



FEDDSM 2022

Fluids Engineering Division Summer Meeting

Program

CONFERENCE
August 3–5, 2022

InterContinental Toronto Centre,
Toronto Canada

<https://event.asme.org/FEDDSM>

Welcome to FEDSM 2022!

Welcome to the 2022 Fluids Engineering Division's (FED) Summer Meeting! We are very excited to welcome you all in person. FED continues to strive to meet the challenges of disseminating timely technical information by organizing technical conferences and conducting workshops and panel discussions. This year the summer meeting is the 6th joint US–European Fluids Engineering Division Summer Meeting (FEDSM). Some recent past collaborations in FEDSM include FEDSM 2020 with the ASME Heat Transfer Division and the International Conference on Multi-, Mini-, and Nano-Channels, and AJK2019 with the Japanese and Korean mechanical engineering societies. In addition, the FED also participates annually in the ASME International Mechanical Engineering Congress and Exposition each November.

Despite the challenges we all have been facing due to COVID, FEDSM 2022 is still truly international, which is evident in international participation, including 20 countries spanning five continents with over 200 presentations. The State-of-the-Art in the world of Fluids Engineering will be presented from industrial, academic, and governmental researchers.

Our FED plenaries feature the following:

- 2022 ASME Fluids Engineering Awardee, Yassin Hassan, Texas A&M University
- 2022 ASME Freeman Scholar, Tim Colonius, Caltech
- 2022 ASME Henry R. Worthington Medal Awardee, Paul Thamsen, Technical University, Berlin

Our conference is organized around our six technical committees: Fluid Applications and Systems, Fluid Measurement and Instrumentation, Fluid Mechanics, Multiphase Flow, Computational Fluid Dynamics, and Micro-Nano Fluid Dynamics. Our Awards Program recognizes Best-Papers, Flow-Visualization, Who's Who and Graduate-Student Scholars and Returning Scholars.

You are invited to participate in our Towne Hall Meeting during the conference where we provide an update on the direction the FED is pursuing. We also invite you to join and participate in our Technical Committee meetings during the conference to network and help organize our future conferences. We especially thank our track and topic organizers and reviewers who make FEDSM 2022 possible by inviting presenters, organizing sessions, and reviewing papers. We also thank the ASME staff who have worked tirelessly over the past several months to make this conference a success.

We very much look forward to interesting, thought-provoking, and cutting-edge presentations and discussions, as well as networking and meeting opportunities. We feel sure that this will be a rewarding and exciting experience for you.

FEDSM 2022 Conference Chair

Philipp Epple, FASME
Coburg University of Applied Sciences

FEDSM 2022 Conference Co-Chair

Kamran Siddiqui, FASME
University of Western Ontario



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Conference Information



REGISTRATION INFORMATION

Lower lobby

Registration Hours:

Tuesday, August 2
1:00PM–5:00PM

Wednesday, August 3
7:00AM–5:30PM

Thursday, August 4
7:00AM–5:30PM

Friday, August 5
7:00AM–12:30PM

EXHIBIT INFORMATION

Ontario/Niagara Foyer

Hours

Tuesday, August 2
5:00PM–8:00PM

Wednesday, August 3
7:00AM–5:00PM

Thursday, August 4
7:00AM–5:00PM

Friday, August 5
7:00AM–4:00PM

AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

All technical sessions are equipped with one LCD projector and one screen. Laptops will NOT be provided in the sessions. Presenters MUST bring their own or make arrangements in advance with the session chairs to share theirs. Please bring your presentation on a thumb drive 15 minutes prior to the session start time.

BADGE REQUIRED FOR ADMISSION

All conference attendees must wear the official ASME 2022 FEDSM badge at all times in order to gain admission to technical sessions, exhibits, meals, and other conference events. Without a badge, you will NOT be allowed to attend any conference activities.

CONFERENCE MEALS

Conference breakfast will be held from 7:00AM to 8:00AM on Wednesday - Friday in the Ontario/Niagara Foyer. Lunches will be on your own.

OPENING RECEPTION

Tuesday, August 2
6:00PM–08:00PM
Ontario/Niagara Foyer

Guest tickets are available for \$70

FED AWARDS DINNER

Thursday August 4
6:30PM – 9:00PM
Ballroom B

Guest tickets are available for \$105

PHEEDLOOP CONFERENCE APP-

The best way to see the most up to date information and schedule

Download the Pheedloop Go! App and hold the entire program in the palm at your hand! The new ASME Pheedloop Go! App allows you to easily look up sessions, search for papers or people, message with other attendees, post to various social media platforms, and create your own schedule. The Pheedloop App is available at the App Store on iOS devices, and the Play Store App is available on Android devices. Access emails were sent to all registrants. Stop by the registration desk if you need assistance or have questions

INTERNET ACCESS IN THE HOTEL

Wi-Fi is included in your guest room and in the meeting space:

- Please go to the registration desk for details

CONFERENCE PROCEEDINGS

Each attendee will receive an email with a unique code to access digital copies of all the papers accepted for presentation at the conference. The official conference archival proceedings will be published after the conference and will not include accepted papers that were not presented at the conference. The official conference proceedings are registered with the Library of Congress and are submitted for abstracting and indexing. The proceedings are published on the ASME Digital Library. You will be provided with an individual link to the online papers via email. In the event you do not receive the email, send a request to conferencepubs@asme.org.

PRESENTER ATTENDANCE POLICY

According to ASME's Presenter Attendance Policy, if a paper is not presented at the conference, the paper will not be published in the official Archival Proceedings, which are registered with the Library of Congress and are abstracted and indexed. The paper also will not be published in the ASME Digital Collection and may not be cited as a published paper.

Schedule at a Glance

TIME	EVENT	ROOM
TUESDAY, AUGUST 2, 2022		
11:00AM–2:45PM	Executive Committee Meeting (Closed)	Niagara
3:00PM–4:30PM	Executive Committee Meeting w/TC Chairs (Closed)	Niagara
6:00PM–8:00PM	Opening Reception	Ontario/Niagara Foyer
WEDNESDAY, AUGUST 3, 2022		
7:00AM–8:00AM	Breakfast	Ontario/Niagara Foyer
8:00AM–8:10AM	Opening Welcome: Zhongquan (Charlie) Zheng (FED Division Chair) Thomas Costabile (ASME Executive Director/CEO) Philipp Epple (FEDSM 2022 Conference Chair)	Ballroom B
8:00AM–8:45AM	Plenary 1: 2022 ASME Fluids Engineering Award Yassin A Hassan	Ballroom B
8:45AM–9:45AM	FED Towne Hall Assembly	Ballroom B
9:45AM–10:00AM	Refreshment Break	Ontario/Niagara Foyer
10:00AM–12:00PM	Technical Sessions FASTC 01-01-01 MFTC 04-01 FMTC 03-01-01 FMITC 02-01-01 CFDTC 05-01-01	Ontario Niagara Ballroom A Ballroom B Kingsway (2nd FL)
12:00PM–1:30PM	Lunch Break (On your own)	
12:30PM–1:30PM	Graduate Student Scholars Committee Meeting (Closed)	Ontario
1:30PM–3:30PM	Technical Sessions FASTC 01-02-01 MFTC 04-03 FMTC 03-02-01 MNFDTTC 06-02 CFDTC 05-01-02	Ontario Niagara Ballroom A Ballroom B Kingsway (2nd FL)
3:30PM–3:45PM	Refreshment Break	Ontario/Niagara Foyer
3:45PM–5:45PM	Technical Sessions FASTC 01-04-01 MFTC 04-02 FMTC 03-02-02 FMTC 03-04-01 CFDTC 05-01-03	Ontario Niagara Ballroom A Ballroom B Kingsway (2nd FL)
6:00PM–7:00PM	FMTC Committee Meeting	Ballroom A
6:00PM–7:00PM	40 Years FMITC Committee Meeting	Ontario
7:00PM–8:00PM	FMITC Committee Meeting	Ontario
8:20PM–9:20PM	CFDTC Committee Meeting	Ontario
THURSDAY, AUGUST 4, 2022		
7:00AM–8:00AM	Breakfast	Ontario/Niagara Foyer
7:00AM–8:00AM	Honors/Awards Committee Meeting (Closed)	Haliburton (2nd FL)
8:00AM–9:00AM	FASTC Committee Meeting	Haliburton (2nd FL)

Schedule at a Glance

TIME	EVENT	ROOM
9:10AM–9:55AM	Plenary 2: 2022 ASME Freeman Scholar Prof. Dr. Colonius	Ballroom B
9:55AM–10:15AM	Refreshment Break	Ontario/Niagara Foyer
10:15AM–12:15PM	Technical Sessions FASTC 01-03-01 MFTC 04-04 FMTC 03-09-01 FMITC 02-01-02 CFDTC 05-02-01	Ontario Niagara Ballroom A Ballroom B Kingsway (2nd FL)
10:15AM–11:15AM	MNFDTC Committee Meeting	Haliburton (2nd FL)
12:15PM–1:30PM	Lunch Break (On your own)	
12:30PM–1:30PM	JFE AE Meeting (Closed)	Haliburton (2nd FL)
1:30PM–3:30PM	Technical Sessions FASTC 01-05-01 MFTC 04-05 FMTC 03-09-02 MNFDTC 06-04 CFDTC 05-02-04	Ontario Niagara Ballroom A Ballroom B Kingsway (2nd FL)
3:30PM–3:45PM	Refreshment Break	Ontario/Niagara Foyer
3:45PM–5:45PM	Technical Sessions CFDTC 05-01-04 MFTC 04-06 FMTC 03-07 CFDTC 05-04	Ontario Niagara Ballroom A Kingsway (2nd FL)
6:30PM–9:30PM	FEDSM Awards Dinner	Ballroom B
FRIDAY, AUGUST 5, 2022		
7:00AM–8:00AM	Breakfast	Ontario/Niagara Foyer
7:00AM–8:00AM	Advisory Committee Meeting (Closed)	Kingsway (2nd FL)
8:00AM–9:00AM	MFTC Committee Meeting	Kingsway (2nd FL)
9:10AM–9:55AM	Plenary 3: 2022 ASME Henry R. Worthington Medal: Prof. Dr. Thamsen	Ballroom B
9:55AM–10:15AM	Refreshment Break	Ontario/Niagara Foyer
10:15AM–12:15PM	Technical Sessions FMITC 02-01-03 CFDTC 05-02-02 FMTC 03-04-02 FMTC 03-06	Ontario Niagara Ballroom A Ballroom B
12:15PM–1:30PM	Lunch Break (On your own)	
1:30PM–3:30PM	Technical Sessions MFTC 04-08 CFDTC 05-02-03 FMTC 03-09-03 FMTC 03-10	Ontario Niagara Ballroom A Ballroom B
3:45PM–4:45PM	Executive Committee Meeting (Closed)	Kingsway (2nd FL)
5:00PM–6:00PM	Executive Committee Meeting w/TC Chairs (Closed)	Kingsway (2nd FL)

Plenary Speakers

WEDNESDAY, AUGUST 3, 8:00AM–8:45AM

BALLROOM B

WINNER OF THE 2022 ASME FLUIDS ENGINEERING AWARD



Yassin A. Hassan

University Distinguished Professor, Regents Professor, and the L.F. Peterson '36 Chair II in Engineering Texas A&M University

High Resolution Experiments for Modeling and Simulation: from Nuclear Applications to COVID-19

BIOGRAPHY: Prior to joining Texas A&M September 1986, Yassin A. Hassan worked for seven years at Nuclear Power Division, Babcock & Wilcox Company, Lynchburg, Virginia, where he conducted several thermal hydraulic analyses and undertook development of several computational techniques. He has performed experimental and computational studies of advanced reactors (gas cooled reactors, liquid metal, molten salt, and SMR). He also participated in resolving the Generic Safety Issue (GSI-191) for the South Texas Project Nuclear Operating Plant. He is the Director of the Center for Advanced Small Modular and Microreactors (CASMR). He was appointed a member of the Civil Nuclear Trade Advisory committee by Honorable Commerce Secretary Gina Raimondo, May 4, 2021. He graduated and advised 60 PhD and 112 MS graduate students. He has co-authored with his students more than 600 refereed publications in technical journals and conference proceedings. He delivered more than 150 plenary and invited presentations.

