by Modifying Tongue Shape of Air Conditioner Mounted With Cross-Flow Fan
Technical Paper Publication (ASME). AJKFLUIDS2019-4958
Haruki Nukaga, Hiroshi Maita, *Hitachi, Ltd., Hitachi Research Laboratory, Hitachinaka-shi, Ibaraki, Japan,* **Hisashi Daisaka,** *Hitachi-Johnson Controls Air Conditioning, Inc., Tochigi-shi, Tochigi, Japan*

Aerodynamic Design and Assessment of a Compact, Single Stage Axial Fan for Low Noise Emission
Technical Paper Publication (ASME). AJKFLUIDS2019-5070
Daniel Kessler, *Technische Universität Braunschweig, Braunschweig, Germany,* **Daniel Giesecke, Jens Friedrichs,** *Technische Universität Braunschweig, Braunschweig, Lower Saxony, Germany,* **Joerg Leuschner,** *AKG Verwaltungsgesellschaft mbH, Hofgeismar, Germany*

Effects of Curvature Radius of Volute Profile on Aerodynamic Performance of Squirrel Cage Fan
Technical Paper Publication (ASME). AJKFLUIDS2019-5078
Ke Wang, Yaping Ju, Chuhua Zhang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

MICRO & NANO FLUID DYNAMICS (MNFDTC) TRACK

Track Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*
Track Co-Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan,* **Han Seo Ko, Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 6-1 MODELLING AND SIMULATION IN MICROFLUIDICS

6-1-1
MODELLING AND SIMULATION IN MICROFLUIDICS
Room G
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States*
Session Co-Organizer: **Masao Watanabe,** *Hokkaido University, Sapporo, Japan*

Bubble Driven Micromixer Based on Thermal Inkjet Technology
Technical Paper Publication (ASME). AJKFLUIDS2019-4703
Hua Tan, *Washington State University Vancouver, Vancouver, WA, United States*

Viscosity Measurement Using Fast-Flow Paper-Based Channel
Technical Presentation. AJKFLUIDS2019-5540
Ilhoon Jang, Charles Henry, *Colorado State University, Fort Collins, CO, United States*

Numerical Investigation of the Forming and Ordering of Inertially Focused Particle Trains in a Square Microchannel
Technical Paper Publication (ASME). AJKFLUIDS2019-4814
Shan Wang, *Shanghai Jiao Tong University, Shanghai, China,* **ShanShan Li,** *Shanghai Institute of Technology, Shanghai, China,* **Zhenhai Pan,** *Shanghai Jiao Tong University, Shanghai, China*

Flow Characterization of Microfluidic Paper-Based Analytical Devices With Hollow Channels
Technical Paper Publication (ASME). AJKFLUIDS2019-5502
Haipeng Zhang, *University of Nebraska-Lincoln, Lincoln, NE, United States,* **Danielle Barmore,** *University of Wisconsin-La Crosse, La Crosse, WI, United States,* **Sangjin Ryu,** *University of Nebraska-Lincoln, Lincoln, NE, United States*

TOPIC 6-3 BIOLOGICALLY ENABLED MICROFLUIDICS AND BIOMICROFLUIDICS

6-3-1
BIOMICROFLUIDICS
Room N
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Jae Sung Park,** *University of Nebraska-Lincoln, Lincoln, NE, United States*
Session Co-Organizer: **Jessie Jeon,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic),* **Jing Fan,** *City College of New York, New York, NY, United States*

Numerical and Experimental Analysis of Recirculation and Wall Shear Stress of Symmetric Tip Catheters
Technical Presentation. AJKFLUIDS2019-5073
Seongsu Cho, Ryungeun Song, Useok Gang, Sang-Hyeok Yang, Seok Won Sung, Seongmin Park, Chang Ho Seo, *Sungkyunkwan University, Suwon-si, Gyeonggi-do, Korea (Republic),* **Hoon Suk Park, Sun Cheol Park,** *The Catholic University of Korea, Seoul, Korea (Republic),* **Dae Hee Lee,** *Sungwon Medical, Cheongwon-gun, Chungcheongbuk-do, Korea (Republic),* **Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

Fabrication and Testing of a Magnetophoretic Bioseparation Chip for Isolation and Detection of Circulating Tumor Cells From Peripheral Blood
Technical Paper Publication (ASME). AJKFLUIDS2019-5082
Seth Jackson, Jeff Darabi, Joseph Schober, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*

Formation of Clot Analogs Between Co-Flow Fluid Streams in a Microchannel Device
Technical Paper Publication (ASME). AJKFLUIDS2019-5513
Sue-Mae Saw, Anand Ramasubramanian, Melinda Simon, Sang-Joon Lee, *San Jose State University, San Jose, CA, United States*

Integration of On-Chip Electrophoretic Analysis on Cytoplasmic RNa of Single Cells and High-Throughput RNA-Sequencing
Technical Presentation. AJKFLUIDS2019-5765
Arata Tsuchida, *RIKEN, Wako-shi, Saitama-ken, Japan,* **Ryuji Yokokawa,** *Kyoto University, Kyoto, Japan,* **Hirifumi Shintaku,** *RIKEN, Wako-shi, Saitama-ken, Japan*

Multifunctional Microfluidics Device Based on Orthogonal and Interdigitated Electrode Pattern
Technical Presentation. AJKFLUIDS2019-5582
Nazmul Islam, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Factors Affecting Trapping Ability of Opto-Thermoelectric Nanotweezer: Experimental and Theoretical Studies
Technical Presentation. AJKFLUIDS2019-5728
Hongru Ding, Linhan Lin, Yuebing Zheng, *University of Texas at Austin, Austin, TX, United States*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-3 FLUID POWER

1-3-2
SESSION 2
Room O
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Emma Frosina,** *University of Naples, Naples, Italy*

Session Co-Organizer: **Wontae Hwang,** *Seoul National University, Seoul, Korea (Republic)*

Computational Fluid Dynamics Modelling of a Load Sensing Proportional Valve
Technical Paper Publication (ASME). AJKFLUIDS2019-4708
Alessandro Corvaglia, Giorgio Altare, Roberto Finesso, Massimo Rundo, *Politecnico di Torino, Turin, Italy*

An Experimental Study on the Actuator Line Method With Anisotropic Regularization Kernel
Technical Paper Publication (ASME). AJKFLUIDS2019-4749
Zhe Ma, Pan Zeng, *Tsinghua University, Beijing, China,* Earl Dowell, *Duke University, Durham, NC, United States,* LiPing Lei, *Tsinghua University, Beijing, China*

Optimizing a Segmented Transmission Line Model for Dynamic Flows in Arbitrarily Tapered Pipelines
Technical Paper Publication (ASME). AJKFLUIDS2019-4773
Travis Wiens, *University of Saskatchewan, Saskatoon, SK, Canada*

High Speed Transient Flow in Manifolds
Technical Paper Publication (ASME). AJKFLUIDS2019-5577
Nicholas Findanis, *Pentair, Ramsgate, NSW, Australia*

TOPIC 1-4 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS

1-4-1
SESSION 1
Room D
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Yoshihiro Kubota,** *Toyo University, Kawagoe, Japan*

Session Co-Organizer: **Wei Zhang,** *Cleveland State University, Cleveland, OH, United States*

Wake Behavior Around Flapping Wings of Model Hawkmoth Moving Sideways
Technical Paper Publication (ASME). AJKFLUIDS2019-4808
Jong-Seob Han, Jae-Hung Han, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Aerodynamic Force Estimation of a Two-Dimensional Bristled Wing
Technical Presentation. AJKFLUIDS2019-5062
Seung Hun Lee, Minhyeong Lee, Daegyoum Kim, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Numerical Simulation of Influences of the Body's Presence on Flow Around the Wings in Insect Flapping Flight
Technical Paper Publication (JSME). AJKFLUIDS2019-5176
Kohei Yamauchi, Tomohiro Fukui, Koji Morinishi, *Kyoto Institute of Technology, Kyoto, Japan*

Wing-Wake Interaction of Insect-Like Flapping Wing in Hover: Effect of Aspect Ratio and Kinematics at Re~104
Technical Paper Publication (ASME). AJKFLUIDS2019-4804
Reynolds Addo-Akoto, Jong-Seob Han, Jae-Hung Han, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Locomotive Capabilities of a Free-Swimming Robotic Tuna
Technical Paper Publication (ASME). AJKFLUIDS2019-5557
Nicholas Noviasky, *The State University of New York at Buffalo, Amherst, NY, United States,* Alexander Matta, Javid Bayandor, *The State University of New York at Buffalo, Buffalo, NY, United States*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*

Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-3
APPLIED CFD III
Room E
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Gocha Chochua,** *Schlumberger, Sugar Land, TX, United States*

Session Co-Organizer: **Yechun Wang,** *North Dakota State University, Fargo, ND, United States*

Analysis of Angular Velocities, Surrounding Air Pressure and Velocities of Various Designed Micro Vertical Axis Savonius Wind Turbines by the Computational Fluid Dynamics (CFD) Method
Technical Paper Publication (ASME). AJKFLUIDS2019-4911
Woradej Manosroi, Thanapol Tangtrakool, Chinnapat Lhaosornthong, Chiang Mai University, Chiang Mai, Thailand

Numerical Investigation of Pressure Pulsation in Vaneless Region of a High Speed Centrifugal Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4912
Yongshun Zeng, *China Agricultural University, Beijing, China,* **Min Yang,** *Aerospace Petrochemical Technology and Equipment Engineering Corporation, Beijing, China,* **Yuqing Zhai, Zhifeng Yao, Fujun Wang, Ruofu Xiao,** *China Agricultural University, Beijing, China*

Numerical Simulations of a Centrifugal Pump With a Non-Newtonian Fluid: Influence on Performances of Different Rheological Modelling
Technical Paper Publication (ASME). AJKFLUIDS2019-4940
Matteo Occari, Valentina Mazzanti, Francesco Mollica, Enrico Munari, Michele Pinelli, Alessio Suman, *University of Ferrara, Ferrara, Italy*

A Computational Heat Transfer and Optimization Study of Drying of Peas and Rice in a Rotary Dryer
Technical Paper Publication (ASME). AJKFLUIDS2019-4949
Atinder Pal Singh, P.S. Ghoshdastidar, *Indian Institute of Technology Kanpur, Kanpur, Uttar Pradesh, India*

Numerical Investigation on Multiphase Reacting/Combusting Turbulent Flows: Aerodynamics, Kinetics, Heat and Mass Transfer Inside a Cement Kiln Precalciner
Technical Paper Publication (ASME). AJKFLUIDS2019-5033
Eugen-Dan Cristea, *Independent Author, Bergamo (BG), Italy,* **Pierangelo Conti,** *Università degli Studi di Bergamo, Dalmine, BG, Italy*

Computational Studies of Droplet Motion Near a Rough Surface via 3D Spectral Boundary Elements
Technical Paper Publication (ASME). AJKFLUIDS2019-5137
Yechun Wang, Xinnan Wang, *North Dakota State University, Fargo, ND, United States*

TOPIC 2-5 FLUID STRUCTURE INTERACTION (INCLUDING IBM)

2-5-3
NEW METHODS AND IBM APPLICATIONS
Room M
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Tomonori Yamada,** *University of Tokyo, Tokyo, Japan*
Session Co-Organizer: **Bo Yin,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*

A New Immersed Stress Method Based on Volume Average
Technical Paper Publication (ASME). AJKFLUIDS2019-4697
Toshiaki Fukada, *Central Research Institute of Electric Power Industry, Kanagawa, Japan,* **Shintaro Takeuchi, Takeo Kajishima,** *Osaka University, Suita, Osaka, Japan*

Extra-Low Reynolds Number Vane Separation Using Immersed Boundary Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5077
Prasert Prapamonthon, Bo Yin, Guowei Yang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

A Finite Element Based Partitioned Coupling Method for the Simulation of Flow-Induced Fiber Motion
Technical Paper Publication (ASME). AJKFLUIDS2019-50967
Diwei Zhang, *Prairie View A&M University, Cypress, TX, United States,* **Xiaobo Peng, Dongdong Zhang,** *Prairie View A&M University, Prairie View, TX, United States*

An Explicit Modeling Approach for Simulating Fluid-Structure Interaction Problems With Immersed-Boundary Finite-Volume Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5212
Yanbo Huang, *Shanghai Jiao Tong University, Shanghai, China,* **ShanShan Li,** *Shanghai Institute of Technology, Shanghai, China,* **Zhenhai Pan,** *Shanghai Jiao Tong University, Shanghai, Shanghai, China*

TOPIC 2-11 APPLICATIONS OF CFD IN MEDICINE AND BIOMEDICAL SYSTEMS

2-11-2
CFD IN MEDICINE AND BIO-SYSTEMS II
Room L
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Kazuyasu Sugiyama,** *Osaka University, Toyonaka, Osaka, Japan*
Session Co-Organizer: **Yechun Wang,** *North Dakota State University, Fargo, ND, United States,* **Sanghun Choi,** *Kyungpook National University, Daegu, Korea (Republic)*

A Patient-Specific Physiologically Derived Boundary Condition Coupled to an Upstream 3D CFD Model to Noninvasively Estimate Fractional Flow Reserve in Coronary Arteries
Technical Presentation. AJKFLUIDS2019-4894
Iyad Fayssal, *Rafik Hariri University, Mechref, Lebanon,* **Fadl Moukalled,** *American Univesristy of Beirut, Beirut, Lebanon*

A Numerical Analysis of Interactions Between Different Collagen I:III Ratios and Cardiomyocytes
Technical Presentation. AJKFLUIDS2019-5482
Brian Roman, Shweta Anil Kumar, Binata Joddar, V M KRUSHNARAO Kotteda, Vinod Kumar, *University of Texas at El Paso, El Paso, TX, United States*

Effects of Stenosis Geometry on Flow in Arteriovenous Fistula Patients
Technical Paper Publication (ASME). AJKFLUIDS2019-4689
Jeffrey Krampf, Ramesh Agarwal, Surendra Shenoy, *Washington University in St. Louis, St. Louis, MO, United States*

CFD DEM Analysis of a Dry Powder Inhaler
Technical Paper Publication (ASME). AJKFLUIDS2019-4771
Antara Badhan, V.M. Krushnarao Kotteda, Vinod Kumar, *University of Texas at El Paso, El Paso, TX, United States*

Large Eddy Simulation of Turbulent Flow Within Human Aortic Arch
Technical Presentation. AJKFLUIDS2019-5461
Kuiyu Cheng, Sang-Wook Lee, *University of Ulsan, Ulsan, Korea (Republic)*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-1 FLUID MACHINERY SYMPOSIUM

3-1-2
FLUID MACHINERY II
Room F
Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Kazutoyo Yamada,** *Iwate University, Morioka, Japan*
Session Co-Organizer: **Jinkook Lee,** *Eaton, Concord, OH, United States,* **Yangjun Zhang,** *Tsinghua University, Beijing, China*

Search of High Efficiency Design by Another Specific Speed Design
Technical Paper Publication (ASME). AJKFLUIDS2019-4645
Takuji Tsugawa, *Independent consultant, Kobe, Japan*

Investigation on the Effects of Torque Converter Blade Thickness Based on FSI Simulation
Technical Paper Publication (ASME). AJKFLUIDS2019-4719
Cheng Liu, Meng Guo, Wei Wei, Qingdong Yan, *Beijing Institute of Technology, Beijing, China,* **Pengyu Li,** *Haerbin First Machinery Group Co. Ltd., Haerbin, China*

Transient Simulation on Unbalanced Torque of Piston Type Valve Cores During Dynamic Motion
Technical Paper Publication (ASME). AJKFLUIDS2019-4733
Cong-wei Hou, Juan Mu, Wen-qing Li, Zhi-Jiang Jin, Jin-yuan Qian, *Zhejiang University, Hangzhou, China*

An Optimization Study on Cavitation Flow in a Steam Trap Valve
Technical Paper Publication (ASME). AJKFLUIDS2019-4993
Chang Qiu, *Zhejiang University, Hangzhou, China,* **Han Zhang,** *Shanghai Power Equipment Research Institute Co. Ltd., Shanghai, China,* **Chen Yang, Cong-wei Hou, Zhi-Jiang Jin, Jin-yuan Qian,** *Zhejiang University, Hangzhou, China*