THURSDAY, AUGUST 4, 9:10AM–9:55AM

BALLROOM B

WINNER OF THE 2022 ASME FREEMAN SCHOLAR AWARD



Tim Colonius

Frank and Ora Lee Marble Professor of Mechanical Engineering California Institute of Technology

Progress and Challenges in the Simulation of Bubbly Cavitating Flows

ABSTRACT: Flow models and numerical methods for multiphase, cavitating flows have benefitted from recent advances in sharp and diffuse interface-capturing schemes, but many challenges remain—resolving the complex interface and large range of spatiotemporal scales associated with cavitation strains, existing algorithms, and computational resources. We review formulations for multiphase/multicomponent flows that involve large changes in volume, including methods that explicitly resolve the material interface, and ones that model the mixture as either homogeneous or as a dilute dispersion of spherical bubbles. For resolved-interface modeling, the seemingly simple test case of a single collapsing spherical bubble—solved without assuming symmetry on a three-dimensional grid—represents a successful application of interface capturing techniques, but it also highlights ongoing pathologies in the numerical methods and the extreme challenges of fully resolving the physics. Closure models, in the form of sub-grid-scale bubble modeling and hybrid, large-eddy-simulation-like approaches, can reduce this computational burden. We show how data-driven/machine-learned closure models can harness information from experiments and interface-resolved simulations to improve closures and develop accurate, general-purpose cavitation models. The models discussed are illustrated through application to cavitation and bubble dynamics in therapeutic ultrasound and other medical applications.

BIOGRAPHY: Tim Colonius is the Frank and Ora Lee Marble Professor of Mechanical Engineering at the California Institute of Technology. He received his B.S. from the University of Michigan in 1987 and M.S. and Ph.D. in Mechanical Engineering from Stanford University in 1988 and 1994, respectively. He and his research team use numerical simulations to study a range of problems in fluid dynamics, including aeroacoustics, flow control, instabilities, shock waves, and bubble dynamics. Prof. Colonius also investigates medical applications of ultrasound and is a member of the Medical Engineering faculty at Caltech. He is a Fellow of the American Physical Society and the Acoustical Society of America. He was the recipient of the 2018 AIAA Aeroacoustics Award and the 2022 APS-DFD Stanley Corrsin Award.

FRIDAY, AUGUST 5, 9:10AM–9:55AM

BALLROOM B

WINNER OF THE 2022 ASME HENRY R. WORTHINGTON MEDAL



Prof. Dr.-Ing. Paul Uwe Thamsen
Professor Fluid System Dynamics
Technical University Berlin

Research on Centrifugal Pumps Over the Course of Time

ABSTRACT: The research on centrifugal pumps in the last decades moved from specific topics around the pump design more and more to a holistic approach of the complete pumping system. The presentation will bridge the research questions starting from specific pump improvements, e.g., cavitation bores in a single blade pump destroying cloud cavitation or a special semi-axial design for constant power consumption to the complete design of pumping stations, diagnostic with active reactions and digitalization. Nowadays, pump research participates actively in solving the great challenges from energy, water, and climate impact.

BIOGRAPHY: Prof. Dr.-Ing. Paul Uwe Thamsen's education (1980–1992) at Pfeleiderer-Institute Braunschweig focused on pump design, experimental investigations, cavitation measurements, and submersible pump development finalized in doctorate research on Operational Behavior of Submersible Pumps with Inlet Distortions. During the industrial time (1992–2003) at Pleuger Worthington GmbH in Hamburg (Ingersoll Dresser Pumps/Flowserve), his responsibility was for R&D, engineering, marketing and sales, general management—always involved in technical development as a hydraulic/technical expert for a lot of projects. Final position was general manager and technical director for submersible pumps worldwide. During this time, they developed a couple of successful new pump lines and built challenging projects (e.g., large water projects, multiphase subsea, mining, offshore).

Since 2003, he has been professor for fluid system dynamics at Technical University Berlin, focusing on fluid mechanic, fluid flow machines, and fluid infrastructures. His main research topics are on centrifugal pumps, water and wastewater, automation and digitalization, and medical applications. A strong cooperation with industry results in innovative products and new control methods for pump operation. A lot of results are published in new standards for pumping station design a pumping infrastructure in the field of wastewater pumping.

Committee Meetings

All registrants are invited to attend the technical committee meetings and become a part of the FED community

COMMITTEE	TIME	ROOM
Tuesday, August 2		
Opening FED Executive Committee (Closed)	11:00AM–2:45PM	Niagra
Executive Committee w/ TC Chairs (Closed)	3:00PM–4:30PM	Niagra
Wednesday, August 3		
Graduate Student Scholars Committee (Closed)	12:30PM–1:30PM	Ontario
FMTC Fluid Mechanics Technical Committee	6:00PM–7:00PM	Ballroom A
40 Years FMITC Fluid Measurement & Instrumentation Technical Committee	6:00PM–7:00PM	Ontario
FMITC Fluid Measurement & Instrumentation Technical Committee	7:00PM–8:00PM	Ontario
CFDTC Computational Fluid Dynamics Technical Committee	8:20PM–9:20PM	Ontario
Thursday, August 4		
Honors & Awards Committee (Closed)	7:00AM–8:00AM	Haliburton (2nd FL)
FASTC Fluid Applications and Systems Technical Committee	8:00AM–9:00AM	Haliburton (2nd FL)
MNFDTC Micro Nano Fluid Dynamics Technical Committee	10:15AM–11:15AM	Haliburton (2nd FL)
Friday, August 13		
FED Advisory Committee (Closed)	7:00AM–8:00AM	Kingsway (2nd FL)
MFTC Multiphase Flow Technical Committee	8:00AM–9:00AM	Kingsway (2nd FL)
Closing EC w/TC Chairs (Closed)	3:45PM–4:45PM	Kingsway (2nd FL)
Closing EC Executive Committee (Closed)	5:00PM–6:00PM	Kingsway (2nd FL)

WEDNESDAY AUGUST 3, 2022

07-01 FLOW VISUALIZATION

PRESENTATIONS WILL BE DISPLAYED

THROUGHOUT EACH DAY

ONTARIO/NIAGARA FOYER

Chair: **Philipp Epple** - Coburg University of Applied Sciences

Chair: **Kamran Siddiqui** - University of Western Ontario

Validation of Low and High-Fidelity Turbulence Models for Prediction of Turbulent Heat Transfer in Low Prandtl Number Flows Under Buoyant and Separated Flow Conditions

Flow Visualization Presentation: FEDSM2022-97670

Mohammed El Mellouki - Mississippi State University, **Shanti Bhushan** - Mississippi State University, **Keith Walters** - University of Arkansas, **Christopher Pilmaier** - Mississippi State University, **Elia Mezzari** - Penn State University, **Aleksandr Obabko** - Argonne National Laboratory, **Hassan Yassin** - Texas A&M University, **Brent Hollra** - Texas A&M University, **Michael Gorman** - Texas A&M University, **Milorad Dzodzo** - Westinghouse Electric Company

Hydrodynamic Performance and Wake Topology of Schooling Fish in Three-Dimensional Formations

Flow Visualization Presentation: FEDSM2022-97656

Yu Pan - University of Virginia, **Haibo Dong** - University of Virginia

Saturated Flow Boiling of an Isolated Seed Bubble Across a Heated Square Cylinder in a Microchannel

Flow Visualization Presentation: FEDSM2022-97621

Haoxiang Huang - Shanghai Jiao Tong University, **Zhe Yan** - Shanghai Jiao Tong University, **Zhenhai Pan** - Shanghai Jiao Tong University

Swirl Effects on Gas-Liquid Upward Vertical Pipe Flow

Flow Visualization Presentation: FEDSM2022-97649

Matheus Garcia - Delft University of Technology, **Luis Portela** - Delft University of Technology

Data Driven Actuator Line Model Farm Simulation

Flow Visualization Presentation: FEDSM2022-97659

Joshua Bowman - Mississippi State University

Urine Splatter Characteristics

Flow Visualization Presentation: FEDSM2022-97660

Randy Hurd - Weber State University, **Ethan Barlow** - Weber State University, **Nathan Speirs** - Naval Undersea Warfare Center, **Jesse Belden** - Naval Undersea Warfare Center, **Zhao Pan** - University of Waterloo, **Tadd Truscott** - King Abdullah University of Science and Technology

The Effect of Wings' Taper Ratio on 3d Stall Cell Formation

Flow Visualization Presentation: FEDSM2022-97668

Sara Khaleghizadeh - Amirkabir University of Technology, **Arash Zargar** - University of Alberta, **Mehrnoosh Rahbardar** - Washington University in St. Louis, **Mahmoud Mani** - Amirkabir University of Technology

Physics of High-Speed Flow Interactions With Canonical Projectile Geometries

Flow Visualization Presentation: FEDSM2022-97677

Jacob Gamertsfelder - University of Cincinnati, **Luis Bravo** - Aberdeen Proving Ground, **Prashant Khare** - University of Cincinnati

Development of a Finite Element Solver Including a Level-Set Method for Modeling Hydrokinetic Turbines

Flow Visualization Presentation: FEDSM2022-97691

Ahmed Hamada - Texas A&M University, **Mirjam Fürth** - Texas A&M University

Flow Visualization of Wing Vortices of Different Types of Delta Wings

Flow Visualization Presentation: FEDSM2022-97878

Philipp Epple - Coburg University of Applied Sciences, **Michael Steppert** - Coburg University of Applied Sciences, **Dustyn Kramer** - Coburg University of Applied Sciences

Visualization of 3d Vortex Structures of Sluice Gate Flows

Flow Visualization Presentation: FEDSM2022-97894

Philipp Epple - Coburg University of Applied Sciences, **Michael Steppert** - Coburg University of Applied Sciences, **Andreas Malcherek** - Bundeswehr University Munich

Visualization of Thermally Developing Turbulent Channel Flows at Different Prandtl Numbers

Flow Visualization Presentation: FEDSM2022-97675

Farid Rousta - *Clarkson University*, Bamdad Lessani - *University of North Carolina at Charlotte*, Goodarz Ahmadi - *Clarkson University*

Visualization of Particle Motion in Turbulent Channel Flow

Flow Visualization Presentation: FEDSM2022-97673

Farid Rousta - *Clarkson University*, Bamdad Lessani - *University of North Carolina at Charlotte*, Goodarz Ahmadi - *Clarkson University*

Fluid Flow Through Stepped Micro Pin Fin Heat Sink

Flow Visualization Presentation: FEDSM2022-88017

Prabhakar Bhandari - *KR Mangalam University*

Flow Structures and Bubble Dynamics Within the Heated Microfluidic Y-Junctions

Flow Visualization Presentation: FEDSM2022-97178

Zhe Yan - *Shanghai Jiao Tong University*, Haoxiang Huang - *Shanghai Jiao Tong University*, Zhenhai Pan - *Shanghai Jiao Tong University*

Interactions Between Shock Waves and Liquid Droplet Clusters: Interfacial Physics

Flow Visualization Presentation: FEDSM2022-97229

Mitansh Tripathi - *University of Cincinnati*, Prashant Khare - *University of Cincinnati*

Visualization for the Effects of Wing-Induced Flow on the Odor Plume Structures During an Odor Tracking Flight of Monarch Butterfly

Flow Visualization Presentation: FEDSM2022-97230

Zhipeng Lou - *University of Virginia*, Menglong Lei - *Villanova University*, Haibo Dong - *University of Virginia*, Kai Zhao - *The Ohio State University*, Chengyu Li - *Villanova University*

Visualization of Thermals in a Heated Turbulent Boundary Layer

Flow Visualization Presentation: FEDSM2022-97278

Kadeem Dennis - *University of Western Ontario*, Kamran Siddiqui - *University of Western Ontario*

Visualization of Coherent Structures in a Three Dimensional Lid-Driven Cavity at High Reynolds Number

Flow Visualization Presentation: FEDSM2022-97533

Khodr Jaber - *University of Toronto*, Ebenezer Essel - *University of Toronto*, Pierre Sullivan - *University of Toronto*

Numerical Investigation of a Rotating Double Compression Ramp Intake

Flow Visualization Presentation: FEDSM2022-97608

Lubna Margha - *Texas A&M University*, Ahmed Atef Abdelsatar Ahmed Hamada - *Texas A&M University*, Ahmed Eltaweel - *University of Science and Technology - Zewail City*

09-01 FEDSM POSTER SESSION

POSTERS WILL BE DISPLAYED

THROUGHOUT EACH DAY FEDSM 2022 ONTARIO/NIAGARA FOYER

Chair: Kamran Siddiqui - *University of Western Ontario*

Chair: Philipp Epple - *Coburg University of Applied Sciences*

Lipid Concentration-Controlled Microbubble Shrinkage in Microfluidic Channels

Poster Presentation: FEDSM2022-97183

Intesar Zalloum - *Ryerson University*, Ali Paknahad - *Ryerson University*, Michael Kolios - *Ryerson University*, Raffi Karshafian - *Ryerson University*, Scott Tsai - *Ryerson University*

Investigation of Water Droplet Deflection by Dielectrophoresis

Poster Presentation: FEDSM2022-87590

Xiaoman Guo - *University of Toronto*, Sina Alavi - *University of Toronto*, Javad Mostaghimi - *University of Toronto*

02-01-01 FLUID MEASUREMENT AND INSTRUMENTATION

10:00AM–12:00PM

BALLROOM B

Chair: **Yang Liu** - East Carolina University
 Chair: **Ivaylo Nedyalkov** - University of New Hampshire
 Chair: **Soroor Karimi** - The University of Tulsa

Fluid Velocity Sensing at Extreme Altitude or Low Density Environments

Keynote: Technical Paper Publication: FEDSM2022-87083

George Papadopoulos - *Innoveering, LLC*, **Daniel Bivolaru** - *Innoveering, LLC*, **Andrew Murphy** - *Innoveering, LLC*, **Spencer Siu** - *Innoveering, LLC*

High-Speed-Imaging-Supported Investigation of the Acoustics of Cavitation in an Industrial Centrifugal Pump

Technical Paper Publication: FEDSM2022-87430

Timo Gonschior - *TU Berlin*, **David Konstantin Tilcher** - *TU Berlin*, **Antonia Heinrich** - *TU Berlin*, **Paul Uwe Thamsen** - *TU Berlin*

Generation Mechanism of High-Frequency Sound Induced by Supersonic Jet Impinging on Flat Plate

Technical Paper Publication: FEDSM2022-87368

Hiromasa Suzuki - *Tokyo Metropolitan College of Industrial Technology*, **Masaki Endo** - *Tokyo Denki University*, **Yoko Sakakibara** - *Tokyo Denki University*

Development of Three-Dimensional Velocity Vector Profiler Using Ultrasonic Pulsed Doppler Method

Technical Paper Publication: FEDSM2022-87878

Naruki Shoji - *Tokyo Institute of Technology*, **Hideharu Takahashi** - *Tokyo Institute of Technology*, **Hiroshige Kikura** - *Tokyo Institute of Technology*

Study of Couette-Taylor-Poiseuille Flow With a Wavy Internal Cylinder Surface at Low Taylor and Axial Reynolds Numbers

Technical Paper Publication: FEDSM2022-87569

Lamia Gaied - *INSA Hauts-de-France*, **Emna Berrich** - *Nantes University*, **Fethi Aloui** - *INSA Hauts-de-France*

03-01-01 ADVANCES IN FLUIDS ENGINEERING EDUCATION

10:00AM–12:00PM

BALLROOM A

Chair: **Ivana Milanovic** - University of Hartford

E-Designation for Compressible Aerodynamics Course

Technical Paper Publication: FEDSM2022-86317

Ivana Milanovic - *University of Hartford*, **Tom Eppes** - *University of Hartford*, **Kalyan Goparaju** - *ANSYS*

Learning and Engaging Through Transformative Informal Setting Driven by COVID Induced Leading Edge Virtual Technology for Advanced Fluid Mechanics Modeling and Simulations Seminar Series

Technical Paper Publication: FEDSM2022-87409

Demy Rodriguez - *The University of Texas at El Paso*, **Leslie Trevizo** - *The University of Texas at El Paso*, **Arturo Rodriguez** - *The University of Texas at El Paso*, **Julio Aguilar** - *The University of Texas at El Paso*, **Clinton Chijioke** - *The University of Texas at El Paso*, **Brandon Paez** - *The University of Texas at El Paso*, **Rafael Baez** - *The University of Texas at El Paso*, **V.M. Krushnarao Kotteda** - *The University of Texas at El Paso*, **Vinod Kumar** - *The University of Texas at El Paso*

Effects of Reynolds Number and Streamwise Aspect Ratio on Turbulent Wakes Generated by Rectangular Cylinders

Technical Paper Publication: FEDSM2022-86964

Manqi Liu - *University of Manitoba*, **Sedem Kumahor** - *University of Manitoba*, **Mark F. Tachie** - *University of Manitoba*

Investigations of Aspect Ratio Effects on Wake Dynamics of Rectangular Cylinders

Technical Paper Publication: FEDSM2022-87654

Manqi Liu - *University of Manitoba*, **Sedem Kumahor** - *University of Manitoba*, **Lucas Audette** - *University of Manitoba*, **Mark Tachie** - *University of Manitoba*

Virtual Engine Laboratories Developed During Covid Pandemic

Technical Presentation Only: FEDSM2022-87707

Rohith Giridhar - *The University of Kansas*, **Ray Taghavi** - *The University of Kansas*

Technical Sessions

05-01-01 APPLIED CFD

10:00AM-12:00PM

KINGSWAY (2ND FL)

Chair: **Zhongquan Zheng** - Utah State University
Chair: **Philipp Epple** - Coburg University of Applied Sciences
Chair: **Ning Zhang** - McNeese State University
Chair: **Kamran Siddiqui** - University of Western Ontario
Chair: **Haibo Dong** - University of Virginia
Chair: **Sijun Zhang** - Advanced Simulation and Modeling, Inc.
Chair: **Georg Scheuerer** - IsimQ GmbH

Growth Mechanism of a Vortex Structure Formed by a Sweeping Jet and a Main Flow

Technical Paper Publication: FEDSM2022-79617

Eisei Kobayashi - *Kyushu Institute of Technology*, **Masaki Fuchiwaki** - *Kyushu Institute of Technology*, **Surya Raghu** - *Advanced Fluidics LLC*

Hypersonic Non-Equilibrium Flow Simulations of Conical Deceleration Structure

Technical Paper Publication: FEDSM2022-86771

Yu Liu - *Beijing Institute of Space Mechanics & Electricity*, **Wei Jiang** - *Beijing Institute of Space Mechanics & Electricity*, **He Jia** - *Beijing Institute of Space Mechanics & Electricity*, **Wei Huang** - *Beijing Institute of Space Mechanics & Electricity*, **Sijun Zhang** - *Advanced Simulation and Modeling, Inc.*

Effects of Throttling Orifice Plate on Flow and Aerodynamic Noise Characteristics Inside Valve Downstream

Technical Paper Publication: FEDSM2022-86877

Long-Jie Yu - *Zhejiang University*, **Fang-Na Xiang** - *Zhejiang University*, **Jiao-Shan Hao** - *Chongqing Chuanyi Control Valve*, **Yong-Bing Jiang** - *Chongqing Chuanyi Control Valve*, **Zhi-Jiang Jin** - *Zhejiang University*, **Jin-yuan Qian** - *Zhejiang University*

Quantification of the Aerodynamic Drivers of a Deployable Propeller

Technical Presentation Only: FEDSM2022-94069

David Malyszek - *University of Central Florida*, **Michael Kinzel** - *University of Central Florida*, **Kawai Kwok** - *University of Central Florida*, **Annan Mashin** - *University of Central Florida*

Research on Fluid Dynamics and Thermal Characteristics in Hydraulic Valves by Thermal-Fluid-Solid Coupling Method

Technical Paper Publication: FEDSM2022-86878

Jia-Xi Nie - *Zhejiang University*, **Zhen-Hao Lin** - *Zhejiang University*, **Jiao-Shan Hao** - *Chongqing Chuanyi Control Valve*, **Yong-Bing Jiang** - *Chongqing Chuanyi Control Valve*, **Zhi-Jiang Jin** - *Zhejiang University*, **Jin-Yuan Qian** - *Zhejiang University*

01-01-01 AUTOMOTIVE FLOWS

10:00AM-12:00PM - ONTARIO

Chair: **Ravinder Yerram** - GE
Chair: **Kevin Anderson** - California State Polytechnic University, Pomona
Chair: **Aarthi Sekaran** - SUNY Polytechnic Institute Technical
Chair: **Ernesto Primero** - Chevron

Robust Optimization of High-Speed Train Head Shape Under Crosswind Condition

Technical Paper Publication: FEDSM2022-87623

Yeteng Wang - *Institute of Mechanics, Chinese Academy of Sciences*, **Zhenxu Sun** - *Institute of Mechanics, Chinese Academy of Sciences*, **Shengjun Ju** - *Institute of Mechanics, Chinese Academy of Sciences*, **Dilong Guo** - *Institute of Mechanics, Chinese Academy of Sciences*, **Guowei Yang** - *Institute of Mechanics, Chinese Academy of Sciences*

Research on Effects of Tunnel Buffer Structures on the Aerodynamic Force of the Pantograph

Technical Paper Publication: FEDSM2022-86879

Jionghao Cheng - *Institute of Mechanics, Chinese Academy of Sciences*, **Dilong Guo** - *Institute of Mechanics, Chinese Academy of Sciences*, **Guowei Yang** - *Institute of Mechanics, Chinese Academy of Sciences*, **Zhanling Ji** - *Institute of Mechanics, Chinese Academy of Sciences*, **Dawei Chen** - *CRRC Qingdao Sifang Co., Ltd.*

Performance Analysis and Parametric Study of Vortex Whistle

Technical Paper Publication: FEDSM2022-87902

Ang Li - *Purdue University*, **Jun Chen** - *Purdue University*, **Jordan Awan** - *Purdue University*, **David Eddins** - *University of South Florida*, **Shaheen Awan** - *University of South Florida*

System Dynamics and Tomography-Based Control of a Gas-Liquid Inline Swirl Separator

Technical Paper Publication: FEDSM2022-89309

Matheus Garcia - Delft University of Technology, Luis Portela - Delft University of Technology

CFD as a Key Actor Inside Digital Twins

Technical Paper Publication: FEDSM2022-87997

Jose Páscoa Marques - Universidade da Beira Interior

04-01 NUMERICAL AND DATA BASED METHODS FOR MULTIPHASE FLOWS

10:00AM-12:00PM

NIAGARA

Chair: Michael Kinzel - University of Central Florida

Chair: Robert Kunz - Penn State University

Multiscale Euler-Lagrange Modeling of Bubble Collection and Phase Separation in a Vortex Chamber

Technical Paper Publication: FEDSM2022-86898

Jingsen Ma - Dynaflow, Inc., Chao-Tsung Hsiao - Dynaflow, Inc.