Numerical Simulation of Torque Converter With Different Pump Blade Camber
Technical Paper Publication (ASME). AJKFLUIDS2019-5394
Zhifang Ke, Cheng Liu, Wei Wei, Qingdong Yan, Xianglu Meng, *Beijing Institute of Technology, Beijing, China*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-8
INDUCERS
Seacliff A 1:30PM—3:30PM

Session Organizer: **Angelo Pasini,** *University of Pisa, Pisa, Italy*
Session Co-Organizer: **Yu Ito,** *Tokyo Institute of Technology, Yokohama, Kanagawa, Japan*

Influence of Turbulence Models in Transient Simulations of Inducers Under Steady Operation
Technical Paper Publication (ASME). AJKFLUIDS2019-4640
Björn Gwiasda, Matthias Mohr, Dennis Herrmann-Verspagen, Martin Boehle, *Technical University Kaiserslautern, Kaiserslauten, Germany*

An Experimental Study of Influence of Slits in Throat Position on Suppression of Cavitation Instabilities in Liquid Propellant Rocket Inducer
Technical Paper Publication (ASME). AJKFLUIDS2019-4838
Moena Kanamaru, Yoshito Kamikura, *Tohoku University, Sendai, Miyagi, Japan,* **Satoshi Kawasaki, Takashi Shimura,** *Japan Aerospace Exploration Agency, Kakuda, Miyagi, Japan,* **Yuka Iga,** *Institute of Fluid Science, Tohoku University, Sendai, Miyagi, Japan*

The Effect of Suction Pressure and Flow Rate on the Dynamic Characteristics of a Cavitating Inducer
Technical Paper Publication (ASME). AJKFLUIDS2019-5274
Yuta Morimoto, Takafumi Sugiura, Hironori Horiguchi, Kazuyasu Sugiyama, *Osaka University, Toyonaka, Osaka, Japan*

Inducer Design Optimization to Improve its Suction Performance
Technical Paper Publication (JSME). AJKFLUIDS2019-5371
Yushi Nakamura, *Osaka institute of technology, Osaka, Japan,* **Marek Lubieniecki,** *Delft University of Technology, Delft, Netherlands,* **Kentarou Hayashi, Yutaka Kawata, Masahiro Miyabe,** *Osaka Institure of Technology, Osaka, Japan,* **Claudio Lettieri,** *Delft University of Technology, Delft, Netherlands*

Thermal Cavitation Instability Analysis in Axial Inducers by Means of Casing and Hub-Mounted Pressure Sensors
Technical Paper Publication (ASME). AJKFLUIDS2019-5620
Ruzbeh Hadavandi, *Sitael S.p.A., Pisa, Italy,* **Angelo Pasini,** *University of Pisa, Pisa, Italy,* **Dario Valentini, Giovanni Pace,** *Sitael S.p.A., Pisa, Italy,* **Luca D'agostino,** *University of Pisa, Pisa, Italy*

TOPIC 3-4 COMBUSTION

3-4-2
COMBUSTION II
Seacliff D 1:30PM—3:30PM

Session Organizer: **Bahram Khalighi,** *General Motors Global R&D, Birmingham, MI, United States*
Session Co-Organizer: **Daesik Kim,** *Gangneung-Wonju National University, Wonju, Korea (Republic),* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan*

CFD Analysis of Premixed Combustion in a Two Stroke Polygon Engine
Technical Paper Publication (ASME). AJKFLUIDS2019-4607
Kevin Anderson, Christian Mendez, *California State Polytechnic University at Pomona, Pomona, CA, United States*

Flame Ignition and Subsequent Growth in Bluff-Body Burner
Technical Paper Publication (ASME). AJKFLUIDS2019-4837
Jian Zhang, *LNM, Institute of Mechanics, Chinese Academy of Science, Beijing, China,* **Yuqing Guo,** *Shanghai Jiao Tong University, Shanghai, Shanghai, China,* **Lipo Wang,** *UM-SJTU joint Institute, Shanghai, China*

Forced Ignition of Bluff-Body Flame in Nitrogen Diluting Coflow
Technical Paper Publication (ASME). AJKFLUIDS2019-5043
Qiong Lan, *Beihang University, Beijing, Beijing, China,* **Jian Zhang,** *LNM, Institute of Mechanics, Chinese Academy of Science, Beijing, China,* **Yangwei Liu,** *Beihang University, Beijing, Beijing, China*

A Numerical Study on the Low Limit Auto-Ignition Temperature of Syngas and Modification of Chemical Kinetic Mechanism
Technical Paper Publication (KSME). AJKFLUIDS2019-5432
Seungeon Jang, Hongjip Kim, Jin Park, *Chungnam National University, Daejeon, Korea (Republic),* **Ki Sung Jung,** *Ulsan National Institute of Science and Technology, Ulsan, Korea (Republic),* **Sang Hyeon Han,** *Chungnam National University, Daejeon, Korea (Republic),* **Chun Sang Yoo,** *Ulsan National Institute of Science and Technology, Ulsan, Korea (Republic)*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-5
ROTATING MACHINERY V - TURBINES
Seacliff C 1:30PM—3:30PM

Session Organizer: **Kazutoyo Yamada,** *Iwate University, Moriok, Japan*
Session Co-Organizer: **Yutaka Ohta,** *Waseda University, Tokyo, Japan*

Numerical Study on the Flow Field Analysis and Optimization of Turbine in Supercritical Compressed Air Energy Storage
Technical Paper Publication (ASME). AJKFLUIDS2019-4849
Meng Wang, Jianqiang Deng, Yang He, *Xi'an Jiaotong University, Xi'an, China,* **Haisheng Chen, Yujie Xu,** *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China*

Secondary Flow Loss Reduction Method by Use of 3D-Fence in a Gas Turbine Cascade
Technical Paper Publication (JSME). AJKFLUIDS2019-5367
Ryota Uehara, Kakeru Kusano, Syohei Mizuguchi, Masahiro Miyabe, Yutaka Kawata, *Osaka Institute of Technology, Osaka, Japan*

Improvement of Film Cooling Effectiveness in the Gas Turbine Endwall by Use of Optimization Framework
Technical Paper Publication (JSME). AJKFLUIDS2019-5368
Daisuke Hata, Kazuto Kakio, Yutaka Kawata, Masahiro Miyabe, *Osaka Institute of Technology, Osaka, Japan*

Design Method and Loss Mechanism Study on a Small-Scale Axial Turbine With Supercritical CO_2
Technical Paper Publication (ASME). AJKFLUIDS2019-5417
Qiyu Ying, Weilin Zhuge, Yangjun Zhang, *Tsinghua University, Beijing, China,* **Panpan Song,** *Beijing Institute of Technology, Beijing, China*

Leakage Performance and Rotordynamic Effect of Radial Outflow Turbine With Grooved Shape
Technical Presentation. AJKFLUIDS2019-5586
Yun Seok Ha, Jung Wan Kim, Wonil Kwak, *University of Science and Technology, Daejeon, Korea (Republic),* **Chaeeun Lee,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Yong-Bok Lee,** *Korea Institute of Science and Technology, Seoul, Korea (Republic)*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*

Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-1 FLUID MEASUREMENT AND INSTRUMENTATION

4-1-1
FLUID MEASUREMENTS AND INSTRUMENTATION - JETS AND SPRAYS

Room G

Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States*

Session Co-Organizer: **Jun Sakakibara,** *Meiji University, Kawasaki, Japan*

Experimental Methods for Studying and Characterizing Freely Expanding Supersonic Gaseous Jets
Technical Paper Publication (ASME). AJKFLUIDS2019-5104
Ryan Holguin, John Bernardin, Robert Morgan, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Effect of Geometry of Pressure-Swirl Duplex Nozzle and ALR on Atomization Characteristics of Jet A-1 Fuel
Technical Paper Publication (KSME). AJKFLUIDS2019-5111
Mohammad Mehedi Hasan, Rakhul Chandrahasan, *Chonbuk National University, Jeonju, Korea (Republic),* **Seungwha Ru, Young Choi,** *Agriculture Science and Technology Development, Jeonju, Korea (Republic),* **Jeekeun Lee,** *Chonbuk National University, Jeonju, Jollabukdo, Korea (Republic)*

Droplet Sizing of Opaque Liquid With Integrated Transmitting and Receiving Optical Arrangement
Technical Presentation. AJKFLUIDS2019-5238
Wing Lai, *TSI Inc., Saint Paul, MN, United States,* **Daniel Troolin,** *TSI Incorporated, Shoreview, MN, United States*

Influence of Nozzle Aspect Ratio and Orientation on Flow Characteristics of Multiple Elliptic Jets
Technical Paper Publication (JSME). AJKFLUIDS2019-5255
Hiroshi Teramoto, Takahiro Kiwata, Kako Yajima, *Kanazawa University, Kanazawa, Japan*

The Dynamic Measurement of Impinging Sheet Thickness via Partial Coherent Interferometry
Technical Paper Publication (ASME). AJKFLUIDS2019-5464
Weixiao Shang, Jun Chen, *Purdue University, West Lafayette, IN, United States*

TOPIC 4-5 NOVEL TECHNIQUES AND UNCERTAINTY QUANTIFICATION IN FLUID MECHANICS

4-5-1
NOVEL TECHNIQUES AND UNCERTAINTY QUANTIFICATION IN FLUID MECHANICS

Room N

Pacific Concourse 1:30PM—3:30PM

Session Organizer: **Theodore Heindel,** *Iowa State University, Ames, IA, United States*

Session Co-Organizer: **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Asymptotic Expansion Technique for Evaluating the Uncertainty of Moist-Air Density Formula
Technical Paper Publication (ASME). AJKFLUIDS2019-4635
Sejong Chun, *Korea Research Institute of Standards and Science, Daejeon, Korea (Republic)*

Development of a Surface Flow Sensor for Measuring Turbulent Drag Force
Technical Paper Publication (ASME). AJKFLUIDS2019-4680
Il Doh, Il-Bum Kwon, Jiho Chang, Sejong Chun, *Korea Research Institute of Standards and Science, Daejeon, Korea (Republic)*

Frequency Response Characterization for Dynamic Measurement of Pressure
Technical Paper Publication (ASME). AJKFLUIDS2019-4730
George Papadopoulos, Daniel Bivolaru, *Innoveering, LLC, Ronkonkoma, NY, United States*

High-Speed Flow Visualization of a Canonical Airblast Atomizer Using Synchrotron X-Rays
Technical Paper Publication (ASME). AJKFLUIDS2019-4992
Theodore Heindel, Timothy Morgan, Thomas Burtnett, Julie Bothell, Danyu Li, *Iowa State University, Ames, IA, United States,* **Alberto Aliseda, Nathanael Machicoane,** *University of Washington, Seattle, WA, United States*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Track Co-Organizer: **Robert Kunz**, *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-1 NUMERICAL METHODS FOR MULTIPHASE FLOWS

5-1-1
COMPUTATIONAL INTERFACIAL METHODS
Seacliff B 1:30PM—3:30PM

Session Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Session Co-Organizer: **Gihun Son,** *Sogang University, Seoul, Korea (Republic),* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan*

LBM Simulations of Dispersed Multiphase Flows in a Channel: Role of a Pressure Poisson Equation
Technical Paper Publication (ASME). AJKFLUIDS2019-4943
Jeremy Horwitz, *Stanford University, Stanford, CA, United States,* **Surya Vanka,** *University of Illinois at Urbana-Champaign, Urbana, IL, United States,* **Purushotam Kumar,** *Corning Incorporated, Corning, NY, United States*

Validation of Numerical Simulation of Drop Motion on Surfaces With Micro Patterns
Technical Paper Publication (JSME). AJKFLUIDS2019-5528
Junya Onishi, Naoki Shikazono, *University of Tokyo, Tokyo, Japan*

Numerical Study of Ultrasound-Driven Microdroplet Evaporation in a Channel
Technical Presentation. AJKFLUIDS2019-5165
Sukwon Park, Seongwook Cho, Gihun Son, *Sogang University, Seoul, Seoul, Korea (Republic)*

A Multiscale Approach to Directly Simulate Droplet Impingement
Technical Presentation. AJKFLUIDS2019-5535
Jason Turner, *University of Illinois Urbana-Champaign, Urbana, IL, United States,* **Brendon Cavainolo, Michael Kinzel,** *University of Central Florida, Orlando, FL, United States*

An Exponential Time Differencing Method for the Baer-Nunziato Two-Phase Flow Model
Technical Paper Publication (ASME). AJKFLUIDS2019-5317
Shan Liang, Jian Zhang, *Computer Network Information Center, Beijing, China*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-3 FLUID POWER

1-3-3
SESSION 3
Room O
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Yutaka Tanaka,** *Hosei University, Tokyo, Japan*

Session Co-Organizer: **Arvind Jayaprakash,** *A.O. Smith Corp., Johnson City, TN, United States*

Estimation and Feasibility of Generating Power Using Tidal Energy
Technical Paper Publication (ASME). AJKFLUIDS2019-4665
Satya Prasad Paruchuru, Siva Kalyani Koneti, Deepthi Jammula, Rao SSS, *VNRV JIET, Hyderabad, Telangana, India*

Wake Characteristics Comparison Between Isolated and Pair Configurations of Marine Hydrokinetic Crossflow Turbines at Low Reynolds Numbers
Technical Paper Publication (ASME). AJKFLUIDS2019-4741
Ivan H. Alayeto, Minh Doan, Kana Kumazawa, Shinnosuke Obi, *Keio University, Yokohama, Kanagawa-ken, Japan*

Impact of Differing Water Contents on Electrostatic Charging
Technical Paper Publication (ASME). AJKFLUIDS2019-4960
Philipp C. Weishaar, Tobias Mielke, Katharina Schmitz, *RWTH Aachen University, Aachen, NRW, Germany*

Design and Modelling of a Cartridge Pressure Amplifier
Technical Paper Publication (ASME). AJKFLUIDS2019-5474
Barbara Zardin, Giovanni Cillo, *University of Modena and Reggio Emilia, Modena, Italy,* **Peter Zavadinka, Juraj Hanusovsky,** *Piston Power sro, Povazska Bystrica, Slovakia (Slovak Republic),* **Massimo Borghi,** *University of Modena and Reggio Emilia, Modena, Italy*

TOPIC 1-4 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS

1-4-2
SESSION 2
Room D
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Bo Yin,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, Beijing, China*
Session Co-Organizer: **Daegyoum Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Fluid-Structure Interaction Simulation of Lactating Human Breast
Technical Paper Publication (ASME). AJKFLUIDS2019-4845
Jamasp Azarnoosh, Fatemeh Hassanipour, *University of Texas at Dallas, Richardson, TX, United States*

Effect of Particle Size and Shape on Transport Using a Model of the Upper Airways Driven by a Single Cilium
Technical Presentation. AJKFLUIDS2019-4946
Carlos Ruvalcaba, Jean-Pierre Delplanque, *University of California, Davis, Davis, CA, United States*

Study of a Microfluidic System Based One-Step Blood Cell-Free Region for Biomarker Detection
Technical Paper Publication (ASME). AJKFLUIDS2019-5301
Anoop Kanjirakat, *Texas A&M University at Qatat, Doha, Qatar,* **Reza Sadr,** *Texas A&M University, College Station, TX, United States*

Flying Spiders: Effects of the Dragline Length and the Spider Mass in Free-Fall
Technical Paper Publication (ASME). AJKFLUIDS2019-5083
Tessa Stevens, *Case Western Reserve University, Cleveland, OH, United States,* **Ryan Courtney,** *Cleveland State University, Cleveland, OH, United States,* **Longhua Zhao,** *Case Western Reserve University, Cleveland, OH, United States,* **Laura Miller,** *Univiversity of North Carolina at Chapel Hill, Chapel Hill, NC, United States,* **Wei Zhang,** *Cleveland State University, Cleveland, OH, United States*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*
Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-6
APPLIED CFD VI
Room E
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*
Session Co-Organizer: **Gocha Chochua,** *Schlumberger, Sugar Land, TX, United States*