A Numerical Method and Study of Viscoelastic Droplet Breakup

Technical Paper Publication: FEDSM2022-87895

Caroline Anderson - University of Central Florida, Michael Kinzel - University of Central Florida

A Study of Microfluidic Device Geometries on Fluid Instabilities

Technical Paper Publication: FEDSM2022-87470

Sylvain Le Henaff - University of Central Florida, Taylor Peterson - University of Central Florida, Candice Hovell - Imec USA, Jeremy Mares - Imec USA, Melanie Coathup - University of Central Florida, Veerle Reumers - Imec USA, Michael Kinzel - University of Central Florida

Design Optimization of Laser-Induced Bubble for Highly Efficient Generation of Microjets

Technical Paper Publication: FEDSM2022-86873

Tatsumasa Ishikawa - Tokyo University of Agriculture and Technology, Hiroyuki Nishida - Tokyo University of Agriculture and Technology, Yoshiyuki Tagawa - Tokyo University of Agriculture and Technology

03-02-01 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS

1:30PM-3:30PM

BALLROOM A

Chair: Deify Law - California State University, Fresno

Chair: Stefan Aus Der Wiesche - University of Applied Sciences Muenster

Chair: Philipp Epple - Coburg University of Applied Sciences

Chair: Javid Bayandor - The State University of New York

Chair: Jun Chen - Purdue University

Chair: Kamran Siddiqui - University of Western Ontario

Methodology for Experimental Investigation of Hydraulic and Mechanical Characteristics of Ventricular Assist Devices

Technical Paper Publication: FEDSM2022-86732

Carsten Strauch - Technische Universität Berlin, Julija Peter - Technische Universität Berlin, Paul Uwe Thamsen - Technische Universität Berlin

Onto Quantifying Unsteady Propulsion Characteristics Using Momentum and Energy Control Volume Assessments

Technical Paper Publication: FEDSM2022-87219

George Loubimov - University of Central Florida, Michael Kinzel - University of Central Florida

Designing an Experimental Setup for Analyzing the Flow Through a 3D Printed Venous Valve System From Arthroscopic Images Networks

Technical Paper Publication: FEDSM2022-87419

Alan Rascon - The University of Texas at El Paso, Nazmul Hossain - University of Houston, V.M. Krushnaro Kotteda - The University of Texas at El Paso, Christopher Harris - DeepVein Inc., Herbert Janssen - Texas Tech University Health Sciences Center El Paso, Ellen Dudley - Texas Tech University School of Medicine, Vinod Kumar - The University of Texas at El Paso, Amit Lopes - The University of Texas at El Paso

Body Shape Effects on the Hydrodynamic Performance of Bio-Inspired Undulating Swimmers

Technical Paper Publication: FEDSM2022-87645

John Kelly - University of Virginia, Yu Pan - University of Virginia, Haibo Dong - University of Virginia

Experimental Investigation of the Flow Over Biomimetic Fish Scale Arrays

Technical Presentation Only: FEDSM2022-87633

Isaac Clapp - Western University, Kamran Siddiqui - Western University

04-03 MULTIPHASE FLOWS IN INDUSTRIAL APPLICATIONS

1:30PM–3:30PM

NIAGARA

Chair: Srinivas Swaroop Kolla - Oklahoma State University
Chair: Seung Jun Kim - Los Alamos National Laboratory
Chair: Robert Kunz - Penn State University
Chair: Bertrand Rollin - Lawrence Livermore National Laboratory
Chair: Bernhard Vowinckel - TU Braunschweig

Uncertainty Quantification and Sensitivity Analysis of Semi-Mechanistic Models for Sand Erosion in Elbows for Single and Multiphase Flows

Technical Paper Publication: FEDSM2022-79746

Ronald Vieira - The University of Tulsa, Siamack Shirazi - The University of Tulsa

Study of Thixotropic Behavior of Non-Newtonian Fluids in Tool-Joints of Oil Wells

Technical Paper Publication (Iran): FEDSM2022-87150

Ardeshir Gholami - Amirkabir University, Zohreh Mansoori - Amirkabir University, Majid Saffar-Avval - Amirkabir University, Goodarz Ahmadi - Clarkson University

Four-Way Coupled Simulation of Proppants Flowing in Rock Fracture With Realistic Geometry: Hydraulic Fracturing Application

Technical Paper Publication: FEDSM2022-87688

Farid Rousta - Clarkson University, Goodarz Ahmadi - Clarkson University, Dustin Crandall - U.S. Department of Energy

Concentrating Slurries Mesofluidically for Nuclear Waste Processing

Technical Paper Publication: FEDSM2022-87708

Leonard F. Pease - Pacific Northwest National Laboratory, Judith Ann Bamberger - Pacific Northwest National Laboratory, Carolyn A. Burns - Pacific Northwest National Laboratory, Michael J. Minette - Pacific Northwest National Laboratory

Electrostatic Painting Process: Impact of Using Connected High-Voltage Embodiments With Rotary Bell Atomizers on Droplets Transport and Deposition

Technical Paper Publication: FEDSM2022-88033

Mohammad-Reza Pendar - University of Beira Interior, José Carlos Páscoa - University of Beira Interior

06-02 MICRO/NANOFLUIDIC SYSTEMS, TECHNIQUES AND DEVICES

1:30PM–3:30PM

BALLROOM B

Chair: Sangjin Ryu - University of Nebraska-Lincoln
Chair: Rasim Guldiken - University of South Florida

Fabrication of a Microfluidic Cell Compressor Using a 3D-Printed Mold

Technical Paper Publication: FEDSM2022-87613

Carson Emeigh - University of Nebraska-Lincoln, Haipeng Zhang - University of Nebraska-Lincoln, Sangjin Ryu - University of Nebraska-Lincoln

Development of Nano- and Micro-Fluids Using Magnetic Poly(Ionic Liquid)-Surfactant Complexes for Stimuli Response

Technical Paper Publication: FEDSM2022-87758

Kayla Foley - University of Arkansas, Keisha Walters - University of Arkansas

Fabrication of a Multi-Well Plate Channel Device With Reversible Seals

Technical Paper Publication: FEDSM2022-87923

Haipeng Zhang - *University of Nebraska-Lincoln*, **Carson Emeigh** - *University of Nebraska-Lincoln*, **Stephen Brooks** - *University of Nebraska-Lincoln*, **Timothy Wei** - *University of Nebraska-Lincoln*, **Sangjin Ryu** - *University of Nebraska-Lincoln*, **Yiannis Chatzizisis** - *University of Nebraska Medical Center*, **Xiang-Der Liu** - *University of Nebraska Medical Center*

01-02-01 ENERGY SYSTEMS

1:30PM–3:30PM

ONTARIO

Chair: **Ravinder Yerram** - GE

Chair: **Kevin Anderson** - California State Polytechnic University, Pomona

Chair: **Bruno Schiavello** - Retired Consultant

Chair: **Aarthi Sekaran** - SUNY Polytechnic Institute Technical

Chair: **Ernesto Primero** - Chevron

Numerical Simulation of a Canadian Well With One Circumferential Row of Internal Vortex Generators

Technical Paper Publication: FEDSM2022-87012

Nabil Kharoua - *Ecole Nationale Polytechnique de Constantine*, **Hamza Semmari** - *Ecole Nationale Polytechnique de Constantine*, **Mehdi Haroun** - *Ecole Nationale Polytechnique de Constantine*, **Housseem Korichi** - *Ecole Nationale Polytechnique de Constantine*, **Md. Islam** - *Khalifa University of Science & Technology*

CFD Analysis of a Grooved Heat Pipe for Space Application

Technical Paper Publication: FEDSM2022-87018

Salman Hemayet Uddin - *Khalifa University of Science and Technology*, **Md. Islam** - *Khalifa University of Science and Technology*, **Shital Mone** - *Khalifa University of Science and Technology*, **Firas Jarrar** - *Khalifa University of Science and Technology*, **Ryan Fernandes** - *Khalifa University of Science and Technology*, **Yap Fatt** - *Khalifa University of Science and Technology*

Optimizing VCC Air Conditioner Systems in Arid Climates: A Dubai Residence as Case Study

Technical Paper Publication: FEDSM2022-87087

Ahmad Abdalla - *Khalifa University of Science and Technology*, **Md. Islam** - *Khalifa University of Science and Technology*, **Ali Al Alili** - *Dubai Electricity and Water Authority R&D Centre*, **Saeed Alhassan** - *Khalifa University of Science and Technology*, **Omer Qureshi** - *Dubai Electricity and Water Authority R&D Centre*, **Edwin Rodriguez-Ubinas** - *Dubai Electricity and Water Authority R&D Centre*

Effects of Tire Attributes on the Aerodynamic Performance of a Generic Car-Tire Assembly

Technical Paper Publication: FEDSM2022-87705

Shubham Rath - *Virginia Tech*, **Alexandrina Untaroiu** - *Virginia Tech*, **Gen Fu** - *Virginia Tech*

In-Situ Measurement of Oil Droplets Size and Velocity in the Rotary Compressor Under Different Operating Conditions

Technical Paper Publication: FEDSM2022-87928

Puyuan Wu - *Purdue University*, **Jun Chen** - *Purdue University*, **Paul Sojka** - *Purdue University*, **Yang Li** - *Guangdong Meizhi Compressor Co., Ltd.*, **Hongjun Cao** - *Guangdong Meizhi Compressor Co., Ltd.*

05-01-02 APPLIED CFD

1:30PM–3:30PM - KINGSWAY (2ND FL)

Chair: **Zhongquan Zheng** - Utah State University

Chair: **Philipp Epple** - Coburg University of Applied Sciences

Chair: **Ning Zhang** - McNeese State University

Chair: **Kamran Siddiqui** - University of Western Ontario

Chair: **Haibo Dong** - University of Virginia

Chair: **Sijun Zhang** - Advanced Simulation and Modeling, Inc.

Chair: **Georg Scheuerer** - IsimQ GmbH

CFD Simulation of Hurricane Force Wind and its Impacts on Residential Buildings

Technical Paper Publication: FEDSM2022-87027

Ghalib Siaka - *McNeese State University*, **Ning Zhang** - *McNeese State University*

Slurry Pumps Instability Investigation Using High Fidelity CFD Simulation

Technical Paper Publication: FEDSM2022-87040

Mohamed Garman - *GIW Industries*, Robert Visintainer - *GIW Industries*

Numerical Investigation of Flow and Thermal Behavior in Channels With PCM-Filled Thermal Energy Storage Columns for Potential Application in Photobioreactors

Technical Paper Publication: FEDSM2022-87279

Sameed Akber - *University of Western Ontario*, Kamran Siddiqui - *University of Western Ontario*, Christopher Degroot - *University of Western Ontario*

Combining 4D MRI With CFD for Investigating Patient-Specific Cardiovascular Flows: A Comprehensive Comparison of ANSYS, COMSOL, and SimVascular Illustrated With the Prediction of Thoracic Aortic Hemodynamics

Technical Paper Publication: FEDSM2022-87596

Farshad Tajeddini - *University of Toronto*, David Romero Torres - *University of Toronto*, Davis McClarty - *University of Toronto*, Jennifer Chung - *University Health Network, University of Toronto*, Cristina Amon - *University of Toronto*

Free Surface Shape in a Cylinder With a Rotating Bottom

Technical Presentation Only: FEDSM2022-94127

Alexander Rashkovan - *NRCN*, Shay David Amar - *Ben-Gurion University*, Ulrich Bieder - *DEN-STMF, CEA, Université Paris-Saclay*, Gennady Ziskind - *Ben-Gurion University of the Negev*

03-04-01 FLOW MANIPULATION AND ACTIVE CONTROL

3:45PM–5:45PM

BALLROOM B

Chair: Martin Agelin-Chaab - *University of Ontario*

Chair: Jun Chen - *Purdue University*

Chair: Hassan Peerhossaini - *Université de Paris*

Mechanical Properties of Irreversible Gel Induced by Dosing With Surfactant Solution

Technical Paper Publication: FEDSM2022-86782

Shin Hirota - *Doshisha University*, Shumpei Hara - *Doshisha University*

Improvement of the Clogging Behaviour of a Wastewater Impeller by the Use of an Inlet Guide Fin

Technical Paper Publication: FEDSM2022-86926

Matthias Steffen - *Technische Universität Berlin*, Paul Uwe Thamsen - *Technische Universität Berlin*

Photosynthetic Micro-Swimmers in Oscillating Flow

Technical Paper Publication: FEDSM2022-87604

Mojtaba Jarrahi - *University of Paris-Saclay*, Elnaz Pashmi - *Université de Paris*, Hassan Peerhossaini - *Université de Paris*

Phototactic Behavior of Micro-Swimmers: Light Effects on Cell Swimming in Oscillating Flow

Technical Paper Publication: FEDSM2022-87606

Elnaz Pashmi - *Université de Paris*, Hassan Peerhossaini - *Université de Paris*, Mojtaba Jarrahi - *University of Paris-Saclay*

Separation Control on an NACA 0025 Airfoil Using an Array of MEMS-Based Synthetic Jets

Technical Paper Publication: FEDSM2022-87621

Kecheng Xu - *University of Toronto*, Philippe Lavoie - *University of Toronto*, Pierre Sullivan - *University of Toronto*

Numerical Simulation of Anti-Icing Effect With Dielectric Barrier Discharge Plasma Actuators on a Surface of an Airfoil

Technical Paper Publication: FEDSM2022-87763

Frederico Rodrigues - *University of Beira Interior*, Mahdi Abdollahzadeh - *Universidade da Beira Interior*, Fatemeh Bagherighajari - *Universidade da Beira Interior*, José Páscoa - *Universidade da Beira Interior*

01-04-01 FLUID MACHINERY SYMPOSIUM

3:45PM–5:45PM

ONTARIO

Chair: **Ravinder Yerram** - GE

Chair: **Kevin Anderson** - California State Polytechnic University, Pomona

Chair: **Bruno Schiavello** - Retired Consultant

Chair: **Ernesto Primero** - Chevron

Effects of Tip Clearance on Internal Flow and Loss Generation Mechanism in an Axial Compressor at Windmilling Conditions

Technical Paper Publication: FEDSM2022-86773

Tomohiro Inada - *Waseda University*, Ryouzuke Sekino - *Waseda University*, Nobumichi Fujisawa - *Waseda University*, Yutaka Ohta - *Waseda University*

Simulation-Driven Blade Work Distribution Based Design Strategy and Optimization of a Low-Pressure Axial Fan

Technical Paper Publication: FEDSM2022-87635

Manuel Fritsche - *Coburg University of Applied Sciences*, Philipp Epple - *Coburg University of Applied Sciences*, Antonio Delgado - *Friedrich-Alexander-Universität Erlangen-Nürnberg*

The Impact of Scaling on the Gap Flow Rate of Radial Fans

Technical Paper Publication: FEDSM2022-87987

Manuel Fritsche - *Coburg University of Applied Sciences*, Philipp Epple - *Coburg University of Applied Sciences*, Antonio Delgado - *University of Erlangen-Nuernberg*

Diffuser Vane Slit Width Optimization Using Simple Prediction Method of Diffuser Rotating Stall Onset in a Centrifugal Pump

Technical Paper Publication: FEDSM2022-86728

Shunya Takao - *Osaka Institute of Technology*, Sota Nakayama - *Osaka Institute of Technology*, Shinichi Konno - *Nikkiso Co., Ltd.*, Yasushi Fujishima - *Nikkiso Co., Ltd.*, Shinichiro Ejiri - *Nikkiso Co., Ltd.*, Masahiro Miyabe - *Osaka Institute of Technology*

Clogging Behavior of Different Impeller Types of Sewage Pumps at Speed Variation

Technical Paper Publication: FEDSM2022-87023

Enrico Müller - *KSB SE / TU Berlin*, Thomas Pensler - *KSB SE & Co. KGaA*, Paul Uwe Thamsen - *TU Berlin*

Hydraulic Design and Optimization of Multistage Pumps

Technical Presentation Only: FEDSM2022-87764

Ralph Peter Mueller - *CFturbo, Inc.*, Sascha Henoch - *CFturbo GmbH*

04-02 CAVITATION AND BUBBLY FLOWS

3:45PM–5:45PM - NIAGARA

Chair: **William Straka** - Penn State University

Chair: **Robert Kunz** - Penn State University

Study on the Entrainment Behaviors of the Droplet Jet Between Plates Considering the Hydrophobicity of the Plate

Technical Paper Publication: FEDSM2022-86006

GuangHang Wang - *Institute of Mechanics, Chinese Academy of Sciences*, Jian Huang - *Chinese Academy of Sciences*, Jingzhu Wang - *Institute of Mechanics, Chinese Academy of Sciences*, Yiwei Wang - *Institute of Mechanics, Chinese Academy of Sciences*

On the Transition Between Re-Entrant Jet and Condensation Shock Mechanism in Sheet to Cloud Cavitation

Technical Paper Publication: FEDSM2022-87588

Diego Vaca Revelo - *Worcester Polytechnic Institute*, Aswin Gnanaskandan - *Worcester Polytechnic Institute*

An Experimental Investigation of Deformable Bubbles in Intense Turbulence

Technical Presentation Only: FEDSM2022-86944

Chris Hwang - *Johns Hopkins University*, Xu Xu - *Johns Hopkins University*, Shiyong Tan - *Johns Hopkins University*, Rui Ni - *Johns Hopkins University*

Cleaning Effect of Bubbles Impacting Tilted Walls Under Acoustic Waves

Technical Paper Publication: FEDSM2022-86897

Alireza Hooshanginejad - *Cornell University*, Tim Sheppard - *Cornell University*, Janeth Manyalla - *Cornell University*, John Jaicks - *Cornell University*, Sunghwan Jung - *Cornell University*

Technical Sessions

Investigation of Drag Reduction by Bubbles Using Simultaneous Measurement of Wall Shear Stress, Liquid Phase Velocity, and Bubble Distribution

Technical Paper Publication: FEDSM2022-87600

Takamichi Hiroi - National Maritime Research Institute, Chiharu Kawakita - National Maritime Research Institute

03-02-02 BIO-INSPIRED AND BIOMEDICAL FLUID MECHANICS 3:45PM-5:45PM BALLROOM A

Chair: Deify Law - California State University, Fresno
Chair: Stefan Aus Der Wiesche - University of Applied Sciences Muenster
Chair: Philipp Epple - Coburg University of Applied Sciences
Chair: Javid Bayandor - The State University of New York
Chair: Jun Chen - Purdue University
Chair: Kamran Siddiqui - University of Western Ontario

Effect of Physical Partitions on Spread of Respiratory Droplets

Technical Paper Publication: FEDSM2022-87681

Aarthi Sekaran - SUNY Polytechnic Institute

Interactions of Aerosol Droplets With Ventilated Airflows in the Context of Airborne Pathogen Transmission

Technical Paper Publication: FEDSM2022-87739

Steven Schroeder - University of Central Florida, Bernhard Stiehl - University of Central Florida, Juanpablo Delgado - University of Central Florida, Rajendra Shrestha - University of Central Florida, Michael Kinzel - University of Central Florida, Kareem Ahmed - University of Central Florida

Aerodynamics of Straight Rods at Low Reynolds Numbers in a Quiescent Fluid to Model Settling of Microfibers in the Atmosphere

Technical Presentation Only: FEDSM2022-87916

Daniel Daramsing - York University, Amirhossein Hamadi - York University, Roozbeh Alishahian - York University, Ronald Hanson - York University, Eric Ward - York University, Mark Gordon - York University, Liisa Jantunen - Environment and Climate Change Canada

Computational Modeling of the Effects of Total Inferior or Middle Turbinectomy on the Heat and Moisture Transfer, and Microparticle Filtration in a Human Nasal Cavity

Technical Presentation Only: FEDSM2022-87729

Nima Behzadzadeh - Shiraz University, Sasan Sadrizadeh - KTH University, Goodarz Ahmadi - Clarkson University, Omid Abouali - KTH University

Experimental Investigation of Hybrid Propulsion Mechanism for Robotic Fish

Technical Paper Publication: FEDSM2022-87961

Abdulrahman Aly - American University of Sharjah, Mohamad Omari - American University of Sharjah, Mehdi Ghommem - American University of Sharjah, Lotfi Romdhane - American University of Sharjah

05-01-03 APPLIED CFD 3:45PM-5:45PM KINGSWAY (2ND FL)

Chair: Zhongquan Zheng - Utah State University
Chair: Philipp Epple - Coburg University of Applied Sciences
Chair: Ning Zhang - McNeese State University
Chair: Kamran Siddiqui - University of Western Ontario
Chair: Haibo Dong - University of Virginia
Chair: Sijun Zhang - Advanced Simulation and Modeling, Inc.
Chair: Georg Scheuerer - IsimQ GmbH

On to Quantifying the Effect of Droplet Size Distribution on the Airborne Transmission of the Virus

Technical Paper Publication: FEDSM2022-87718

Rajendra Shrestha - University of Central Florida, Juanpablo Delgado - University of Central Florida, Douglas Fontes - University of Central Florida, Bernhard Stiehl - University of Central Florida, Jonathan Reyes - University of Central Florida, Steven Schroeder - University of Central Florida, Kareem Ahmed - University of Central Florida, Michael Kinzel - University of Central Florida

Numerical Evaluation of Thermo-Physical Properties of Dielectric Coolants for Improved Thermal Performance of Immersion Cooled Li-Ion Batteries for Electric Vehicles