Analysis of Vertical Axis Wind Turbine Using Hybrid Airfoil Design
Technical Paper Publication (ASME). AJKFLUIDS2019-5624
Muhammad ZiaUllah Khan, Emad Uddin, Zaib Ali, *National University of Sciences and Technology, Islamabad, Punjab, Pakistan,* **Adil Loya,** *PAK Karachi Institute of Information Technology, Karachi, Pakistan,* **Asfandyar Arshad,** *National University of Sciences and Technology, Islamabad, Pakistan,* **Muhammad Yamin Younis,** *Mirpur University of Science and Technology, AJK, AJK, Pakistan*

A Numerical Modeling Study for Improving the Starting Behavior of a Small Horizontal Axis Wind Turbine
Technical Presentation. AJKFLUIDS2019-4810
Sikandar Khan, *King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

Research on Flow Field in a Rotary Vane Energy Recovery Device
Technical Presentation. AJKFLUIDS2019-4850
Fanghua Ye, Jianqiang Deng, *Xi'an Jiaotong University, Xi'an, China*

Reynolds Averaged Navier-Stokes Simulation of Highly Turbulent, Under-Expanded Jets and Effects of Impingement at Elevated Injection Pressure
Technical Paper Publication (ASME). AJKFLUIDS2019-5564
Jacob Riglin, Adam Wachtor, Robert Morgan, Ryan Holguin, John Bernardin, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Influence of the Tip Clearance Height on the Performance and Minimum Pressure Coefficient of the Water Jet Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5602
Ning Li, Gang Chen, Peng Yan, *Marine Design & Research Institue of China, Shanghai, China*

TOPIC 2-5 FLUID STRUCTURE INTERACTION (INCLUDING IBM)

2-5-4
INDUSTRIAL AND AEROSPACE APPLICATIONS
Room M
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Christoph Brandstetter,** *Ecole Centrale De Lyon, Ecully, France*
Session Co-Organizer: **Yuqing Liu,** *Bechtel Oil, Gas, and Chemical, Sugar Land, TX, United States*

Reservoir Geomechanical Modeling and Ground Uplift During CO_2 Injection Into Khuff Reservoir
Technical Paper Publication (ASME). AJKFLUIDS2019-4809
Sikandar Khan, Yehia Khulief, Abdullatif Al-Shuhail, *King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

A Numerical Modeling Study for Improving the Starting Behavior of a Small Horizontal Axis Wind Turbine
Technical Presentation. AJKFLUIDS2019-4811
Sikandar Khan, *King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

Numerical Analysis of Geometrical Nonlinear Aeroelasticity With CFD/CSD Method
Technical Presentation. AJKFLUIDS2019-5048
Xueyuan Nie, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

Flutter Study on High Speed Train External Windshield by a Tight Coupling Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5422
Qian Jiang, Guannan Zheng, Guilin Zhao, *Chinese Academy of Sciences, Beijing, China*

Differentiating Between Acoustic-Induced and Flow-Induced Vibration
Technical Presentation. AJKFLUIDS2019-5743
Yuqing Liu, *Bechtel Oil, Gas, and Chemical, Sugar Land, TX, United States,* **Ismat El Jaouhari,** *Bechtel Corporation, Sugar Land, TX, United States,* **Freeman Self,** *Bechtel Oil, Gas, and Chemical, Houston, TX, United States*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-1 FLUID MACHINERY SYMPOSIUM

3-1-3
FLUID MACHINERY III
Room F
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Kwang-Yong Kim,** *Inha University, Incheon, Korea (Republic)*
Session Co-Organizer: **Shouqi Yuan,** *Jiangsu University, Jiangsu, China,* **Upendra Rohatgi,** *Brookhaven National Laboratory, Upton, NY, United States*

An Accurate Thermal Measurement Approach for Determining Fan Efficiencies Based on System Identification
Technical Paper Publication (ASME). AJKFLUIDS2019-4613
Stefan aus der Wiesche, Felix Reinker, Robert Wagner, *Muenster University of Applied Sciences, Steinfurt, Germany,* **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany,* **Manuel Fritsche,** *Hochschule Coburg, Coburg, Germany,* **Hans Joerg Russwurm,** *Russwurm Ventilatoren GmbH, Meitingen, Germany*

A Study on Improvement of Aerodynamic Performance for 100HP Axial Fan Blade and Guide Vane Using Response Surface Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5146
Young-Seok Choi, *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic),* **Yong-in Kim,** *Korea University of Science and Technology, Daejeon, Korea (Republic),* **Sung Kim,** *Korea Institute of Industrial Technology, Cheonan, Korea (Republic),* **Seul-Gi Lee,** *Korea University of Science and Technology, Daejeon, Korea (Republic),* **Hyeon-Mo Yang, Kyoung-Yong Lee,** *Korea Institute of Industrial Technology, Cheonan, Korea (Republic)*

Design and Verification of Cooling Fans for Engine Rooms of Mobile Hydraulics Vehicles
Technical Paper Publication (KSME). AJKFLUIDS2019-5607
Jong-Hwa Kim, Chun-Ho Lim, Geun-Pyo Lee, Seungbae Lee, *Inha University, Incheon, Korea (Republic)*

CFD-Simulation of Centrifugal Fan Performance Characteristics Using Ideal and Real Gas Models for Air and Organic Fluids
Technical Paper Publication (ASME). AJKFLUIDS2019-4815
Manuel Fritsche, *Hochschule Coburg, Coburg, Germany,* **Philipp Epple,** *Hochschule Coburg, Nurnberg, Bavaria, Germany,* **Karsten Hasselmann, Felix Reinker, Robert Wagner, Stefan aus der Wiesche,** *Muenster University of Applied Sciences, Steinfurt, Germany,* **Hans Joerg Russwurm,** *Russwurm Ventilatoren GmbH, Meitingen, Germany*

Numerical Simulation and Vorticity Analysis of Cavitating Flow Around a Marine Propeller Behind the Hull
Technical Paper Publication (ASME). AJKFLUIDS2019-4740
Yun Long, Cheng Z. Han, Bin Ji, Xin P. Long, *Wuhan University, Wuhan, Hubei Province, China,* Zhi R. Zhang, *The China Ship Scientific Research Center, Wuxi, Jiangsu Province, China*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-11
SPECIAL PUMPING MEDIUM (LIQUID-SOLID, HIGH VISCOSITY)
Seacliff A 3:45PM—5:45PM

Session Organizer: **Paul Uwe Thamsen,** *Technical University Berlin, Berlin, Germany, Germany*
Session Co-Organizer: **Christian Brix Jacobsen,** *Grundfos Holding A/S, Bjerringbro, Denmark*

A Review of Pump Performance Prediction Methods for High Viscosity Fluids
Keynote Presentation. AJKFLUIDS2019-5766
Stefan Berten, *Sulzer Management Ltd., Winterthur, Switzerland*

Validation of a Developed Assessment Procedure for the Functional Performance of Wastewater Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5439
Michael Pöhler, Ümit Hasirci, Tim Rese, Paul Uwe Thamsen, *Technical University Berlin, Berlin, Germany*

Investigations Into Wet Wipe Related Clogging Phenomena of Wastewater Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5446
Raja-Louisa Mitchell, *Technische Universität Berlin, Berlin, Germany,* Susanne Busche, *Dahlem Beratende Ingenieure GmbH & Co. Wasserwirtschaft KG, Berlin, Germany,* Paul Uwe Thamsen, *Technical University Berlin, Berlin, Germany, Germany*

A Numerical Study of Turbulence Model and Rebound Model Effect on Erosion Simulations in an Electrical Submersible Pump (ESP)
Technical Paper Publication (ASME). AJKFLUIDS2019-5538
Haiwen Zhu, Jun Zhang, Jianjun Zhu, *University of Tulsa, Tulsa, OK, United States,* Risa Rutter, *Baker Hughes, a GE company, Claremore, OK, United States,* Hong-Quan Zhang, *University of Tulsa, Tulsa, OK, United States*

TOPIC 3-6 INDUSTRIAL FLUID MECHANICS

3-6-1
INDUSTRIAL FLUID MECHANICS I
Room L
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Session Co-Organizer: **Kazuyoshi Miyagawa,** *Waseda University, Tokyo, Japan,* **Jinkook Lee,** *Eaton, Concord, OH, United States*

CFD Investigation of a PEMFC Stack Assembly
Technical Paper Publication (ASME). AJKFLUIDS2019-4744
Kevin Anderson, Andrew Murphy, *Cal Poly Pomona, Pomona, CA, United States*

CFD Investigation of a PEMFC Stack Assembly
Technical Paper Publication (ASME). AJKFLUIDS2019-4744
Kevin Anderson, Andrew Murphy, *Cal Poly Pomona, Pomona, CA, United States*

Simulation of Dynamic Characteristics of Pneumatic Control Valve With Smart Valve Positioner
Technical Paper Publication (ASME). AJKFLUIDS2019-4783
Chongho Youn, Kenji Saito, Motohiro Furuya, *Azbil Corporation, Fujisawa Kanagawa, Japan*

Development of a New Exhaust Air System for Combined Air Compressor and Dryer System
Technical Paper Publication (ASME). AJKFLUIDS2019-5106
Michael Steppert, *Hochschule Coburg, Coburg, Germany,* Philipp Epple, *Hochschule Coburg, Nurnberg, Bavaria, Germany,* Michael Steber, Michael Florschuetz, Felix Schneider, Kevin Habrock, *Coburg University of Applied Sciences, Coburg, Germany,* Erwin Ruppelt, Sebastian Eideloth, Anja Seitz, *Kaeser Kompressoren SE, Coburg, Germany*

Design Optimization of an IGG Blower to Enhance the Aerodynamic Performance
Technical Paper Publication (KSME). AJKFLUIDS2019-5148
Sang-Moon Lee, Choon-Man Jang, *Korea Institute of Civil Engineering and Building Technology, Goyang-si, Gyeonggi-do, Korea (Republic),* Ki-Yong Lee, *Yujin Engineering & Mfg. Co., Ltd., Bucheon, Gyeonggi-do, Korea (Republic)*

TOPIC 3-10 ROTATING MACHINERY / TURBOMACHINERY

3-10-6
ROTATING MACHINERY VI - BEARINGS
Seacliff C 3:45PM—5:45PM

Session Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Session Co-Organizer: **Yutaka Ohta,** *Waseda University, Tokyo, Japan,* **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States*

Two Flow Models for Designing Hydrostatic Bearings With Porous Material
Technical Paper Publication (ASME). AJKFLUIDS2019-4657
Martin Boehle, *Technical University Kaiserslautern, Kaiserslauten, Germany,* **Yandong Gu,** *Jiangsu University, Zhengjiang, Jiangsu,* **Arthur Schimpf,** *Technical University Kaiserslautern, Kaiserslautern, Germany*

Numerical Method for Studying Bearing Gap Pressure Wave Development and Subsequent Performance Mapping of Externally Pressurized Gas Journal Bearings
Technical Paper Publication (ASME). AJKFLUIDS2019-4732
Tom Lawrence, Marvin Kemple, *Indiana University Purdue University Indianapolis, Indianapolis, IN, United States*

Influence of Cryogenic Fluid on the Friction Interactions in the Ball Bearing Consisting of AG-Coated Races and PTFE Cage
Technical Presentation. AJKFLUIDS2019-5583
Wonil Kwak, *University of Science and Technology, Daejeon, Korea (Republic),* **Yong-Bok Lee,** *Korea Institute of Science and Technology, Seoul, Korea (Republic)*

Investigation of Magnetic Journal Bearing Instability Issues in Supercritical CO_2 Turbomachinery
Technical Paper Publication (ASME). AJKFLUIDS2019-5349
Dokyu Kim, Seungjoon Baik, Jeongik Lee, *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*
Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-1 FLUID MEASUREMENT AND INSTRUMENTATION

4-1-2
FLUID MEASUREMENTS AND INSTRUMENTATION - BUBBLY FLOWS AND MIXING
Room G
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*
Session Co-Organizer: **Simon Song,** *Hanyang University, Seoul, Korea (Republic)*

Investigation on the Characteristic of Bubbles in Horizontal Channel Flow by Fiber Optic Sensor
Technical Paper Publication (ASME). AJKFLUIDS2019-4646
Takamichi Hiroi, Tatsuya Hamada, Chiharu Kawakita, *National Maritime Research Institute, Mitaka, Tokyo, Japan*

Investigations on Energy Shares and Flow Structures of the Mixing Flow Using 3D-POD Analyses
Technical Paper Publication (KSME). AJKFLUIDS2019-5058
Daekyeong Kong, Gyeongrae Cho, *Korea Maritime and Ocean University, Busan, Korea (Republic),* **Nao Ninomiya,** *Utsunomiya University, Utsunomiya, Japan,* **Sunghee Kang,** *LG Electronics, Changwon City, Korea (Republic),* **Deog-Hee Doh, Myoung-Jin Kim,** *Korea Maritime and Ocean University, Busan, Korea (Republic),* **Sangmo Kang, Yong Kweon Suh,** *Dong-a University, Busan, Korea (Republic)*

Experimental Analysis of a Liquid-Gas Two-Phase Flow in a Flow Distributor
Technical Paper Publication (ASME). AJKFLUIDS2019-5443
Luiz H.M. Lino, Henrique K. Eidt, Carolina C. Rodrigues, Cesar Y. Ofuchi, Paulo H.D. Santos, Flavio Neves Jr., Marco J. Silva, Rigoberto Morales, *Federal University of Technology Parana, Curitiba, PR,, Brazil*

Neutron Imaging of Capillary Effect Under High-Pressure and High Temperature Condition
Technical Paper Publication (ASME). AJKFLUIDS2019-5589
Wilson Susanto, Tomonori Ihara, Tatsuya Hazuku, *Tokyo University of Marine Science and Technology, Tokyo, Japan,* **Shinichi Morooka,** *Waseda University, Tokyo, Japan,* **Daisuke Ito,** *Institute for Integrated Radiation and Nuclear Science, Kyoto University, Osaka, Japan*

2D Velocity Vector Profile Measurement and Phase Separation on Swirling Bubbly Flow Using Ultrasound Technique
Technical Paper Publication (JSME). AJKFLUIDS2019-5636
Wongsakorn Wongsaroj, Hideharu Takahashi, *Tokyo Institute of Technology, Tokyo, Japan,* **Natee Thong-un,** *King Mongkut's University of Technology North Bangkok, Bangkok, Thailand,* **Hiroshige Kikura,** *Tokyo Institute of Technology, Tokyo, Japan*

TOPIC 4-6 VOLUMETRIC OR TOMOGRAPHIC TECHNIQUES IN FLUIDS MECHANICS

4-6-1
VOLUMETRIC OR TOMOGRAPHIC TECHNIQUES AND APPLICATIONS IN FLUIDS MECHANICS
Room N
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Navid Goudarzi,** *University of North Carolina at Charlotte, Charlotte, NC, United States*
Session Co-Organizer: **Ruben Hortensius,** *TSI Incorporated, Shoreview, MN, United States*

Three-Dimensional Measurement of Smoke Density Distribution by Switching Volumetric Color Illumination Patterns
Technical Paper Publication (JSME). AJKFLUIDS2019-4871
Park Hyun Jin, Yuhei Sugano, Yuji Tasaka, Yuichi Murai, *Hokkaido University, Sapporo, Hokkaido, Japan*

Measurements of Dimension and Morphology of Solid Particles Volume With Digital In-Line Holography
Technical Paper Publication (ASME). AJKFLUIDS2019-5211
Yijie Wang, Jun Chen, *Purdue University, West Lafayette, IN, United States*

DPIR: Dense Particle Identification and Reconstruction for Dual Frame and Time-Resolved Volumetric Particle Tracking Velocimetry (PTV)
Technical Presentation. AJKFLUIDS2019-5526
Aaron Boomsma, Daniel Troolin, Stamatios Pothos, *TSI Incorporated, Shoreview, MN, United States*