Technical Presentation Only: FEDSM2022-97579

Prahit Dubey - Romeo Power Technology, Gautam Pulugundla - Romeo Power Technology, Aishwarya Krishnan - Romeo Power Technology

Numerical Analysis to Study the Effect of Control Temperature Location Inside a Datacenter

Technical Paper Publication: FEDSM2022-87885

Atta Ul Mannan Hashmi - *College of Electrical & Mechanical Engineering*, Arshan Ahmed Tipu - *College of Electrical & Mechanical Engineering*, Fahad Rafi Butt - *Digital Pakistan Lab*, Imran Akhtar - *College of Electrical & Mechanical Engineering*, Muhammad Saif Ullah Khalid - *University of Alberta*

Optimization of an Elliptical Fairing in the Wake of a D-Shaped Bluff Body

Technical Paper Publication: FEDSM2022-87937

Luis Amaya - *University of Central Florida*, George Loubimov - *University of Central Florida*, Michael Kinzel - *University of Central Florida*

Numerical Analysis of Turbulent Density Current Over Sloping Rough Surfaces Using Large Eddy Simulation

Technical Presentation Only: FEDSM2022-96797

Ishan Bhattarai - *The University of Texas at San Antonio*, Kiran Bhaganagar - *The University of Texas at San Antonio*

THURSDAY AUGUST 4, 2022

8-01 WHO'S WHO COMPETITION PRESENTATIONS WILL BE DISPLAYED THROUGHOUT EACH DAY ONTARIO/NIAGARA FOYER

Chair: Zhongquan Zheng - *Utah State University*

Fürth Laboratory: Improved Ocean Current and Wave Energy Harvesting Through High Fidelity Numerical Modeling

Technical Presentation Only (WW): FEDSM2022-97694

Ahmed Hamada - *Texas A&M University*, Mirjam Fürth - *Texas A&M University*

Prof. Ronald Hanson's Fluid Mechanics and Flow Control Laboratory and Team

Technical Presentation Only: FEDSM2022-98007

Ronald Hanson - *York University*, Vahid Nsar Esfahani - *University of Toronto*

High Fidelity Modeling of Multiphase Flows for Engineering and Biomedical Applications

Technical Presentation Only: FEDSM2022-97504

Aswin Gnanaskandan - *Worcester Polytechnic Institute*

04-04 GAS-LIQUID FLOWS

10:15AM-12:15PM

NIAGARA

Chair: Thomas Shepard - *University of St. Thomas*

Chair: Robert Kunz - *Penn State University*

Chair: Bertrand Rollin - *Lawrence Livermore National Laboratory*

Chair: Bernhard Vowinckel - *TU Braunschweig*

Chair: Arshia Merdasi - *Pennsylvania State University*

Cavity Ripples Associated With Entrapped Liquid Film Repellence

Technical Paper Publication: FEDSM2022-86783

Christian Mulbah - *Jiangsu University*, Ning Mao - *Jiangsu University*, Yongchao Zhang - *Jiangsu University*, Can Kang - *Jiangsu University*, Shuang Teng - *Jiangsu University*

Experimental and Numerical Study on Solid Particle Erosion of Standard Elbows in Dispersed-Bubble Flow

Technical Paper Publication: FEDSM2022-86965

Faris Bilal - *The University of Tulsa*, Mazen Othayq - *The University of Tulsa*, Thiana Sedrez - *The University of Tulsa*, Siamack Shirazi - *The University of Tulsa*

Characterization of Droplet Dynamics in the Presence of a Wedge-Shaped Bluff Body

Technical Presentation Only: FEDSM2022-87819

Cody Kellogg - *University of Western Ontario*, Kamran Siddiqui - *University of Western Ontario*

Characterizing of Droplet Detachment in a Turbulent Airflow

Technical Presentation Only: FEDSM2022-87833

Cody Kellogg - *University of Western Ontario*, Kamran Siddiqui - *University of Western Ontario*

Experimental Investigation in Turbulent Shear Mixing Layer at Supercritical Condition

Technical Paper Publication: FEDSM2022-87029

Chang Hyeon Lim - *Georgia Institute of Technology* Stephen Johnston - *Georgia Institute of Technology*, Devesh Ranjan - *Georgia Institute of Technology*

05-02-01 CFD METHODS

10:15AM-12:15PM

KINGSWAY (2ND FL)

Chair: Zhongquan Zheng - *Utah State University*
Chair: Philipp Epple - *Coburg University of Applied Sciences*
Chair: Kamran Siddiqui - *University of Western Ontario*
Chair: Haibo Dong - *University of Virginia*
Chair: Sijun Zhang - *Advanced Simulation and Modeling, Inc.*
Chair: Georg Scheuerer - *IsimQ GmbH*

CFD Development of an Independent Adjoint Solver

Technical Paper Publication: FEDSM2022-86845

Sijun Zhang - *Advanced Simulation and Modeling, Inc.*, Yu Liu - *Beijing Institute of Space Mechanics & Electricity*, Wei Jiang - *Beijing Institute of Space Mechanics & Electricity*, He Jia - *Beijing Institute of Space Mechanics & Electricity*, Wei Huang - *Beijing Institute of Space Mechanics & Electricity*

Development of Additional Material Transport to Augmented Reality Sandbox Algorithm to Model Pollution and Contaminant Runoff

Technical Paper Publication: FEDSM2022-86712

Tyler Ainsworth - *University of North Carolina at Charlotte*, Elizabeth Smith - *University of North Carolina at Charlotte*

A-Step an Accurate Approach for Reducing Computational Time in Tracking of Random Particles

Technical Presentation Only: FEDSM2022-88406

Mark Parker - *Maple Key Labs*, Anthony Straatman - *University of Western Ontario*, Eric Savory - *University of Western Ontario*

Evaluation of Flow and Heat Transfer During Compression Stroke in a Porous Material Using MVCEF Solving Method

Technical Paper Publication: FEDSM2022-86938

Inès Marzougui - *University of Monastir*, Ramla Gheith - *University of Monastir*, Houda Hachem - *Energy Research and Technology Center*, Fethi Aloui - *Université Polytechnique Hauts-de-France*

01-03-01 ENVIRONMENTAL FLOWS

10:15AM-12:15PM - ONTARIO

Chair: Ravinder Yerram - *GE*

Scientific and Technological Perspectives on Decarbonising Energy

Keynote: FEDSM2022-99846

Nedunchezian Swaminathan - *University of Cambridge*

How to Test the Operation and Monitoring of Critical Wastewater Infrastructure in a Laboratory Environment

Technical Paper Publication: FEDSM2022-84601

David Konstantin Tilcher - *TU Berlin*, Christopher Bölter - *TU Berlin*, Max Mühlefeldt - *TU Berlin*, Paul Uwe Thamsen - *TU Berlin*

Usage of Clear Water Pumps in Wastewater Treatment Plants: Field Study

Technical Paper Publication: FEDSM2022-86885

Yvonne Holzbauer - *Andritz AG*, Paul-Uwe Thamsen - *TU Berlin*

LES Investigation of Pollution Dispersion in a Street Canyon

Technical Paper Publication: FEDSM2022-87197

Jedhathai Boontanom - *Virginia Tech*, Danesh Tafti - *Virginia Tech*

A Micro-Scale Computational Investigation on the Effects of Leaf Hair on PM2.5 Deposition

Technical Paper Publication: FEDSM2022-87200

Jedhathai Boontanom - *Virginia Tech*, Danesh Tafti - *Virginia Tech*

03-09-01 TURBULENT FLOWS (1/3)

10:15AM–12:15PM

BALLROOM A

Chair: **Jun Chen** - Purdue University

Chair: **Keith Walters** - University of Arkansas

Dynamical Theory of Wall-Bounded Turbulent Flows

Technical Paper Publication: FEDSM2022-86887

Taewoo Lee - Arizona State University

Wall Roughness Effects on Turbulent Flow Past a Near-Wall Square Cylinder

Technical Paper Publication: FEDSM2022-86954

Heath Chalmers - University of Manitoba, Xingjun Fang - University of Manitoba, Mark Tachie - University of Manitoba

Effects of an Impingement Plate Upon the Turbulent Velocity of a Two Parallel Plane Jet With a Periodic Vortex Shedding Phenomenon

Technical Paper Publication: FEDSM2022-86847

Soichiro Hiromasa - Doshisha University, Shumpei Hara - Doshisha University, Kyoji Inaoka - Doshisha University

Atmospheric Turbulence Intermittency Effects on Remote Sensing Laser Propagation

Technical Paper Publication: FEDSM2022-86958

Arturo Rodriguez - The University of Texas at El Paso, Venkata Gudimetla - Air Force Research Laboratory, Richard Adansi - The University of Texas at El Paso, Jose Terrazas - The University of Texas at El Paso, Vicente Corral - The University of Texas at El Paso, Christopher Harris - Imperial College London, Vinod Kumar - The University of Texas at El Paso, Rafael Baez - The University of Texas at El Paso, Brandon Paez - The University of Texas at El Paso

A Study of Second Moment Closure Modeling for Stratified Wakes Using DNS Ensembles

Technical Paper Publication: FEDSM2022-86979

Naman Jain - The Pennsylvania State University, Xinyi Huang - The Pennsylvania State University, Xiang Yang - The Pennsylvania State University, Robert Kunz - The Pennsylvania State University

02-01-02 FLUID MEASUREMENT AND INSTRUMENTATION, UNCERTAINTY QUANTIFICATION

10:15AM–12:15PM

BALLROOM B

Chair: **Soroor Karimi** - The University of Tulsa

Chair: **Ivaylo Nedyalkov** - University of New Hampshire

Chair: **Yang Liu** - East Carolina University

The Measurement of Velocity Distribution of a Liquid Sheet Formed by Two Impinging Jets via Particle Tracking Velocimetry

Technical Paper Publication: FEDSM2022-87925

Weixiao Shang - Purdue University

Jun Chen - Purdue University

Study on Measurement Accuracy of State Parameters in Leakage Process of Supercritical CO₂ Pipeline

Technical Paper Publication: FEDSM2022-86864

Xiaolu Guo - Hefei General Machinery Research Institute Co., Ltd., Zhichao Fan - Hefei General Machinery Research Institute Co., Ltd., Shuangqing Xu - Hefei General Machinery Research Institute Co., Ltd., Yunfeng Wang - Hefei General Machinery Research Institute Co., Ltd., Shuai Yu - Dalian University of Technology

Experimental Study on Heat Transfer Performance and Flow Pattern in Micro-Fin Tubes and 1EHT Three-Dimensional Heat Exchange Tubes

Technical Paper Publication: FEDSM2022-87580

Hong Cheng - Qingdao University of Science and Technology, Yu Gao - Qingdao University of Science and Technology, Wei Li - Zhejiang University, David Kukulka - State University of New York College at Buffalo

Intraventricular Vector Flow Mapping With Data Fusion and Uncertainty Quantification

Technical Presentation Only: FEDSM2022-87711

Cathleen M. Nguyen - University of Washington, Bahetihazi Maidu - University of California, San Diego, Darrin J. Wong - University of California, San Diego, Sachiyo Igata - University of California, San Diego, Christian Chazo - Hospital Gregorio Maranon, Pablo Martinez-Legazpi - Hospital Gregorio Maranon, Javier Bermejo - Hospital Gregorio Maranon, Andrew M. Kahn - University of California, San Diego, Anthony Demaria - University of California, San Diego, Juan C. Del Alamo - University of Washington

Technical Sessions

04-05 LIQUID-SOLID FLOWS

1:30PM-3:30PM

NIAGARA

Chair: **Mark R. Duignan** - Savannah River National Laboratory
Chair: **Robert Kunz** - Penn State University
Chair: **Goodarz Ahmadi** - Clarkson University
Chair: **Bertrand Rollin** - Lawrence Livermore National Laboratory
Chair: **Bernhard Vowinckel** - TU Braunschweig

Blockage of the Deep-Sea Mining Pump Transporting Large Particles With Different Configurations

Technical Paper Publication: FEDSM2022-86315

Shuang Teng - Jiang University, **Can Kang** - Jiangsu Univeristy, **Minghui Li** - Jiangsu University, **Sheng Zhang** - National Pump Product Quality Inspection Center (Shandong), **Kejin Ding** - Shanghai Marine Equipment Research Institute

Experimental and Modeling Study of Sand Transport in Slightly Upward Inclined Solid-Liquid Flow

Technical Paper Publication: FEDSM2022-86786

Ronald Vieira - The University of Tulsa, **Siamack Shirazi** - The University of Tulsa

Investigation of Volume-of-Fluid Method to Simulate Melting-Solidification of CMAS Particles

Technical Paper Publication: FEDSM2022-85863

Brendon Cavainolo - University of Central Florida, **Michael Kinzel** - University of Central Florida

06-04 MODELING AND SIMULATION IN MICROFLUIDICS

1:30PM-3:30PM

BALLROOM B

Chair: **Jeff Darabi** - Southern Illinois University Edwardsville
Chair: **Debjyoti Banerjee** - Texas A&M University

Geometric Analysis of Insect Wing Vein Network

Technical Paper Publication: FEDSM2022-87031

Jacob White - University of Nebraska at Omaha, **Ying Hu** - University of Nebraska at Omaha, **Sangjin Ryu** - University of Nebraska-Lincoln, **Seunghee Kim** - University of Nebraska-Lincoln, **Haipeng Zhang** - University of Nebraska-Lincoln

Numerical Analysis of Dielectrophoretic-Based DNA Separation and Trapping

Technical Paper Publication: FEDSM2022-87076

Jeff Darabi - Southern Illinois University Edwardsville

Internal Flow of Sessile Droplets Evaporating on Heated Hydrophobic and Superhydrophobic Substrates

Technical Paper Publication: FEDSM2022-87601

Jingbo Chen - China Tobacco Hunan Industrial Co., Ltd., **Zhenhai Pan** - Shanghai Jiao Tong University, **Zhiguo Wang** - China Tobacco Hunan Industrial Co., Ltd., **Jun Cao** - China Tobacco Hunan Industrial Co., Ltd., **Wen Du** - China Tobacco Hunan Industrial Co., Ltd., **Jialing Yu** - Shanghai Jiao Tong University

Effect of Single Nanoparticle Diameter on a Nanochannel Fluid Flow and Heat Transfer

Technical Paper Publication: FEDSM2022-86966

Isaias Gonzalez - California State University, Fresno, **Deify Law** - California State University, Fresno

01-05-01 FLUID POWER SYSTEMS

1:30PM–3:30PM

ONTARIO

Chair: **Ravinder Yerram** - GE

Chair: **Kevin Anderson** - California State Polytechnic University, Pomona

Chair: **Aarthi Sekaran** - SUNY Polytechnic Institute Technical

Chair: **Ernesto Primero** - Chevron

On the Effects of Volute Tongue on Turbocharger Radial Turbine

Technical Paper Publication: FEDSM2022-86319

Roberto Mosca - KTH Royal Institute of Technology, **Mihai Mihaescu** - KTH Royal Institute of Technology

Development and Experimental Study of Ultra-High Pressure Abrasive Water Cutting Equipment for Deep-Sea Sunken Ship

Technical Paper Publication: FEDSM2022-86880

Zhengwen Chen - Hefei General Machinery Research Institute Co., Ltd., **Qile Ren** - Hefei General Machinery Research Institute Co., Ltd., **Jinxin Su** - Hefei General Machinery Research Institute Co., Ltd., **Yongqiang Wang** - Hefei General Machinery Research Institute Co., Ltd., **Shengxiang Xue** - Hefei General Machinery Research Institute Co., Ltd., **Caihong Han** - Hefei General Machinery Research Institute Co., Ltd.

Time-Resolved Measurements for the Detection of Clogging Mechanisms

Technical Paper Publication: FEDSM2022-86961

David Beck - Technical University of Berlin, **Florian Brokhausen** - Technical University of Berlin, **Paul Uwe Thamsen** - Technical University of Berlin

Supercritical Carbon Dioxide Opposing Piston Expander Design and Analysis Using Simscape

Technical Paper Publication: FEDSM2022-80756

Frederick Mitri - California State Polytechnic University, **Kevin Anderson** - California State Polytechnic University, **Chris Mcnamara** - California State Polytechnic University, **Mariano Rubio** - Citrus College

Porous Media Model Parameter Development in Flame Arrestor Applications Numerical Study

Technical Paper Publication: FEDSM2022-86102

Hoden Farah - Emerson, **Bartley De La Houssaye** - Emerson, **Juan Diaz** - Emerson, **Frank Lu** - The University of Texas at Arlington

Numerical Simulation on Application of Airfoil Cross-Section Rod of Pantograph

Technical Paper Publication: FEDSM2022-87608

Mohan Zhang - Institute of Mechanics, Chinese Academy of Sciences, **Bo Yin** - Institute of Mechanics, Chinese Academy of Sciences, **Guowei Yang** - Institute of Mechanics, Chinese Academy of Sciences

03-09-02 TURBULENT FLOWS (2/3)

1:30PM–3:30PM

BALLROOM A

Chair: **Jun Chen** - Purdue University

Chair: **Keith Walters** - University of Arkansas

Comparison of Turbulent Flow Characteristics of Round and Square Oscillating Twin Jets

Technical Presentation Only: FEDSM2022-87059

Maziar Mosavati - University of Windsor, **Ronald Barron** - University of Windsor, **Ram Balachandar** - University of Windsor

Effect of the Rear Geometry on the Flow Structure and Drag of the Ahmed Body

Technical Paper Publication: FEDSM2022-87396

Trevor Harley - Ontario Tech University, **Naseeb Ahmed Siddiqui** - Ontario Tech University, **Martin Agelin-Chaab** - Ontario Tech University

Surface Roughness and Trip Effects for a Circular Cylinder at Subcritical Reynolds Numbers

Technical Presentation Only: FEDSM2022-87441

Vidushan Rajavarotheyam - York University, **Ronald Hanson** - York University, **Philippe Lavoie** - University of Toronto Institute for Aerospace Studies, **Vahid Nasr Esfahani** - York University, **Kevin Quan** - Kevin Quan Studios

Vortex Identification in Large Eddy Simulations Under the Lattice Boltzmann Framework With a Smagorinsky Subgrid Model

Technical Paper Publication: FEDSM2022-87534

Khodr Jaber - University of Toronto, **Ebenezer Essel** - University of Toronto, **Pierre Sullivan** - University of Toronto

The Effects of Aspect Ratio on Turbulence Wake Flow Over Right Trapezoidal Prism

Technical Paper Publication: FEDSM2022-87640

Jinhao Kang - University of Manitoba, Sedem Kumahor - University of Manitoba, Amir Sagharichi - University of Manitoba, Mark Tachie - University of Manitoba

05-02-04 CFD METHODS

1:30PM-3:30PM

KINGSWAY (2ND FL)

Chair: Zhongquan Zheng - Utah State University
Chair: Philipp Epple - Coburg University of Applied Sciences
Chair: Kamran Siddiqui - University of Western Ontario
Chair: Haibo Dong - University of Virginia
Chair: Sijun Zhang - Advanced Simulation and Modeling, Inc.
Chair: Georg Scheuerer - IsimQ GmbH

Is it Turbulent or Laminar? Convolutional Neural Network Predictions

Technical Paper Publication: FEDSM2022-87412

Nicholas Dudu - The University of Texas at El Paso, Arturo Rodriguez - The University of Texas at El Paso, V.M. Krushnarao Kotteda - The University of Texas at El Paso, Jose Terrazas - The University of Texas at El Paso, Daniel Villanueva - The University of Texas at El Paso, Clinton Chijioke - The University of Texas at El Paso, Rafael Baez - The University of Texas at El Paso, Brandon Paez - The University of Texas at El Paso, Vinod Kumar - The University of Texas at El Paso

Mesh Adaptability Technique for Canonical Turbulent Jet Flows via Reinforcement Learning

Technical Paper Publication: FEDSM2022-87413

Brandon Paez - The University of Texas at El Paso, Arturo Rodriguez - The University of Texas at El Paso, V.M. Krushnarao Kotteda - The University of Texas at El Paso, Ashesh Chattopadhyay - Rice University, Jose Terrazas - The University of Texas at El Paso, Rafael Baez - The University of Texas at El Paso, Vinod Kumar - The University of Texas at El Paso

Applying Physics-Informed Neural Network to Solve Navier-Stokes Equations for Laminar Flow Around a Solid Particle

Technical Paper Publication: FEDSM2022-87468

Beichao Hu - Florida International University, Maria Presa-Reyes - Florida International University, Pratik Mahyawansi - Florida International University, Shu-Ching Chen - Florida International University, Cheng-xian Lin - Florida International University

Data-Driven Dynamical System Models of Roughness-Induced Secondary Flows in Thermally Stratified Boundary Layers

Technical Paper Publication: FEDSM2022-87630

Christoffer Hansen - Aarhus University, Xiang Yang - Pennsylvania State University, Mahdi Abkar - Aarhus University

03-07 HIGH-SPEED FLOWS

3:45PM-5:45PM

BALLROOM A

Chair: Stefan Aus Der Wiesche - University of Applied Sciences Muenster
Chair: Philipp Epple - Coburg University of Applied Sciences
Chair: Jun Chen - Purdue University
Chair: Kamran Siddiqui - University of Western Ontario
Chair: Deify Law - California State University, Fresno

Numerical Investigation of a Rotating Double Compression Ramp Intake

Technical Paper Publication: FEDSM2022-87753

Lubna Margha - Texas A&M University, Ahmed Hamada - Texas A&M University, Othman Ahmed - Badr University in Cairo, Ahmed Eltaweel - University of Science and Technology - Zewail City

Shock System Dynamics of a Morphing Bump Over a Flat Plate

Technical Paper Publication: FEDSM2022-87504

Ahmed A. Hamada - Texas A&M University, Lubna Margha - Texas A&M University, Mohamed M. Abdelrahman - Cairo University, Amr Gaily - Nile University

Dynamic Transition From Mach to Regular Reflection Over a Moving Wedge

Technical Paper Publication: FEDSM2022-87754

Lubna Margha - Texas A&M University, Ahmed Hamada - Texas A&M University, Ahmed Eltaweel - University of Science and Technology - Zewail City

Modeling Intricate Unsteady Flow Field Development of a Self-Contained Novel Entry, Descent, Landing and Locomotion Planetary Exploration Module

Technical Paper Publication: FEDSM2022-87904

Alexandra Nordmann - *University at Buffalo*, Trinity Blackman - *University at Buffalo - The State University of New York*, Javid Bayandor - *University at Buffalo - The State University of New York*

Aerodynamic Performance of Symmetric and Cambered Airfoils at Low Reynolds Numbers