A TomoPIV Flow Field Study of NACa 63-215 Hydrofoil With CFD Comparison
Technical Paper Publication (ASME). AJKFLUIDS2019-5517
Mohammadamin Sheikhshahrokhdehkordi, Navid Goudarzi, Farhad Saffaraval, Peter Tkacik, Seyedmohammad Mousavisani, *University of North Carolina at Charlotte, Charlotte, NC, United States,*

Exploring and Improving the Flow Characteristics of an Empty Water Channel Test Section: The Application of TomoPIV and Flowrate Sensors for Whole-Flow-Field Visualization
Technical Paper Publication (ASME). AJKFLUIDS2019-5539
Seyedmohammad Mousavisani, Navid Goudarzi, Mohammadamin Sheikhshahrokhdehkordi, Tucker Bisel, Jerry Dahlberg, Peter Tkacik, *University of North Carolina at Charlotte, Charlotte, NC, United States*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*
Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-1 NUMERICAL METHODS FOR MULTIPHASE FLOWS

5-1-2
COMPUTATIONAL MULTIPHASE FLOW
Room B
Pacific Concourse 3:45PM—5:45PM

Session Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*
Session Co-Organizer: **Limin Wang,** *Institute of Process Engineering, Beijing, China,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Gihun Son,** *Sogang University, Seoul, Korea (Republic)*

On Scouring Efficiency of Flush Waves in Sewers: A Numerical and Experimental Study
Technical Paper Publication (ASME). AJKFLUIDS2019-4615
Maryam Alihosseini, Paul Uwe Thamsen, *Technical University Berlin, Berlin, Germany*

Numerical Simulation of Unsteady Moist-Air Flows Through Whole-Annulus Rotor Blade Rows in Transonic Compressor
Technical Paper Publication (ASME). AJKFLUIDS2019-4782
Shota Moriguchi, Takuro Endo, Hironori Miyazawa, Takashi Furusawa, *Tohoku University, Sendai, Japan,* **Satoru Yamamoto,** *Tohoku University, Sendai, Miyagi, Japan*

Numerical Study of Unsteady Film Condensation in a Vertical Channel
Technical Presentation. AJKFLUIDS2019-5311
Yunmin Choi, Gihun Son, *Sogang University, Seoul, Korea (Republic)*

Supercritical CO_2 Flows in Brine Saturated Fractured Reservoirs
Technical Presentation. AJKFLUIDS2019-5376
Amir A. Mofakham, Goodarz Ahmadi, *Clarkson University, Potsdam, NY, United States,* **Dustin Crandall,** *National Energy Technology Laboratory, Department of Energy, Morgantown, WV, United States*

The Study of Exhausting Accumulated Liquid in Upward Inclined Pipe Using a Swirl Tool
Technical Paper Publication (ASME). AJKFLUIDS2019-4913
Zhenqiang Xie, Xuewen Cao, Fachun Liang, *China University of Petroleum (East China), Qingdao, ShanDong, China,* **Jun Zhang,** *University of Tulsa, Tulsa, OK, United States*

MICRO & NANO FLUID DYNAMICS (MNFDTC) TRACK

Track Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*
Track Co-Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan,* **Han Seo Ko,** *Sungkyunkwan University, Suwon-Si, Gyeonggi-Do, Korea (Republic),* **Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 6-8 MICRO/NANO FABRICATION TECHNIQUES FOR MICROFLUIDICS SYSTEM

6-8-1
MICRO/NANO FABRICATION FOR FLUIDIC SYSTEM
Seacliff D 3:45PM—5:45PM

Session Organizer: **Mohammed Jalal Ahamed,** *University of Windsor, Windsor, ON, Canada*
Session Co-Organizer: **Sung-Jin Kim,** *Konkuk University, Seoul, Korea (Republic)*

Formation Method for SU-8 Film With Uniform Thickness of 400 Micrometers
Technical Paper Publication (JSME). AJKFLUIDS2019-5014
Tamio Fujiwara, *Tokyo City University, Setagaya-ku, Tokyo, Japan,* **Haruyuki Kinoshita,** *University of Tokyo, Meguro-ku, Tokyo, Japan,* **Hiroshi Ohue,** *Tokyo City University, Setagaya-ku, Tokyo, Japan,* **Teruo Fujii,** *University of Tokyo, Tokyo, Japan*

Rapid and Versatile Micromold Fabrication Using Micromilling and Nanopolishing for Microfluidic Devices
Technical Paper Publication (ASME). AJKFLUIDS2019-5398
Thanh Qua Nguyen, Jeong Min Mah, *Korea Institute of Science and Technology, Seoul, Korea (Republic),* **Woo-Tae Park,** *Seoul National University. of Science and Technology, Seoul, Korea (Republic),* **Sangyoup Lee,** *Korea Institute of Science and Technology, Seoul, Korea (Republic)*

Analysis of Laser Machining Parameters to Fabricate Microchannels in Glass, PDMS and PMMa Substrates
Technical Presentation. AJKFLUIDS2019-5581
Prashanth Konari, Mohammad Hossan, *University of Central Oklahoma, Edmond, OK, United States*

Experimental Investigation on Silver-Graphene Hybrid Nanofluid Droplet Evaporation and Wetting Characteristics of Its Nanostructured Droplet Residue
Technical Paper Publication (ASME). AJKFLUIDS2019-5049
Farooq Riaz Siddiqui, *The Hong Kong University of Science and Technology, Kowloon, Hong Kong, Hong Kong,* **Edwin C.Y. Tso,** *City University of Hong Kong, Kowloon, Hong Kong, Hong Kong,* **Sau Chung Fu,** *The Hong Kong University of Science and Technology, Kowloon, Hong Kong, Hong Kong,* **Christopher Y.H. Chao,** *University of Hong Kong, Hong Kong, Hong Kong,* **Huihe Qiu,** *The Hong Kong University of Science and Technology, Kowloon, Hong Kong*

Opto-Thermofluidic Nanotweezers in Reconfigurable Assembly of Functional Colloidal Matter
Technical Presentation. AJKFLUIDS2019-5729
Linhan Lin, Xiaolei Peng, Yuebing Zheng, *University of Texas at Austin, Austin, TX, United States*

Atomic-Scale Study of Water Permeation in Graphene Oxide Derivative Membrane
Technical Presentation. AJKFLUIDS2019-5307
Hae Gon Lee, Dana Jin, Sangjin Choi, Wooyoung Shim, Joon Sang Lee, *Yonsei University, Seoul, Korea (Republic)*

Thursday, August 01

PLENARY TALKS

TOPIC 8-1 PLENARY TALKS

8-1-5
PLENARY TALKS V
Grand Ballroom A 8:00AM—9:45AM

Verification, Validation, Scaling, and Uncertainty Quantification for Thermal-Hydraulics Applications
Plenary Presentation. AJKFLUIDS2019-5778
Upendra Rohatgi, *Brookhaven National Laboratory, Upton, NY, United States*

Expedition to Flow Phenomena in Vascular Plants and Development of Biomimetic Technologies
Plenary Presentation. AJKFLUIDS2019-5777
Sang-joon Lee, *Pohang University of Science & Technology, Pohang, Gyeongbuk, Korea (Republic)*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*
Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-4 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS

1-4-3
SESSION 3
Room D
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States*
Session Co-Organizer: **Yoshihiro Kubota,** *Toyo University, Kawagoe, Japan*

The Performance Enhancement of Hemodialyzers: Computational Fluid Dynamics Study
Technical Paper Publication (ASME). AJKFLUIDS2019-4863
Abdullah A. Alghafis, Ahmed Alshwairekh, Anas M. Alwatban, *Lehigh University, Bethlehem, PA, United States,* **Umar Alqsair,** *Lehigh University, Whitehall, PA, United States,* **Alparslan Oztekin,** *Lehigh University, Bethlehem, PA, United States*

A Mathematical Model of Acinar Airway Design in Human Lungs
Technical Presentation. AJKFLUIDS2019-5080
Yeonsu Jung, *Seoul National University, Seoul, Korea (Republic),* **Keunhwan Park,** *Technical University of Denmark, Lyngby, Denmark,* **Taeho Son,** *Seoul National University, Seoul, Korea (Republic),* **Young-Jae Cho,** *Seoul National University Bundang Hospital, Seongnam, Korea (Republic),* **Noo Li Jeon,** *Seoul National University, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic),* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic)*

Flow Measurement in Stented Left Coronary Artery Models
Technical Paper Publication (JSME). AJKFLUIDS2019-5154
Kensuke Ono, *Tokyo University of Science, Tokyo, Japan,* **Ken Yamamoto,** *Tokyo University of Science, Katsusika-ku, Tokyo, Japan,* **Takahiro Tsukahara,** *Tokyo University of Science, Noda-shi, Chiba, Japan,* **Hiroyoshi Kawamoto, Satoko Tahara, Kentaro Tanaka, Sunao Nakamura,** *New Tokyo Hospital, Matsudo-shi, Chiba, Japan,* **Masahiro Motosuke,** *Tokyo University of Science, Katsushika-ku, Tokyo, Japan*

Effect of Diameter Size on the Unsteady Characteristics of Pulsatile Flow in Curved Human Blood Vessel
Technical Paper Publication (ASME). AJKFLUIDS2019-5227
Ruixuan Tang, Xuanming Zhao, Junshi Wang, *University of Virginia, Charlottesville, VA, United States,* **Justin Hyde, Bradley Kesser,** *University of Virginia Health System, Charlotesville, VA, United States,* **Haibo Dong,** *University of Virginia, Charlottesville, VA, United States*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*
Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-1
APPLIED CFD I
Seacliff C 10:00AM—12:00PM

Session Organizer: **Z. Zheng,** *University of Kansas, Lawrence, KS, United States*
Session Co-Organizer: **Kenji Tanno,** *Central Research Institute of Electric Power Industry, Yokosuka, Kanagawa, Japan*

POD Modes and Lyapunov Exponents in Nonlinear Flow States
Invited Presentation. AJKFLUIDS2019-5779
Meihua Zhang, Z. Zheng, *University of Kansas, Lawrence, KS, United States*

Numerical Simulation and Experiment of the Fire Protecting System of the Manipulator in High Temperature Environment
Technical Paper Publication (ASME). AJKFLUIDS2019-5063
Byeong Cheon Kim, Kyoungsik Chang, *University of Ulsan, Ulsan, Korea (Republic)*

Effect of Microscopic Vortices Caused by Flow Interaction With Solid Obstacles on Heat Transfer in Turbulent Porous Media Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-4617
Ching-Wei Huang, Vishal Srikanth, Haodong Li, *North Carolina State University, Raleigh, NC, United States,* **Andrey Kuznetsov,** *North Carolina State University, Raleigh, NC, United States*

Numerical Simulation of Inline Arrangement of Spheroid Particles in Different Orientations
Technical Paper Publication (ASME). AJKFLUIDS2019-4623
Abuzar Jamil, Emad Uddin, Ali Zaidi, Zaib Ali, Jawad Aslam, Omer Gilani, *National University of Sciences and Technology, Islamabad, Punjab, Pakistan*

A Study of Multiphase Flow and Heat Transfer in Proton Exchange Membrane Fuel Cells With Perforated Metal Gas Diffusion Layers
Technical Paper Publication (ASME). AJKFLUIDS2019-4654
Torsten Berning, *Aalborg University, Aalborg, Northern Jutland, Denmark,* **Shiro Tanaka,** *Hydrogen South Africa - Catalysis, Rondebosch (Cape Town), South Africa*

Solution of Unsteady Fluid Dynamic and Energy Equations for High Speed Oscillating Compressible Flows and Blast Wave Propagations
Technical Paper Publication (ASME). AJKFLUIDS2019-4672
Ramlala P. Sinha, *Applied Engineering Consultants, Fairfax, VA, United States*

2-1-7
APPLIED CFD VII
Room E
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Z. Zheng,** *University of Kansas, Lawrence, KS, United States*
Session Co-Organizer: **William Foltz,** *McNeese State University, Lake Charles, LA, United States*

Flow Around Two Cylinders in Tandem At Subcritical Reynolds Numbers
Technical Presentation. AJKFLUIDS2019-4925
Yacine Kahil, *El-Wancharissi University, Tissemsilt, Algeria,* **Abdallah Sofiane Berrouk,** *Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.,* **Imran Afgan,** *University of Manchester, Manchester, United Kingdom*

Blast Tube Characterization using a Shock Physics and Unsteady RANS Approach
Technical Presentation. AJKFLUIDS2019-4884
Robert Morgan, Ronald Parker, John Bernardin, *Los Alamos National Laboratory, Los Alamos, NM, United States*

MOC-CFD Coupled Simulation on a Rotary Pressure Wave Generator and Pipelines
Technical Presentation. AJKFLUIDS2019-4851
Bingwei Xuan, Jianqiang Deng, *Xi'an Jiaotong University, Xi'an, China*

Numerical and Experimental Investigation on the Cooling Effect According to Various Rotor Shapes of a BLDC Motor for Multi-Copters
Technical Presentation. AJKFLUIDS2019-5131
Sungjin Yang, Jungmoo Seo, Myungsung Lee, Joo-han Kim, *Korea Electronics Technology Institute, Bucheon, Gyeonggi-do, Korea (Republic)*

A Numerical Study for an Assessment of Copper Coating Effect on the Vaporization Rate of Liquid Hydrogen Storage
Technical Presentation. AJKFLUIDS2019-5323
Gwang Hoon Rhee, Gun Woo Kim, *University of Seoul, Seoul, Korea (Republic)*

A Numerical Study to Evaluate the Operability and Reliability of Butterfly Valve
Technical Presentation. AJKFLUIDS2019-5328
Sang Hyuk Lee, Jaehyung Kim, Byung Chang Jung, *Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

TOPIC 2-2 CFD DEVELOPMENT

2-2-1
CFD DEVELOPMENT I
Room M
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Z. Zheng,** *University of Kansas, Lawrence, KS, United States*
Session Co-Organizer: **Masaya Muto,** *Meijo University, Nagoya, Japan*

Numerical Studies of Moffat, Dean and Prandtl Vortices
Keynote Presentation. AJKFLUIDS2019-5638
Surya Vanka, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

A Multi-Relaxation-Time Finite Volume Discrete Boltzmann Method for Viscous Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-5034
Leitao Chen, *Rice University, Houston, TX, United States,* **Hamid Sadat,** *University of North Texas, Denton, TX, United States,* **Laura Schaefer,** *Rice University, Houston, TX, United States*

Numerical Simulation of Mixed Flow Past an Inclined Square Cylinder Using a Local Radial Basis Function Method
Technical Paper Publication (ASME). AJKFLUIDS2019-5196
Tongsheng Wang, *Xi'an Jiaotong University, Xi'an, Shannxi, China,* **Zhu Huang,** *Stanford University, Stanford, CA, United States,* **Zhongguo Sun, Guang Xi,** *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

TOPIC 2-3 LES/DNS

2-3-1
WING, AIRFOIL, AND CYLINDER FLOWS
Room O
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Daniel Garmann,** *Air Force Research Lab, WPAFB, OH, United States*
Session Co-Organizer: **Inanc Senocak,** *University of Pittsburgh, Pittsburgh, PA, United States*

Characteristics of Flow Over a Circular Cylinder From Critical to Super-Critical Reynolds Numbers
Technical Presentation. AJKFLUIDS2019-4989
Dohyun Jin, Hyunsik Kim, Seoul National University, *Seoul, Korea (Republic),* **Haecheon Choi,** *Seoul National University, Seoul 151 744, Korea (Republic)*

Wingtip Vortex Stability and Control Using Mean Flow Perturbation
Technical Paper Publication (ASME). AJKFLUIDS2019-5473
Andrew Bodling, Daniel Garmann, *Air Force Research Lab, Wright-Patterson AFB, OH, United States*

Large Eddy Simulation and Active Flow Control of a Plunging Airfoil Under Deep Dynamic Stall
Technical Presentation. AJKFLUIDS2019-5215
William R. Wolf, *University of Campinas, Campinas, SP, Brazil*

Assessment of Compressible RANS and LES Methods for Organic Vapor Flows Past a NACA4412 Airfoil
Technical Paper Publication (ASME). AJKFLUIDS2019-4843
Karsten Hasselmann, Stefan aus der Wiesche, *Muenster University of Applied Sciences, Steinfurt, OO, Germany,* **Eugeny Y. Kenig,** *University of Paderborn, Paderborn, Germany*

Flow Patterns of Secondary Streaming and Gap Averaged Secondary Streaming of Oscillating Flows Past a Circular Cylinder With Two Endplates
Technical Paper Publication (ASME). AJKFLUIDS2019-4909
Yan Su, *University of Macau, Macau, Minnesota, Macau*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-1 FLUID MACHINERY SYMPOSIUM

3-1-4
FLUID MACHINERY IV
Room F
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Yangjun Zhang,** *Tsinghua University, Beijing, China*
Session Co-Organizer: **Yoshinobu Tsujimoto,** *Osaka University, Minoo, Osaka, Japan*

Optimal Design of Reaction Hydro Turbine Model Stay Vane by Vane Angle and Thickness Distribution
Technical Paper Publication (ASME). AJKFLUIDS2019-4611
Ujjwal Shrestha, *Mokpo National University, Muan, Korea (Republic),* **Jun-Gwan Park,** *Korea Hydro & Nuclear Power Co. Ltd., Daejeon, Korea (Republic),* **Young-Do Choi,** *Mokpo National University, Muan, Korea (Republic)*

Global Sensitivity Analysis for Stay Vane and Casing Design of Reaction Hydraulic Turbine
Technical Paper Publication (ASME). AJKFLUIDS2019-4684
Hyunkyoo Cho, Ujjwal Shrestha, *Mokpo National University, Jeonnam, Korea (Republic),* **Young-Do Choi,** *Mokpo National University, Muan, Korea (Republic),* **Jun-Gwan Park,** *Korea Hydro & Nuclear Power Co. Ltd., Daejeon, Korea (Republic)*

Field Testing of Hydraulic Turbines With Thermodynamic Method
Technical Presentation. AJKFLUIDS2019-4834
Yong Cho, Tai-Young Cho, *K-water, Deajeon, Korea (Republic),* **Jong-Woong Choi,** *K-water Convergence Institute, Korea Water Resources Corporation, Daejeon, Korea (Republic),* **Hyun-Dong Kim, Jung-Jae Hyun, Ey Joong Yun,** *K-water, Deajeon, Korea (Republic),* **Andre Abgottspon,** *etaeval GmbH, Horw, Switzerland,* **Thomas Staubli,** *Luzern Unversity of Applied Sciences, Horw, Switzerland,* **Seung Yeol Yoo,** *K-water, Deajeon, Korea (Republic)*

Investigation Into the Draft Tube Flow Chaos Accounted for Substantial Rough Operations in a Francis Turbine Unit
Technical Paper Publication (ASME). AJKFLUIDS2019-5553
Alexis Muhirwa, Weihua Cai, Yao Liu, Chang Liu, *Harbin Institute of Technology, Harbin, China,* **Fengchen Li,** *Sun Yat-Sen University, Zhuhai, China,* **Wentao Su, Maxime Binama,** *Harbin Institute of Technology, Harbin, China*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-9
PRESSURE PULSATIONS - VIBRATIONS - MONITORING
Seacliff A 10:00AM—12:00PM

Session Organizer: **Desheng Zhang,** *Jiangsu University, Zhenjiang, China*

Session Co-Organizer: **Masahiro Miyabe,** *Osaka Institure of Technology, Osaka, Japan*

Pressure Fluctuation Reduction in Side Channel Pumps Using a Modified Impeller Blade
Technical Paper Publication (ASME). AJKFLUIDS2019-4932
Xueyuan Wei, Fan Zhang, Desmond Appiah, Ke Chen, Shouqi Yuan, *Jiangsu University, Zhenjiang, Jiangsu, China,* Martin Boehle, *Technical University Kaiserslautern, Kaiserslauten, Germany*

Effects of Trailing Edge Position of Splitter Blade on the Pressure Pulsation in a Low Specific Centrifugal Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4875
Jinfeng Zhang, *Jiangsu University, Zhenjiang, Jiangsu, China*

Effects of Splitter Vanes on the Performance and Pressure Pulsation in a Centrifugal Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-4878
Chao Li, Bo Gao, Ning Zhang, Dan Ni, *Jiangsu University, Zhenjiang, Jiangsu, China*

Investigation of Pressure Pulsation in the Stages of an Electric Submersible Pump at Best Efficiency Point Under Various Speeds
Technical Paper Publication (ASME). AJKFLUIDS2019-5081
Dhanasekaran Arumugam, *Chennai Institute of Technology, Chennai, Tamil Nadu, India,* Kumaraswamy Sivasailam, *Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

"Cryogenic Pumps Monitoring, Diagnostics and Expert Systems Using Motor Current Signature Analyses and Vibration Analyses"
Technical Paper Publication (ASME). AJKFLUIDS2019-4716
Peter Popaleny, *Bently Nevada, BHGE, Nove Mesto n/V, Slovakia (Slovak Republic),* Nicolas Peton, *Bently Nevada, BHGE, Nantes, France*

Application of Pump Performance Parameters to Reduce Premature Failures
Technical Presentation. AJKFLUIDS2019-5669
Kristo Naude, *NRG Energy, Houston, TX, United States,* Lev Nelik, *Pumping Machinery, Atlanta, GA, United States*

TOPIC 3-6 INDUSTRIAL FLUID MECHANICS

3-6-2
INDUSTRIAL FLUID MECHANICS II
Room L
Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Kazuyoshi Miyagawa,** *Waseda University, Tokyo, Tokyo, Japan*

Session Co-Organizer: **Bok Jik Lee,** *Gwangju Institute of Science and Technology, Gwangju, Korea (Republic),* **Young-Seok Choi,** *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic)*

Numerical Simulation of a Pouring Flow From a Beverage Can
Technical Paper Publication (JSME). AJKFLUIDS2019-5308
Yu Nishio, *Seikei University, Musashino, Tokyo, Japan,* Keiji Niwa, *Masaryk University, Brno, Czech Republic,* Takanobu Ogawa, *Seikei University, Musashino, Tokyo, Japan*

Flow and Heat Transfer Characteristics of Multi-Armed Impinging Jet Using DNS
Technical Paper Publication (JSME). AJKFLUIDS2019-5380
Kentaro Echigo, Koichi Tsujimoto, Toshihiko Shakouchi, Toshitake Ando, *Mie University, Mie, Japan*

Numerical Applications of Cut Cell Method for the Mold Filling Simulation
Technical Presentation. AJKFLUIDS2019-5392
Youngsim Choi, *Korea Institute of Advanced Manufacturing Technology, Gyeonggi-do, Korea (Republic),* Jun-Ho Hong, Ho-Young Hwang, *Korea Institute of Industrial Technology, Gyeonggi-do, Korea (Republic)*

Experimental Analysis of Water Flow in Aquaponics Fish Tanks
Technical Paper Publication (ASME). AJKFLUIDS2019-5481
Hannah Thomas, Danielle Coombs, Ivaylo Nedyalkov, Todd Guerdat, *University of New Hampshire, Durham, NH, United States*

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*

Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-1 FLUID MEASUREMENT AND INSTRUMENTATION

4-1-3
FLUID MEASUREMENTS AND INSTRUMENTATION - TECHNIQUES

Room G

Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*

Session Co-Organizer: **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan*

Considerations for Simultaneous Particle Image Velocimetry (PIV) and Laser Doppler Velocimetry (LDV) Measurements in Experimental Fluid Mechanics
Technical Presentation. AJKFLUIDS2019-5487
Stamatios Pothos, Aaron Boomsma, Daniel Troolin, *TSI Incorporated, Shoreview, MN, United States*

Calculation of the Flow Profile Correction Factor Based on Flow Velocity Distribution Functions for Ultrasonic Flow Metering
Technical Paper Publication (ASME). AJKFLUIDS2019-4679
Sejong Chun, *Korea Research Institute of Standards and Science, Daejeon, Korea (Republic)*

Numerical Calibration of 3D Printed Five-Hole Probes for the Transonic Flow Regime
Technical Paper Publication (ASME). AJKFLUIDS2019-4706
Maximilian Passmann, Stefan aus der Wiesche, *University of Applied Sciences Muenster, Steinfurt, Germany,* **Franz Joos,** *Helmut-Schmidt University, Hamburg, Germany*

Temperature Compensation for Measurement of Low-Speed Internal Flow Fields Using Fast-Response Pressure Sensitive Paint
Technical Paper Publication (JSME). AJKFLUIDS2019-5175
Hideo Mori, Tomohiro Imazeki, Kil-Ju Moon, *Kyushu University, Fukuoka, Fukuoka, Japan*

An Optical Method for Measuring Water Wave Profiles
Technical Paper Publication (JSME). AJKFLUIDS2019-5667
Kazuhide Dan, *National Institute of Technology, Akashi College, Awaji, Hyogo, Japan*

TOPIC 4-7 DATA PROCESSING / ALGORITHMS IN FLUID MEASUREMENTS

4-7-1
DATA PROCESSING / ALGORITHMS IN FLUID MEASUREMENTS

Room N

Pacific Concourse 10:00AM—12:00PM

Session Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*

Session Co-Organizer: **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

Data Processing Technology of Interference Fringe for Particle Decontamination Measurement
Technical Paper Publication (JSME). AJKFLUIDS2019-4983
Kota Fujiwara, Yuki Nakamura, Akiko Kaneko, Yutaka Abe, *University of Tsukuba, Tsukuba, Japan*

Mixing Behavior and Performance of Density Stratification by Gas-Liquid Two-Phase Jet
Technical Paper Publication (JSME). AJKFLUIDS2019-5177
Jiarong Lu, Ryutaro Seo, Akiko Kaneko, Yutaka Abe, *University of Tsukuba, Tsukuba, Japan*

Bubble Generation Behavior Around a Rotating Body in Highly Viscous Fluid
Technical Paper Publication (JSME). AJKFLUIDS2019-5252
Shigeto Akatsuka, Shimpei Saito, Tomohisa Yuasa, Akiko Kaneko, Yutaka Abe, *University of Tsukuba, Tsukuba, Japan*

Applying Hot-Wire Anemometry to Directly Measure the Water Balance in a Proton Exchange Membrane Fuel Cell
Technical Presentation. AJKFLUIDS2019-5445
Torsten Berning, Saher Al Shakhshir, *Aalborg University, Aalborg, Northern Jutland, Denmark*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-13 MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

5-13-1
NUMERICAL SIMULATIONS OF MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

Seacliff B 10:00AM—12:00PM

Session Organizer: **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States*

Session Co-Organizer: **Siamack Shirazi,** *University of Tulsa, Tulsa, OK, United States*

Sea Water, Oil, and Surfactant Three Phases Mixing Simulation Using Population Balance Model (PBM) Coupling With CFD
Technical Paper Publication (ASME). AJKFLUIDS2019-4980
Shaolin Mao, *University of Jamestown, Jamestown, ND, United States,* **Chris Cowan, Metin Ozen,** *Ozen Engineering, Inc., Sunnyvale, CA, United States*

CFD Simulation of Slug Dissipation in an Enlarged Impacting Tee
Technical Paper Publication (ASME). AJKFLUIDS2019-5050
Mobina Mohammadi Kharkeshi, *University of Tulsa, Tulsa, OK, United States,* **Mazdak Parsi,** *DNV GL, Katy, TX, United States,* **Ramin Dabirian, Ram Mohan, Ovadia Shoham,** *University of Tulsa, Tulsa, OK, United States*

CFD Simulations of Oil-Water Flow Behavior in Horizontal Pipe Separator
Technical Paper Publication (ASME). AJKFLUIDS2019-5579
Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

Numerical Analysis of Stratified Air-Water Flow in a Horizontal Pipe
Technical Presentation. AJKFLUIDS2019-5639
Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

Numerical Study of Flow Physics in Gas-Liquid Cylindrical Cylone (GLCC) Separator
Technical Presentation. AJKFLUIDS2019-4736
Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

MICRO & NANO FLUID DYNAMICS (MNFDTC) TRACK

Track Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Track Co-Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan,* **Han Seo Ko, Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 6-4 MICRO-TOTAL-ANALYSIS SYSTEMS (MICROTAS) AND LAB-ON-A-CHIP APPLICATIONS

6-4-1
MICRO-TOTAL-ANALYSIS-SYSTEMS AND LAB-ON-A-CHIP

Seacliff D 10:00AM—12:00PM

Session Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States*

Session Co-Organizer: **Sun Min Kim,** *Inha University, Incheon, Korea (Republic), Jing Fan, City College of New York, New York, NY, United States*

Recapitulation of Trophoblast Invasion During Pregnancy in a Physiological Hypoxia Induced Microfluidic Device
Technical Paper Publication (KSME). AJKFLUIDS2019-5002
Jin Hyuk Woo, Insu Lee, Tae-Joon Jeon, Sun Min Kim, *Inha University, Incheon, Korea (Republic)*

Polydiacetylene Embedded Chromatic Paper Chip for The Detection of Bacillus Thuringiensis HD-73 Spores
Technical Presentation. AJKFLUIDS2019-5007
Tae-Joon Jeon, Chaoge Zhou, Huisoo Jang, Hyunil Ryu, Taeyeong You, Sun Min Kim, *Inha University, Incheon, Korea (Republic)*

Isotachophoretic (ITP) Extraction of TGF-beta 1 in a Microchannel
Technical Presentation. AJKFLUIDS2019-5578
Mohammad Hossan, Frances Matthews, Sanjeewa Gamagedara, *University of Central Oklahoma, Edmond, OK, United States*

Experimental Study on Small Hydraulic Pump Using Visualization Technique
Technical Paper Publication (KSME). AJKFLUIDS2019-5010
Jangmi Woo, Yeonghyeon Gim, Dong Kee Sohn, Han Seo Ko, *Sungkyunkwan University, Suwon-si, Gyeonggi-do, Korea (Republic)*

A Particle-Level Computational Investigation of Electrophoretic Deposition for Fabrication of Battery Electrodes
Technical Presentation. AJKFLUIDS2019-5551
Siamak Mirfendereski, Jae Sung Park, *University of Nebraska-Lincoln, Lincoln, NE, United States*

Multifunctional Microfluidics Device Based on Orthogonal Electrode Pattern
Technical Presentation. AJKFLUIDS2019-5518
Rakesh Guduru, Nazmul Islam, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Technical Tracks

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-4 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS

1-4-4
SESSION 4
Room D
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Daegyoum Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

Session Co-Organizer: **Wei Zhang,** *Cleveland State University, Cleveland, OH, United States*

Pulsatile Flow Characteristics in a Stenotic Aortic Valve Model: An In Vitro Experimental Study
Technical Paper Publication (ASME). AJKFLUIDS2019-4978
Ruihang Zhang, Yan Zhang, *North Dakota State University, Fargo, ND, United States*

Flow Characteristics in Curved Post-Stenotic Geometries
Technical Presentation. AJKFLUIDS2019-4987
Jaerim Kim, Dohyun Jin, Haecheon Choi, *Seoul National University, Seoul, Korea (Republic)*

Hemodynamic Characteristics of Blood Flows Around a Deformable Stenosis
Technical Presentation. AJKFLUIDS2019-5024
Woorak Choi, Sang-joon Lee, *Pohang University of Science and Technology, Pohang, Gyeongbuk, Korea (Republic)*

Hydrodynamics and Flow Characterization of Tuna-Inspired Propulsion in Forward Swimming
Technical Paper Publication (ASME). AJKFLUIDS2019-5472
Junshi Wang, Huy Tran, *University of Virginia, Charlottesville, VA, United States,* **Martha Christino,** *T.C. Williams High School, Alexandria, VA, United States,* **Carl White, Joseph Zhu,** *University of Virginia, Charlottesville, VA, United States,* **George Lauder,** *Harvard University, Cambridge, MA, United States,* **Hilary Bart-Smith, Haibo Dong,** *University of Virginia, Charlottesville, VA, United States*

TOPIC 1-13 BOUNDARY LAYER FLOWS

1-13-1
BOUNDARY LAYER FLOWS
Room N
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Stefan aus der Wiesche,** *University of Applied Sciences Muenster, Steinfurt, Germany*

Session Co-Organizer: **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

Slip Boundary Condition Effects on the Spatial Stability of High-Speed Boundary Layer Flows Over a Flat Plate
Technical Paper Publication (ASME). AJKFLUIDS2019-4780
Xin He, *Michigan Tech, Houghton, MI, United States*

Separation Control of Turbulent Boundary Layer Using Shear-Free Condition
Technical Presentation. AJKFLUIDS2019-5393
Jinhyeok Yun, Moonsun Kim, Jungil Lee, *Ajou University, Suwon, Korea (Republic)*

Characterization of Thermals in a Heated Turbulent Boundary Layer
Technical Paper Publication (ASME). AJKFLUIDS2019-5436
Kadeem Dennis, Kamran Siddiqui, *University of Western Ontario, London, ON, Canada*

Investigation of Turbulent Flow Behavior in a Heated Boundary Layer
Technical Paper Publication (ASME). AJKFLUIDS2019-5437
Kadeem Dennis, Kamran Siddiqui, *University of Western Ontario, London, ON, Canada*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*

Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-5
APPLIED CFD V
Seacliff C 1:30AM—3:30PM

Session Organizer: **Kyoungsik Chang,** *University of Ulsan, Ulsan, Korea (Republic)*

Session Co-Organizer: **Z. Zheng,** *University of Kansas, Lawrence, KS, United States*

Effect of Swirl Vanes of Axial Swirler on the Flow Development Characteristics and Air/Fuel Mixture Uniformity
Technical Paper Publication (ASME). AJKFLUIDS2019-5333
Foad Vashahi, Shahnaz Rezaei, Jeekeun Lee, *Chonbuk National University, Jeonju, Jeollabuk, Korea (Republic)*

Three Dimensional Simulation of Ventilation Flow Through a Solar Windcatcher
Technical Paper Publication (ASME). AJKFLUIDS2019-5383
Peter Abdo, Rahil Taghipour, B. Phuoc Huynh, *University of Technology Sydney, Broadway, Australia*

Three Dimensional Simulation of the Effect of Windcatcher's Inlet Shape
Technical Paper Publication (ASME). AJKFLUIDS2019-5385
Peter Abdo, Rahil Taghipour, B. Phuoc Huynh, *Univiversity of Technology Sydney, Broadway, Australia*

Numerical Study of Heat Transfer in a Row of Cylinders by 2D Large Eddy Simulation
Technical Paper Publication (ASME). AJKFLUIDS2019-5414
Andreas Thorstensen, Andreas Krogh, Bjørn Dueholm, Sebastian Højte, Signe Thomasen, Anna Lyhne Jensen, Henrik Sørensen, Jakob Haervig, *Aalborg Univesity, Aalborg, Denmark*

A Numerical Investigation of Heat and Mass Transfer in Air-Cooled Proton Exchange Membrane Fuel Cells
Technical Paper Publication (ASME). AJKFLUIDS2019-5419
Torsten Berning, *Aalborg University, Aalborg, Denmark*

Ion Partitioning Effects on Electroosmotic Flow Through pH Regulated Cylindrical Nanopore
Technical Paper Publication (ASME). AJKFLUIDS2019-5460
Subrata Bera, *National Institute of Technology Silchar, Silchar, Assam, India,* **Somnath Bhattacharyya,** *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

2-1-8
APPLIED CFD VIII
Room E
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*
Session Co-Organizer: **Hairui Wang,** *McNeese State University, Lake Charles, LA, United States*

A Numerical Analysis on Respiratory Flow Characteristics with Various Types of Dust Filter Masks
Technical Presentation. AJKFLUIDS2019-5346
Jongrak Choi, Jiwoong Yu, *Sogang University, Seoul, Korea (Republic),* **Youngjun Kim,** *LG Electronics, Seoul, Korea (Republic),* **Nahmkeon Hur,** *Sogang University, Seoul, Korea (Republic)*

Numerical Investigation of Laminar Flow Inside a Helically Coiled Pipe
Technical Presentation. AJKFLUIDS2019-5431
Jungwoo Kim, *Seoul National University of Science and Technology, Seoul, Korea (Republic)*

Impacts of Storm Surges on Hydrodynamics and Salinity of Sabine Lake and Sabine River Diversion Canal
Technical Paper Publication (ASME). AJKFLUIDS2019-4669
Hairui Wang, Ning Zhang, *McNeese State University, Lake Charles, LA, United States*

Numerical Study on The Evaporator of Cryogenic Loop Heat Pipe
Technical Presentation. AJKFLUIDS2019-5268
Ehtesham Ali, Jaehyun Park, Heesung Park, *Changwon National University, Changwon-si, Korea (Republic)*

CFD Evaluation of a Discrete Liquid Jet Cooling System for Automotive Power Electronics
Technical Paper Publication (ASME). AJKFLUIDS2019-5470
Vimaldoss Jesudhas, Ram Balachandar, Ron Barron, *University of Windsor, Windsor, ON, Canada,* **Lakshmi Varaha Iyer, Gerd Schlager,** *Magna International Inc., Aurora, ON, Canada,* **Narayan Kar,** *University of Windsor, Windsor, ON, Canada*

TOPIC 2-2 CFD DEVELOPMENT

2-2-2
CFD DEVELOPMENT II
Room M
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*
Session Co-Organizer: **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

An Efficient Hyperbolic Method for Incompressible Navier-Stokes Equations
Technical Presentation. AJKFLUIDS2019-5243
Hyung Taek Ahn, *University of Ulsan, Ulsan, Korea (Republic)*

Numerical and Experimental Study of Thermal Behavior of an Electric Fuse in Electric Vehicle Li-Ion Battery Packs
Technical Paper Publication (ASME). AJKFLUIDS2019-5483
Gautam Pulugundla, *Romeo Power Technology, Vernon, CA, United States,* **Prahit Dubey,** *Romeo Power Technology, Los Angeles, CA, United States*

Turbulent Channel Flow With a Modified k-Turbulence Model for High-Order Finite Element Methods
Technical Paper Publication (ASME). AJKFLUIDS2019-5501
Nojan Bagheri-Sadeghi, Brian T. Helenbrook, Kenneth D. Visser, *Clarkson University, Potsdam, NY, United States*

Toward Large-scale Simulations of Natural Convection Problems Using an MPI Parallelized Monolithic Projection Method
Technical Presentation. AJKFLUIDS2019-5022
Ki-Ha Kim, Xiaomin Pan, *Yonsei University, Seoul, Korea (Republic),* **Ji-Hoon Kang,** *Korea Institute of Science and Technology Information, Daejeon, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-3 LES/DNS

2-3-2
METHODS AND MODEL DEVELOPMENT
Room O
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Soshi Kawai,** *Tohoku University, Sendai, Japan*
Session Co-Organizer: **Daniel Garmann,** *Air Force Research Lab, WPAFB, OH, United States*

Evaluation of Pressure-Strain Correlation as a Basis for Development of a Physics-Based Transition Onset Marker
Technical Paper Publication (ASME). AJKFLUIDS2019-5418
Satish Muthu, Shanti Bhushan, *Mississippi State University, Starkville, MS, United States,* **D. Keith Walters,** *University of Oklahoma, Norman, OK, United States*

Assessment of Error Estimators for Grid Adaptation for LES Application
Technical Paper Publication (ASME). AJKFLUIDS2019-4718
Yao Jiang, Siva K. Nadarajah, *McGill University, Montreal, QC, Canada*

Numerical Researches on Flows Around a Hydrofoil using LBM-LES Model
Technical Presentation. AJKFLUIDS2019-5145
Chao Ning, Shouqi Yuan, Yalin Li, Puyu Cao, Rui Zhu, Lifang He, *Jiangsu University, Zhenjiang, Jiangsu, China*

Turbulent Inflow Generation Having Oscillations
Technical Paper Publication (KSME). AJKFLUIDS2019-5128
YoungWoo Yi, HeeChang Lim, *Pusan National University, Busan, Korea (Republic)*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-1 FLUID MACHINERY SYMPOSIUM

3-1-5
FLUID MACHINERY V
Seacliff F 1:30AM—3:30PM

Session Organizer: **Jinkook Lee,** *Eaton, Concord, OH, United States*
Session Co-Organizer: **Hiroyoshi Watanabe,** *Ebara Corporation, Futtsu-Shi Chiba, Japan,* **Yutaka Ohta,** *Waseda University, Tokyo, Japan*

Opto-Thermofluidic Feedback Control of Micro-Swimmers
Technical Presentation. AJKFLUIDS2019-5730
Xiaolei Peng, Linhan Lin, Zhihan Chen, Jie Fang, Hongru Ding, Yuebing Zheng, *University of Texas at Austin, Austin, TX, United States*

Manned Drone Propeller Design and Verification Test
Technical Presentation. AJKFLUIDS2019-5605
Seungbae Lee, *Inha University, Incheon, Korea (Republic)*

Investigating the Mixing Efficiencies of Liquid-to-Liquid Chemical Injection Manifolds for Aquatic Invasive Species Management
Technical Presentation. AJKFLUIDS2019-5706
Thomas Zolper, *University of Wisconsin - Platteville, Cuba City, WI, United States,* **Aaron Cupp,** *United States Geological Survey, La Crosse, WI, United States,* **David Smith,** *US Army Corps of Engineers - Engineer Research and Development Center, Vicksburg, MS, United States*

Innovative Maritime Equipment to Uniformly Distribute Molluscicide Over-Expansive Areas of Zebra Mussel Infested Waterways
Technical Presentation. AJKFLUIDS2019-5707
Thomas Zolper, *University of Wisconsin - Platteville, Cuba City, WI, United State*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-10
HYDRAULIC LOADS - DYNAMIC BEHAVIOR
Seacliff A 1:30AM—3:30PM

Session Organizer: **Stefan Berten,** *Sulzer Management Ltd., Winterthur, Switzerland*
Session Co-Organizer: **Hiroyoshi Watanabe,** *Ebara Corporation, Futtsu-Shi Chiba, Japan*

Experimental Approach to Predict the Residual Axial Thrust in Centrifugal Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-4883
Giulio Elicio, *BHGE Nuovo Pignone, Bari, Italy,* **Francesco Annese,** *Baker Hughes, Bari, Italy*

Research of Unsteady Characteristics of Torque in Centrifugal Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-4914
Yin Luo, Yuejiang Han, Jian Dong, *Jiangsu University, Zhenjiang, China*

Natural Frequency Analysis of a Submerged Vertical Pump Structure Using Coupled Structural-Acoustic Finite Element Method
Technical Paper Publication (ASME). AJKFLUIDS2019-4936
Eduardo Jimenez Bibriesca, Carlos Modesto, *Flowserve Corporation, Santa Clara Coatitla, Mexico State, Mexico*

Design of a New Type of Balance Drum to Reduce Axial Loading in Centrifugal Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5450
Kevin Bruurs, *Flowserve, Etten Leur, Noord-Brabant, Netherlands,* **Bart Van Esch,** *Eindhoven University of Technology, Eindhoven, Netherlands,* **Martijn Van Der Schoot, Eric Van Der Zijden,** *Flowserve, Etten-Leur, Noord-Brabant, Netherlands*

Dynamic Characteristics of Unshrouded Impellers Equipped With Balance Piston Systems for Rocket Turbo Pumps
Technical Paper Publication (ASME). AJKFLUIDS2019-5600
Tomoyuki Hayashi, Mamiko Yoshimura, Keisuke Matsumoto, Kazuyoshi Miyagawa, *Waseda University, Tokyo, Japan,* **Satoshi Kawasaki,** *Japan Aerospace Exploration Agency, Kakuda, Miyagi, Japan,* **Junya Takida, Hiromichi Hiraki, Naohito Suwa,** *Mitsubishi Heavy Industries, Komaki, Aichi, Japan*

TOPIC 3-6 INDUSTRIAL FLUID MECHANICS

3-6-3
INDUSTRIAL FLUID MECHANICS III
Room L
Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Young-Seok Choi,** *Korea Institute of Industrial Technology, Cheonan, Chungcheongnam-do, Korea (Republic)*
Session Co-Organizer: **Yutaka Ohta,** *Waseda University, Tokyo, Japan,* **Ramin Dabirian,** *University of Tulsa, Tulsa, OK, United States*

A New Vacuum System for Steam Plant Condenser
Technical Paper Publication (ASME). AJKFLUIDS2019-4898
Ahmed Hegazy, Khaled Yousef, *Menoufia University, Shibin El Kom, Menoufia, Egypt,* **Abraham Engeda,** *Michigan State University, East Lansing, MI, United States*

Mixing of Dry Air With Water-Liquid Flowing Through an Inverted U-Tube for Power Plant Condenser Applications
Technical Paper Publication (ASME). AJKFLUIDS2019-4901
Khaled Yousef, Ahmed Hegazy, *Menoufia University, Shibin El Kom, Menoufia, Egypt,* **Abraham Engeda,** *Michigan State University, East Lansing, MI, United States*

A Numerical Study on Improvement of Coating Uniformity by Controlling the Pressure at the Exit of the Slot Die Nozzle
Technical Paper Publication (KSME). AJKFLUIDS2019-5139
Sang Hyun Oh, Sung Il Kim, *Korea Institute of Energy Research, Daejeon, Korea (Republic),* **Byeong hyeok Yu,** *Chungnam National University, Daejeon Metropolitan City, Korea (Republic),* **Ki Ho Park,** *Korea Institute of Energy Research, Korea (Republic)*

Numerical Simulation of Intermittent-Controlled Multiple Jets
Technical Paper Publication (JSME). AJKFLUIDS2019-5163
Koichi Tsujimoto, Kango Kitahara, Toshihiko Shakouchi, Toshitake Ando, *Mie University, Tsu, Mie, Japan*

Technical Tracks

FLUID MEASUREMENT & INSTRUMENTATION (FMITC) TRACK

Track Organizer: **Stamatios Pothos,** *TSI Incorporated, Shoreview, MN, United States*

Track Co-Organizer: **Ivaylo Nedyalkov,** *University of New Hampshire, Durham, NH, United States,* **Masaharu Kameda,** *Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan,* **Jun Sakakibara,** *Meiji University, Kawasaki, Japan,* **Simon Song,** *Hanyang University, Seoul, Korea (Republic),* **Hyungmin Park,** *Seoul National University, Seoul, Korea (Republic)*

TOPIC 4-1 FLUID MEASUREMENT AND INSTRUMENTATION

4-1-4
FLUID MEASUREMENTS AND INSTRUMENTATION - APPLICATIONS

Room G

Pacific Concourse 1:30AM—3:30PM

Session Organizer: **Keefe Manning,** *Penn State University, University Park, PA, United States*

Session Co-Organizer: **Daniel Troolin,** *Tsi Incorporated, Shoreview, MN, United States*

The Influences of Different Factors on Aerodynamic Load of Trains Operating in Tunnels
Technical Paper Publication (ASME). AJKFLUIDS2019-4764
Guo Dilong, Guo Yi, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China,* **Li Ming,** *CRRC Tangshan Co., Ltd., Tangshan, China,* **Liu Wen,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

CFD Simulation and PIV Test of Hydraulic Model of Front Pool of Pumping Station in Sewage Treatment Plant
Technical Presentation. AJKFLUIDS2019-4918
LUO SHUANG, Jiang Jin, Weng Xiaohong, *Wuhan University, Wuhan, Hubei, China*

PIV Leak Assessment of N95 Respirators
Technical Presentation. AJKFLUIDS2019-5231
Daniel Troolin, *Tsi Incorporated, Shoreview, MN, United States,* **Wing Lai,** *TSI Incorporated, Saint Paul, MN, United States*

Experimental Data's Role in Developing FDA Guidance for Computational Simulations of Medical Devices
Technical Presentation. AJKFLUIDS2019-5527
Keefe Manning, *Penn State University, University Park, PA, United States*

Measurement Wall Shear Stress Using MCF Rubber
Technical Paper Publication (JSME). AJKFLUIDS2019-5641
Shunyaa Miyachi, Yoshihiro Kubota, Osamu Mochizuki, *Toyo University, Kawagoe, Japan,* **Kunio Shimada,** *Fukushima University, Fukushima, Japan*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-13 MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

5-13-2
EXPERIMENTAL CHARACTERIZATION OF MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

Seacliff B 1:30AM—3:30PM

Session Organizer: **Srinivas Swaroop Kolla,** *University of Tulsa, Tulsa, OK, United States*

Session Co-Organizer: **Joseph Katz,** *Johns Hopkins University, Baltimore, MD, United States*

X-Ray Flow Visualization of Cyclopentane Hydrate Formation
Technical Paper Publication (ASME). AJKFLUIDS2019-5091
Roy Pillers, Timothy Morgan, Theodore Heindel, *Iowa State University, Ames, IA, United States,* **Douglas Estanga,** *Chevron Energy Technology Company, Houston, TX, United States*

Methane Production Strategies for Oceanic Gas Hydrate Reservoirs
Technical Paper Publication (ASME). AJKFLUIDS2019-5169
Neelam Choudhary, Jyoti Phirani, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

In-Line Testing of Novel Filter Media for Oil-Water Mixtures
Technical Paper Publication (ASME). AJKFLUIDS2019-5554
Anisha Mula, Ramin Dabirian, Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

Internal Two-Phase Flow Induced Vibration Analysis With Machine Learning Techniques
Technical Paper Publication (JSME). AJKFLUIDS2019-5410
SHUICHIRO MIWA, Shuhei Torisaki, *Hokkaido University, Sapporo, Japan*

Dissipation of Injected Slug in Enlarged Impacting Tee in Single Branch Blocking Configuration
Technical Paper Publication (ASME). AJKFLUIDS2019-5054
Tanner Cole, Ramin Dabirian, Mobina Mohammadi Kharkeshi, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

MICRO & NANO FLUID DYNAMICS (MNFDTC) TRACK

Track Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Track Co-Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan,* **Han Seo Ko, Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 6-5 SENSORS AND TRANSDUCERS FOR MICROFLUIDIC APPLICATIONS

6-5-1
SENSORS AND TRANSDUCER FOR MICROFLUIDIC APPLICATIONS
Seacliff D 1:30AM—3:30PM

Session Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Organizer: **Cheol-Woo Park,** *Kyungpook National University, Daegu, Korea (Republic),* **Jeff Darabi,** *Southern Illinois University Edwardsville, Edwardsville, IL, United States,* **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*

Fabrication and Multiphysics Modeling of MEMS Thermal Flow Sensor
Technical Paper Publication (ASME). AJKFLUIDS2019-4606
Justin Cable, Kevin Anderson, *Cal Poly Pomona, Pomona, CA, United States*

Study of Frequency Response of Micropillar Based Acoustic Wave Sensors
Technical Paper Publication (ASME). AJKFLUIDS2019-5088
Siqi Ji, Hongwei Sun, Hamed Esmaeilzadeh, Junwei Su, *University of Massachusetts Lowell, Lowell, MA, United States,* **Majid Charmchi,** *University of Massachusetts Lowell, Jamaica Plain, MA, United States*

Immobilization of Magnetic Beads for Microfluidic Immunoassays
Technical Paper Publication (ASME). AJKFLUIDS2019-5401
Thanh Qua Nguyen, Jeongyun Kim, Dae Woong Lee, Ji Seob Choi, Jaeho Park, Hojeong Jeon, *Korea Institute of Science and Technology, Seoul, Korea (Republic),* **Woo-Tae Park,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Sangyoup Lee,** *Korea Institute of Science and Technology, Seoul, Korea (Republic)*

Characterization of the Anisotropic Wetting Property in Liquid Transportation on the Surface With Ratchet Structures
Technical Paper Publication (ASME). AJKFLUIDS2019-5085
Jing Xu, Jun Chen, *Purdue University, West Lafayette, IN, United States*

Physicochemical Characterization of Mammalian Mucus and Mucin Solutions in Response to pH and [Ca2+]
Technical Paper Publication (ASME). AJKFLUIDS2019-4944
Keisha Walters, Austin Curnutt, Kaylee Smith, *University of Oklahoma, Norman, OK, United States,* **Erick Vasquez,** *University of Dayton, Dayton, OH, United States,* **Santanu Kundu,** *Mississippi State University, Mississippi State, MS, United States,* **Emily Darrow,** *University of Oklahoma, Norman, OK, United States*

Electrohydrodynamic Effects of Dielectric Spacers in Electrochemical Membrane System
Technical Presentation. AJKFLUIDS2019-5409
Keon Huh, *Seoul National University, Seoul, Korea (Republic),* **Hyomin Lee,** *Jeju National University, Jeju-si, Jeju Special Self-Governing Province, Korea (Republic),* **Sung Jae Kim,** *Seoul National University, Seoul, Korea (Republic)*

FLUID MECHANICS (FMTC) TRACK

Track Organizer: **Wayne Strasser,** *Eastman Chemical Co., Kingsport, TN, United States*

Track Co-Organizer: **Jun Chen,** *Purdue University, West Lafayette, IN, United States,* **Koji Fukagata,** *Keio University, Yokohama, Japan,* **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan,* **Yang Na,** *Konkuk University, Seoul, Korea (Republic),* **Jungil Lee,** *Ajou University, Suwon, Korea (Republic)*

TOPIC 1-2 AEROSPACE

1-2-1
AEROSPACE
Room M
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Javid Bayandor,** *The State University of New York at Buffalo, Buffalo, NY, United States*

Session Co-Organizer: **Taku Nonomura,** *Tohoku University, Sendai, Miyagi, Japan*

Simulations of Tubular UAV With Vectored Thrust in Near-Hovering Regimes in the Presence of Side Winds
Technical Paper Publication (ASME). AJKFLUIDS2019-4678
Konstantin Matveev, Miles Wheeler, *Washington State University, Pullman, WA, United States*

Computational Study of Mach Number Effects on Dynamic Stall
Technical Paper Publication (KSME). AJKFLUIDS2019-5336
Taesoon Kim, Seungtae Kim, Jiseop Lim, Junkyu Kim, Solkeun Jee, *Gwangju Institute of Science and Technology, Gwangju, Korea (Republic)*

The Use of Heavy Gas for Airfoil Testing: History and Recent Developments
Invited Presentation. AJKFLUIDS2019-5784
Stefan aus der Wiesche, *Muenster University of Applied Sciences, Steinfurt, Germany*

TOPIC 1-11 TRANSPORT PHENOMENA IN MIXING

1-11-1
TRANSPORT PHENOMENA IN MIXING
Room G
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Khaled Hammad,** *Central Connecticut State University, Simsbury, CT, United States*
Session Co-Organizer: **Lyes Khezzar,** *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

Effect of the Large-Scale Structure on Turbulent Prandtl Number in a Turbulent Shear Layer
Technical Paper Publication (ASME). AJKFLUIDS2019-4722
Kotaro Takamure, Yasuhiko Sakai, Yasumasa Ito, Koji Iwano, *Nagoya University, Nagoya, Japan*

Pattern Selection of Electroconvective Vortices on Ion Exchange Membranes
Technical Presentation. AJKFLUIDS2019-5108
Soohyeon Kang, Rhokyun Kwak, *Hanyang University, Seoul, Korea (Republic)*

The Effect of the Velocity Ratio on the Diffusion Inhibition of Coaxial Jet
Technical Paper Publication (JSME). AJKFLUIDS2019-5369
Fujio Akagi, Takumi Etou, Yuito Fukuda, Ryoya Yoshioka, Youichi Ando, Sumio Yamaguchi, *Fukuoka University, Fukuoka-shi, Fukuoka-ken, Japan*

The Effects of Nozzle Orientation on Mixing Characteristics of Elliptic Twin Free Jets
Technical Paper Publication (ASME). AJKFLUIDS2019-5478
Ella M. Morris, *University of Manitoba, Winnipeg, MB, Canada,* **Neelakash Biswas,** *Indian Institute of Technology Kharagpur, Kharagpur, India,* **Seyed Sobhan Aleyasin, Mark Francis Tachie,** *University of Manitoba, Winnipeg, MB, Canada*

Novel Scaling for Transient Interface Displacement of Stratified Layer by Erosion Mixing Due to Vertical Impinging Jet
Technical Presentation. AJKFLUIDS2019-5288
Wooyoung Lee, Simon Song, *Hanyang University, Seoul, Korea (Republic),* **Young Su Na, Jongtae Kim,** *Korea Atomic Energy Research Institute, Daejeon, Korea (Republic)*

COMPUTATIONAL FLUID DYNAMICS (CFDTC) TRACK

Track Organizer: **Jingsen Ma,** *Dynaflow, Inc., Jessup, MD, United States*
Track Co-Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States,* **Yohei Morinishi,** *Nagoya Institute of Technology, Nagoya, Japan,* **Ryoichi Kurose,** *Kyoto University, Kyoto, Japan,* **Hyoung Gwon Choi,** *Seoul National University of Science and Technology, Seoul, Korea (Republic),* **Jung-Il Choi,** *Yonsei University, Seoul, Korea (Republic)*

TOPIC 2-1 APPLIED CFD

2-1-4
APPLIED CFD IV
Seacliff C 3:45AM—6:45PM

Session Organizer: **Kenji Tanno,** *Central Research Institute of Electric Power Industry, Yokosuka, Kanagawa, Japan*
Session Co-Organizer: **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*

Study of a Multistage Canned Motor Pump: Simulation, Optimization and Validation
Technical Paper Publication (ASME). AJKFLUIDS2019-5157
Helmut Benigni, Markus Mosshammer, Helmut Jaberg, *University of Technology, Graz, Austria*

Numerical Prediction and Experimental Study on the Waviness Mechanical Seal
Technical Paper Publication (ASME). AJKFLUIDS2019-5173
Xiaodong Feng, *Harbin Electric Power Equipment Co., Ltd., Harbin Institute of Technology, Harbin, China,* **Yu Ma,** *Sun Yat-sen University, Harbin, China,* **Bin Huang,** *Zhejiang University, Hangzhou, China*

Numerical Analysis of Steady Blowing Based Active Flow Control for Flow Over Ahmed Body
Technical Paper Publication (ASME). AJKFLUIDS2019-5239
Bansal Shah, Debashis Basu, *Southwest Research Institute, San Antonio, TX, United States*

A Comprehensive Study of Asymmetric Micro-Droplet Splitting in T-Junction
Technical Paper Publication (ASME). AJKFLUIDS2019-5284
Way Lee Cheng, *Texas A&M University at Qatar, Doha, Qatar,* **Reza Sadr, Arum Han,** *Texas A&M University, College Station, TX, United States*

Effect of Splitter Configurations on the Performance of a Sludge Pump
Technical Paper Publication (ASME). AJKFLUIDS2019-5298
Jeong Min Jin, Hyo Geun Ji, Youn-Jea Kim, *Sungkyunkwan University, Suwon, Korea (Republic)*

Optimal Design for Impeller of a Sludge Pump Using Design of Experiment
Technical Paper Publication (ASME). AJKFLUIDS2019-5299
Jeong Min Jin, Hyo Geun Ji, Youn-Jea Kim, *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 2-3 LES/DNS

2-3-3
BOUNDARY LAYERS AND INTERNAL FLOWS
Room O
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Inanc Senocak,** *University of Pittsburgh, Pittsburgh, PA, United States*
Session Co-Organizer: **Soshi Kawai,** *Tohoku University, Sendai, Japan*

Validation and Development of DNS Database for Low Prandtl Numbers in Rod Bundle
Technical Paper Publication (ASME). AJKFLUIDS2019-5036
Jonathan Lai, *Texas A&M, Chandler, AZ, United States,* **Elia Merzari,** *Argonne National Laboratory, Lemont, IL, United States,* **Yassin Hassan,** *Texas A&M, College Station, TX, United States,* **Aleksandr Obabko,** *Argonne National Laboratory, Argonne, IL, United States*

Direct Numerical Simulation of Radial Convection in a Cylindrical Annulus With and Without Rotation
Technical Paper Publication (ASME). AJKFLUIDS2019-5025
Diogo Berta Pitz, William R. Wolf, *University of Campinas, Campinas, Sao Paulo, Brazil*

Numerical Simulations of Turbulent Flow Through a 90° Elbow
Technical Paper Publication (ASME). AJKFLUIDS2019-5498
Ravon Venters, *Clarkson University, Potsdam, NY, United States,* **Brian Helenbrook,** *Clarkson University, Potsdam, NY, United States,* **Goodarz Ahmadi,** *Clarkson University, Potsdam, NY, United States*

Direct Numerical Simulations of Rod- and Cube-Roughened Turbulent Boundary Layers with Varying Roughness Height
Technical Presentation. AJKFLUIDS2019-5129
Yun Kyung Choi, Hyeon Gyu Hwang, Young Mo Lee, Jaehwa Lee, *Ulsan National Institute of Science and Technology, Ulsan, Korea (Republic)*

Large Eddy Simulation of Turbulent Combustion Flows in a Methane-Hydrogen Gasturbine Combustor and NOx Prediction by its Database
Technical Paper Publication (JSME). AJKFLUIDS2019-5107
Nobuyuki Oshima, Ryosuke Kishine, *Hokkaido University, Sapporo, Hokkaido, Japan,* **Takeo Oda,** *Kawasaki Heavy Industries, Ltd., Akashi, Hyogo, Japan*

TOPIC 2-4 HYBRID LES/RANS

2-4-1
METHODS AND APPLICATIONS
Room F
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Daniel Garmann,** *Air Force Research Lab, WPAFB, OH, United States*
Session Co-Organizer: **Tae-Seon Park,** *Kyungpook National University, Daegu, Korea (Republic)*

Enabling Large Eddy Simulations of Realistic Turbulent Flows
Keynote Presentation. AJKFLUIDS2019-5026
Johan Larsson, *University of Maryland, College Park, MD, United States*

A Dynamic Time Filtering Technique for Hybrid RANS-LES Simulation of Non-Stationary Turbulent Flow
Technical Paper Publication (ASME). AJKFLUIDS2019-4696
Tausif Jamal, D. Keith Walters, *University of Oklahoma, Norman, OK, United States*

Development and Validation of a Hybrid RANS-LES Approach Based on Temporal Filtering
Technical Paper Publication (ASME). AJKFLUIDS2019-4937
Vladimir Duffal, Benoît de Laage de Meux, *EDF, Chatou, Yvelines, France,* **Rémi Manceau,** *CNRS /Université de Pau et des Pays de l'Adour, Pau, Pyrénées-Atlantiques, France*

Hybrid RANS-LES Simulation of Turbulent Heat Transfer in a Channel Flow With Imposed Spanwise and Streamwise Mean Temperature Gradient
Technical Paper Publication (ASME). AJKFLUIDS2019-4920
Olalekan Shobayo, D. Keith Walters, *University of Oklahoma, Norman, OK, United States*

Numerical Investigation of Flow and Heat Transfer Characteristics for Attached and Separated Low-Pr Flows
Technical Paper Publication (ASME). AJKFLUIDS2019-5273
Shanti Bhushan, Mohammed Elmellouki, *Mississippi State University, Starkville, MS, United States,* **W.D. Jock, D. Keith Walters,** *University of Oklahoma, Norman, OK, United States,* **Jonathan Lai,** *Texas A&M, Chandler, AZ, United States,* **Yassin Hassan,** *Texas A&M, College Station, TX, United States,* **Aleksandr Obabko,** *Argonne National Laboratory, Argonne, IL, United States,* **Elia Merzari,** *Argonne National Laboratory, Lemont, IL, United States*

TOPIC 2-6 COMPUTATIONAL MARINE HYDRODYNAMICS

2-6-1
COMPUTATIONAL MARINE HYDRODYNAMICS
Room N
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Shawn Aram,** *Naval Surface Warfare Center, McLean, VA, United States*
Session Co-Organizer: **Yiwei Wang,** *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

A Numerical Study of the Influence of Pitch on the Performance of Vertical Axis Turbine
Technical Paper Publication (ASME). AJKFLUIDS2019-4602
Teresa Parra-Santos, *University of Palencia, Valladolid, Spain,* **Raquel Perez-Dominguez, David Arranz Miguel, Soraya de Pablo-Garcia,** *University of Valladolid, Valladolid, Spain,* **Armando Gallegos,** *Universidad de Guanajuato, Salamanca, Salamanca, Mexico*

Control of Air-Ventilated Cavity Under Ship Hull in Abnormal Waves
Technical Paper Publication (ASME). AJKFLUIDS2019-4619
Konstantin Matveev, *Washington State University, Pullman, WA, United States*

Hydrodynamic Performance and Appendage Considerations of Wave-Piercing Planing Craft Overlapping Waves and Porpoising
Technical Paper Publication (JSME). AJKFLUIDS2019-4931
Sangwon Kim, Nobuyuki Oshima, *Hokkaido University, Sapporro, Hokkaido, Japan,* **Seo Kwang-Cheol, Lee Gyoung-Woo,** *Mokpo National Maritime University, Mokpo, Jeollanam-do, Korea (Republic),* **Lee Sang-Eui,** *Changwon National University, Changwon, Gyeongsangnam-do, Korea (Republic)*

Maneuvering Simulation and Flooded Water Dynamics of a Damaged Surface Combatant Using Computational Fluid Dynamics Analysis
Technical Presentation. AJKFLUIDS2019-5186
Yong Jae Cho, Woochan Seok, Jongyeol Park, Jeonghwa Seo, Shin Hyung Rhee, *Seoul National University, Seoul, Korea (Republic)*

Large Eddy Simulation of Flow around Circular Cylinder at Reynolds Number of 10^5
Technical Presentation. AJKFLUIDS2019-5412
Jae Hwan Jung, Seokkyu Cho, Hyunwoo Jung, Hong Gun Sung, Yong Guk Lee, *Korea Research Institute of Ships and Ocean Engineering, Daejeon, Korea (Republic)*

FLUID APPLICATIONS & SYSTEMS (FASTC) TRACK

Track Organizer: **Alexandrina Untaroiu,** *Virginia Tech, Charlottesville, VA, United States*
Track Co-Organizer: **Kevin Anderson**, *Cal Poly Pomona, Pomona, CA, United States,* **Chisachi Kato,** *University of Tokyo, Meguro-Ku, Japan,* **Motohiko Nohmi,** *Ebara Corporation, Fujisawa-Shi, Japan,* **Gwang Hoon Rhee,** *University of Seoul, Seoul, Korea (Republic),* **Wonjung Kim,** *Sogang University, Seoul, Korea (Republic)*

TOPIC 3-2 PUMPING MACHINERY SYMPOSIUM

3-2-14
BASIC STUDIES
Seacliff A 3:45AM—6:45PM

Session Organizer: **Il Su Yoo,** *Korea Institute of Machinery & Materials, Daejeon, N.A, Korea (Republic)*
Session Co-Organizer: **Takahide Nagahara,** *Hitachi, Ltd., Tsuchiura, Japan*

Computational Fluid Dynamics (CFD) Design Optimization of a Centrifugal Impeller With Additive Manufacturing
Technical Presentation. AJKFLUIDS2019-5560
Sarah Agam, Roger Fittro, Houston G. Wood, *University of Virginia, Charlottesville, VA, United States*

Optimizing Pump Selection for Energy Efficiency Across Multiple Operating Conditions Using True Weighted Efficiency (TWE)
Technical Paper Publication (ASME). AJKFLUIDS2019-4777
Trygve Dahl, *Intelliquip Inc., Bethlehem, PA, United States*

Hydraulic Model Test of Pumping Sump Based on PIV System
Technical Paper Publication (ASME). AJKFLUIDS2019-4728
Jin Jiang, Rui Ying, Yanhui Li, Xiaohong Weng, *Wuhan University, Wuhan, China,* **Zhifang Liao,** *BENSV Valve Stock Co., Ltd., Tianjin, China*

Characteristics of Swirl Angle in Pump Intake Flow Near the Minimum Inlet Submergence
Technical Paper Publication (ASME). AJKFLUIDS2019-5053
Tajul Ariffin Norizan, Zambri Harun, Wan Hanna Melini Wan Mohtar, Shahrir Abdullah, *National University of Malaysia, Bangi, Selangor, Malaysia*

Research on the Performance of Check Valve at a Long Distance Pumping System
Technical Paper Publication (ASME). AJKFLUIDS2019-5668
Huili BI, honggang Fan, *Tsinghua University, Beijing, China,* **Bin Cao,** *Shanghai Karon Valve Machinery. Co., Ltd., Shanghai, China,* **Yu Xu,** *Sino-wind Energy Group Ltd., Beijing, China*

Numerical Investigation on the Effect of Wavelength on the Hydrodynamic Characteristics of a Finite-Span Wing With Leading Edge Tubercles
Technical Paper Publication (ASME). AJKFLUIDS2019-5601
Peng Yan, Churui Wan, Ning Li, *Marine Design & Research Institue of China, Shanghai, China*

TOPIC 3-6 INDUSTRIAL FLUID MECHANICS

3-6-4
INDUSTRIAL FLUID MECHANICS IV
Room L
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Bok Jik Lee,** *Gwangju Institute of Science and Technology, Gwangju, Korea (Republic)*
Session Co-Organizer: **Jinkook Lee,** *Eaton, Concord, OH, United States,* **Yutaka Ohta,** *Waseda University, Tokyo, Japan*

Investigation of Flow Distribution on a Printed Circuit Heat Exchanger
Technical Presentation. AJKFLUIDS2019-5172
Jungchul Kim, Sangho Sohn, Jeong-Heon Shin, Seok Ho Yoon, *Korea Institute of Machinery & Materials, Daejeon, Korea (Republic)*

Influence of Geometric Parameters on Aerodynamic and Acoustic Performances of Bladeless Fans
Technical Paper Publication (ASME). AJKFLUIDS2019-5220
Ang Li, Jun Chen, Yangfan Liu, Stuart Bolton, Patricia Davies, *Purdue University, West Lafayette, IN, United States*

Theoretical Model of a Flow in a Tube With a Slit
Technical Paper Publication (JSME). AJKFLUIDS2019-52
Yuki Toda, Masataka Morimatsu, Yu Nishio, Takanobu Ogawa, *Seikei University, Musashino, Tokyo, Japan*

Analysis of the Impact of Flow Characteristics on the Separation Efficiency and Pressure Drop of a Cyclone-Type Oil Separator
Technical Presentation. AJKFLUIDS2019-5286
Guwon Seon, Wontae Hwang, *Seoul National University, Seoul, Korea (Republic)*

TOPIC 3-8 MULTIPHASE FLOW APPLICATIONS

3-8-1
MULTIPHASE FLOW APPLICATIONS I
Room E
Pacific Concourse 3:45AM—6:45PM

Session Organizer: **Kevin Anderson,** *Cal Poly Pomona, Pomona, CA, United States*
Session Co-Organizer: **Kui-Soon Kim,** *Pusan National University, Busan, Korea (Republic)*

Multiphase Flow Simulation of In-Line Gas-Liquid Separator for Multiphase Metering
Technical Paper Publication (ASME). AJKFLUIDS2019-4802
Nakyeong Seo, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.,* Nabil Kharoua, *Ecole Polytechnique de Constantine, Constantine, Algeria,* Lyes Khezzar, Mohamed Alshehhi, Mahmoud Meribout, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

Effect of Reactor Thickness on Gas-Solid Flow and Heat Transfer of Thin Rectangular Fluidized Bed Reactors for CO_2 Capture
Technical Paper Publication (ASME). AJKFLUIDS2019-4842
Seungyeong Choi, Minho Bang, *Yonsei University, Seoul, Korea (Republic),* Kiwoong Kim, Yong-Ki Park, *Korea Research Institute of Chemical Technology, Daejeon, Korea (Republic),* Hyung Hee Cho, *Yonsei University, Seoul, Korea (Republic)*

Effect of Moisture Content on Mixing Air With Water-Liquid Flowing Through Inverted U-Tube for Power Plant Condenser Applications
Technical Paper Publication (ASME). AJKFLUIDS2019-4902
Khaled Yousef, Ahmed Hegazy, *Menoufia University, Shibin El Kom, Menoufia, Egypt,* Abraham Engeda, *Michigan State University, East Lansing, MI, United States*

Gas Wall Layer Experiments for SNS Target
Technical Paper Publication (ASME). AJKFLUIDS2019-5101
Justin Weinmeister, Elvis Dominguez-Ontiveros, Charlotte Barbier, *UT-Batelle, LLC, Oak Ridge, TN, United States*

Ultrasonic Cleaning in a Microchannel
Technical Presentation. AJKFLUIDS2019-5113
Ryeol Park, Yooncho Jeong, *Sogang University, Seoul, Seoul, Korea (Republic),* Junhee Choi, Ho-Young Kim, *Seoul National University, Seoul, Korea (Republic),* Wonjung Kim, *Sogang University, Seoul, Korea (Republic)*

MULTIPHASE FLOW (MFTC) TRACK

Track Organizer: **Marianne Francois,** *Los Alamos National Laboratory, Los Alamos, NM, United States*

Track Co-Organizer: **Robert Kunz,** *Penn State University, University Park, PA, United States,* **Yuichi Murai,** *Hokkaido University, Sapporo, Japan,* **Mitsuru Tanaka,** *Kyoto Institute of Technology, Kyoto, Japan,* **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic)*

TOPIC 5-13 MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

5-13-3
MODELING OF MULTIPHASE FLOWS IN PETROLEUM ENGINEERING

Seacliff B 3:45AM—6:45PM

Session Organizer: **Yuichi Murai,** *Hokkaido University, Sapporo, Japan*

Session Co-Organizer: **Ho-Young Kim,** *Seoul National University, Seoul, Korea (Republic)*

Dynamics of Forced Imbibition in Interacting Pores
Technical Paper Publication (ASME). AJKFLUIDS2019-5167
Aniket Ambekar, Shabina Ashraf, Jyoti Phirani, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

Polynomial Chaos Based Solution to Inverse Problems in Petroleum Reservoir Engineering
Technical Paper Publication (ASME). AJKFLUIDS2019-5291
Sufia Khatoon, Supreet Singh Bahga, Jyoti Phirani, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

A Transient Approach for Estimating Concentration of Water Droplets in Oil and Corrosion Assessment in the Oil and Gas Industry
Technical Paper Publication (ASME). AJKFLUIDS2019-5465
Farzin Darihaki, Siamack Shirazi, *University of Tulsa, Tulsa, OK, United States,* **Qingshan Feng,** *PetroChina Pipeline Company, Langfang, Heibei, China*

Gas Carry-Under in Gas-Liquid Cylindrical Cyclone Separator: A Mechanistic Model
Technical Paper Publication (ASME). AJKFLUIDS2019-4735
Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

Tangential Wall Jet Flow and Gas Entrainment in Gas-Liquid Cylindrical Cyclone Compact Separator
Technical Paper Publication (ASME). AJKFLUIDS2019-4737
Srinivas Swaroop Kolla, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

MICRO & NANO FLUID DYNAMICS (MNFDTC) TRACK

Track Organizer: **Nazmul Islam,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Track Co-Organizer: **Mohammad Hossan,** *University of Central Oklahoma, Edmond, OK, United States,* **Masao Watanabe,** *Hokkaido University, Sapporo, Japan,* **Keita Ando,** *Keio University, Kanagawa, Japan,* **Han Seo Ko, Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

TOPIC 6-7 DIGITAL OR DROPLET MICROFLUIDICS

6-7-1
DIGITAL MICROFLUIDICS

Seacliff D 3:45AM—6:45PM

Session Organizer: **Mohammed Jalal Ahamed,** *University of Windsor, Windsor, ON, Canada*

Session Co-Organizer: **Sang Kug Chung,** *Myongji University, Yongin, Korea (Republic),* **Jeff Darabi,** *Southern Illinois University Edwardsville, Edwardsville, IL, United States*

Double-Sided Electrohydrodynamic Jet Printing of Two-Dimensional Electrode Array in Paper-Based Digital Microfluidics
Technical Presentation. AJKFLUIDS2019-4999
Ali T. Jafry, *Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, Pakistan,* **Hyungdong Lee, Ayodya Pradhipta Tenggara, Hosub Lim, Youngkwang Moon,** *Sungkyunkwang University, Suwon, Korea (Republic),* **Seunghyun Kim,** *Brown University, Providence, RI, United States,* **Yongwoo Lee,** *University of Massachusetts Lowell, Lowell, MA, United States,* **Sung-Min Kim, Sungsu Park, Doyoung Byun, Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

Time-Invariant Deformation of Blood During Necking on an Electrowetting Digital Microfluidic Platform
Technical Paper Publication (ASME). AJKFLUIDS2019-5516
Curtis Young, Anand Ramasubramanian, Melinda Simon, Sang-Joon Lee, *San Jose State University, San Jose, CA, United States*

Deformation of a Moving Micro-Droplet
Technical Paper Publication (ASME). AJKFLUIDS2019-4922
Yonghong Zhong, Qichun Nie, Zhongyi Liu, Haisheng Fang, *Huazhong University of Science and Technology, Wuhan, China*

Dynamics of Emulsion Droplets Under Electric Field
Technical Presentation. AJKFLUIDS2019-5045
Muhammad Salman Abbasi, Ryungeun Song, Sung-Min Kim, *Sungkyunkwan University, Suwon, Korea (Republic),* **Hyoungsoo Kim,** *Korea Advanced Institute of Science and Technology, Daejeon, Korea (Republic),* **Jinkee Lee,** *Sungkyunkwan University, Suwon, Korea (Republic)*

Study on Terminal Velocity of Continuously Ejected Micro Inkjet Droplet
Technical Paper Publication (KSME). AJKFLUIDS2019-5055
Seung-Hwan Kang, Jong Woo Lim, San Kim, Dong Kee Sohn, Han Seo Ko, *Sungkyunkwan University, Suwon-si, Gyeonnggi-do, Korea (Republic)*

Analysis of Characteristics of Bubble on Electrode Surface of Forced Convective Electrolyte Using Image Processing
Technical Paper Publication (KSME). AJKFLUIDS2019-5064
Jaewon Lee, Dong Kee Sohn, Han Seo Ko, *Sungkyunkwan University, Suwon-si, Gyeonnggi-do, Korea (Republic)*

TOPIC 6-1 MODELLING AND SIMULATION IN MICROFLUIDICS

6-1-2
MODELING IN MICROFLUIDICS
Room O, Concourse Level 3:45AM—6:45PM

Session Organizer: **Jeff Darabi,** *Southern Illinois University, Edwardsville, IL, United States*

Dynamics of Nanoelectrokinetic Preconcentrated DNA Leveraged by Convection and Diffusion
Technical Presentation. AJKFLUIDS2019-5534
Seongho Baek, *Seoul National University Hospital, Seoul, Korea (Republic)* **Hyomin Lee,** *Jeju National University, Jeju-si, Jeju Special Self-Governing Province, Korea (Republic),* **Jihye Choi, Seok-Young Son, Junsuk Kim, Sung Jae Kim, Hee Chan Kim, Jong Hee Chae,** *Seoul National University Hospital, Seoul, Korea (Republic)*

Electrokinetic Transport of Power Law Fluid Through a Micro-Channel With Hydrodynamic Slippage
Technical Paper Publication (ASME). AJKFLUIDS2019-4848
Ainul Haque, Ameeya Kumar Nayak, *Indian Institute of Technology Roorkee, Roorkee, India,* **Bernhard Weigand,** *Institute für Thermodynamik der Luft- und Raumfahrt, Stuttgart, Germany*

Electrokinetics of Charged Fluid Globules
Technical Paper Publication (ASME). AJKFLUIDS2019-5140
Somnath Bhattacharyya, Partha P. Majee, *Indian Institute of Technology, Kharagpur, Kharagpur, India*

Simulation of Laminar Flow Inside Microchannels With Realistic Surface Roughness
Technical Presentation. AJKFLUIDS2019-5448
Batuhan Akbas, Cuneyt Sert, *Middle East Technical University, Ankara, Turkey*

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