Technical Paper Publication: FEDSM2022-86960

Abdiel Cruz - *The University of Texas at El Paso*, Arturo Rodriguez - *The University of Texas at El Paso*, V.M. Krushnarao Kotteda - *The University of Texas at El Paso*, Brandon Paez - *The University of Texas at El Paso*, Daniel Villanueva - *The University of Texas at El Paso*, Clinton Chijioke - *The University of Texas at El Paso*, Jose Terrazas - *The University of Texas at El Paso*, Vinod Kumar - *The University of Texas at El Paso*

Aerodynamic Behavior of Bent Microfibers to Support Predictive Modelling of Atmospheric Transport

Technical Presentation Only: FEDSM2022-87947

Amirhossein Hamidi - *York University*, Daniel Daramsing - *York University*, Roozbeh Alishahian - *York University*, Ronald E. Hanson - *York University*, Eric Ward - *York University*, Mark Gordon - *York University*, Liisa Jantunen - *Environment and Climate Change Canada*

04-06 GAS-SOLID FLOWS

3:45PM–5:45PM

NIAGARA

Chair: Goodarz Ahmadi - *Clarkson University*
 Chair: Philipp Epple - *Coburg University of Applied Sciences*
 Chair: Kamran Siddiqui - *University of Western Ontario*
 Chair: Bertrand Rollin - *Lawrence Livermore National Laboratory*
 Chair: Bernhard Vowinckel - *TU Braunschweig*
 Chair: Robert Kunz - *Penn State University*

Ventilation System Performance on the Removal of Respiratory Droplets Emitted During Speaking

Technical Paper Publication (Iran): FEDSM2022-87732

Morteza Ali Masoomi - *Shahid Bahonar University of Kerman*, Mazyar Salmazadeh - *Shahid Bahonar University of Kerman*, Goodarz Ahmadi - *Clarkson University*

A Numerical Study on the Effect of Carrier Fluid Subgrid Scales Fluctuations on Deposition and Dispersion of Lagrangian Particles

Technical Paper Publication: FEDSM2022-87651

Farid Rousta - *Clarkson University*, Bamdad Lessani - *University of North Carolina at Charlotte*, Goodarz Ahmadi - *Clarkson University*

Effect of Microfiber Length on Microfiber Motion in Human Nasal Airways

Technical Paper Publication: FEDSM2022-87037

Jiang Li - *RMIT University*, Jiawei Ma - *Fusetec 3D Pty. Ltd.*, Jiyuan Tu - *RMIT University*, Lin Tian - *RMIT University*, Goodarz Ahmadi - *Clarkson University*

05-04 COMPUTATIONAL MODELING IN SWIMMING AND FLYING 3:45PM–5:45PM KINGSWAY (2ND FL)

Chair: Chengyu Li - *Villanova University*
 Chair: Philipp Epple - *Coburg University of Applied Sciences*
 Chair: Zhongquan Zheng - *Utah State University*
 Chair: Kamran Siddiqui - *University of Western Ontario*
 Chair: Haibo Dong - *University of Virginia*
 Chair: Sijun Zhang - *Advanced Simulation and Modeling, Inc.*
 Chair: Rajat Mittal - *University of South Florida*
 Chair: Georg Scheuerer - *IsimQ GmbH*

A Balance Between Odor Intensity and Odor Perception Range in Odor-Guided Flapping Flight

Technical Paper Publication: FEDSM2022-85407

Menglong Lei - *Villanova University*, Chengyu Li - *Villanova University*

Modeling and Computation of Batoid Swimming Inspired Pitching Impact on Wake Structure and Hydrodynamic Performance

Technical Paper Publication: FEDSM2022-86684

Alec Menzer - *University of Virginia*, Chengyu Li - *Villanova University*, Frank Fish - *West Chester University*, Yuchen Gong - *University of Virginia*, Haibo Dong - *University of Virginia*

Hydrodynamics of Metachronal Motion: Effects of Spatial Asymmetry on the Flow Interaction Between Adjacent Appendages

Technical Paper Publication: FEDSM2022-86967

Zhipeng Lou - *Villanova University*, Adrian Herrera-Amaya - *Pennsylvania State University*, Margaret Byron - *Pennsylvania State University*, Chengyu Li - *Villanova University*

Computational Modeling and Hydrodynamic Analysis of Fish Schools in Three-Dimensional Arrangements

Technical Paper Publication: FEDSM2022-87690

Yu Pan - *University of Virginia*, Wei Zhang - *University of Virginia*, Haibo Dong - *University of Virginia*

Effect of Phase Difference on Wake Characteristics and Propulsive Performance of Pitching Foils in Side-by-Side Configurations

Technical Paper Publication: FEDSM2022-87980

Ahmet Gungor - *University of Alberta*, Muhammad Said Ullah Khalid - *University of Alberta*, Arman Hemmati - *University of Alberta*

Dynamic Mode Decomposition Analysis of the Effect of Morphing on Bio-Inspired Propulsive Efficiency

Technical Presentation Only: FEDSM2022-87966

Wei Zhang - *University of Virginia*, Alec Menzer - *University of Virginia*, Haibo Dong - *University of Virginia*

05-01-04 APPLIED CFD

3:45PM–5:45PM

ONTARIO

Chair: Zhongquan Zheng - *Utah State University*
Chair: Philipp Epple - *Coburg University of Applied Sciences*
Chair: Ning Zhang - *McNeese State University*
Chair: Kamran Siddiqui - *University of Western Ontario*
Chair: Haibo Dong - *University of Virginia*
Chair: Sijun Zhang - *Advanced Simulation and Modeling, Inc.*
Chair: Georg Scheuerer - *IsimQ GmbH*

Nusselt Number Dependence on Aspect Ratio and Rayleigh Number: A Numerical Study of Rayleigh-Benard Instability

Technical Paper Publication: FEDSM2022-87897

Wajeeda Siddiqui - *National University of Science and Technology, Islamabad*, Zafar Abbas - *National University of Science and Technology, Islamabad*, Imran Akhtar - *National University of Science and Technology, Islamabad*, Muhammad Saif Ullah Khalid - *University of Alberta*

Numerical Investigation of Automotive Paint Oven for Improving the Thermal Efficiency

Technical Paper Publication: FEDSM2022-88044

Mohammad-Reza Pendar - *University of Beira Interior*, José Carlos Páscoa - *University of Beira Interior*, Rui Lima - *CCenergia Lda*

Aerodynamic Analysis of the Utility Truck With the Morphing Boom Equipment

Technical Paper Publication: FEDSM2022-88368

Parth Patel - *The University of Alabama at Birmingham*, Thannathorn Jannoi - *The University of Alabama at Birmingham*, Wenhui Zou - *The University of Alabama at Birmingham*, Vladimir Vantsevich - *The University of Alabama at Birmingham*, Roy Koomullil - *The University of Alabama at Birmingham*

The Effect of Phase Interaction Forces and Particle Rotation on Solid Particle Erosion in Liquid-Solid and Liquid-Gas-Solid Flows

Technical Paper Publication: FEDSM2022-86755

Thiana Sedrez - *The University of Tulsa*, Siamack Shirazi - *The University of Tulsa*

Numerical and Experimental Investigations of the Effect of Distance Between Two Elbows in Series in Gas-Solid Flows on Solid Particle Erosion

Technical Paper Publication: FEDSM2022-86729

Mazen M. Othayq - *The University of Tulsa*, Faris S. Bilal - *The University of Tulsa*, Thiana A. Sedrez - *The University of Tulsa*, Siamack A. Shirazi - *The University of Tulsa*

THURSDAY AUGUST 4, 2022

03-06 FLUID-STRUCTURE INTERACTION

10:15AM–12:15PM

BALLROOM B

Chair: Deify Law - *California State University, Fresno*

Chair: Stefan Aus Der Wiesche - *University of Applied Sciences Muenster*

Chair: Jun Chen - *Purdue University*

Chair: Bei Fan - *Michigan State University*

Impact of Aspect Ratio on Drag and Flow Structure for Cylinders With Two Free Ends

Technical Paper Publication: FEDSM2022-87706

Thomas Shepard - *University of St. Thomas*, Deify Law - *California State University, Fresno*, Jacob Dahl - *University of St. Thomas*, Rhett Reichstadt - *University of St. Thomas*, Arun Srinivas Selvamani - *California State University, Fresno*

Effect of the Macroscale on the Dynamics of a Slender Flexible Cylinder in Cross-Flow

Technical Paper Publication: FEDSM2022-86824

Felipe Condo - *Escuela Superior Politecnica del Litoral*, Jorge Silva-Leon - *Escuela Superior Politecnica del Litoral*, Andrea Cioncolini - *The University of Manchester*

Application of Proper Orthogonal Decomposition to Study the Flow Over an Oscillating Flag

Technical Paper Publication: FEDSM2022-86969

Rodrigo Padilla - *University of Idaho*, Vibhav Durgesh - *University of Idaho*, Tao Xing - *University of Idaho*

FSI of a Cantilever Beam: FVM-FEM and Neural Network Analysis

Technical Paper Publication: FEDSM2022-87636

Clinton Chijioke - *The University of Texas at El Paso*, Arturo Rodriguez - *The University of Texas at El Paso*, Andres Enriquez - *The University of Texas at El Paso*, Vinod Kumar - *The University of Texas at El Paso*, Vivek Tandon - *The University of Texas at El Paso*, Jose Terrazas - *The University of Texas at El Paso*, Daniel Villanueva - *The University of Texas at El Paso*, V.M. Krushnarao Kotteda - *The University of Texas at El Paso*

Pumped Storage Plant (PSP) Bajina Basta: Numerical and Field Tests of Hydraulic Transients – Case Studies

Technical Paper Publication: FEDSM2022-87698

Zdravko Giljen - *University Belgrade Mechanical Faculty*

Numerical Study of a Cross Parachute Using Fluid-Structure Interaction Method

Technical Paper Publication: FEDSM2022-86770

Yu Liu - *Beijing Institute of Space Mechanics & Electricity*, Wei Jiang - *Beijing Institute of Space Mechanics & Electricity*, He Jia - *Beijing Institute of Space Mechanics & Electricity*, Wei Huang - *Beijing Institute of Space Mechanics & Electricity*, Sijun Zhang - *Advanced Simulation and Modeling, Inc.*

03-04-02 FLOW MANIPULATION AND ACTIVE CONTROL

10:15AM–12:15PM

BALLROOM A

Chair: Mojtaba Jarrahi - *University of Paris-Saclay*

Chair: Stefan Aus Der Wiesche - *University of Applied Sciences Muenster*

Chair: Philipp Epple - *Coburg University of Applied Sciences*

Chair: Jun Chen - *Purdue University*

Chair: Kamran Siddiqui - *University of Western Ontario*

Chair: Hassan Peerhossaini - *Université de Paris*

Chair: Deify Law - *California State University, Fresno*

Energy Harvesting Improvement of a Flexible Airfoil With Active Control

Technical Paper Publication: FEDSM2022-87779

Kiana Kamrani Fard - *Oregon State University*, James Liburdy - *Oregon State University*

Technical Sessions

Are Active Fluids Age-Dependent?

Technical Paper Publication: FEDSM2022-87914

Zahra Samadi - *Western University at Ontario*, Malihe Mehdizadeh Allaf - *Western University at Ontario*, Thomas Vourc'h - *Université Clermont Auvergne, Institut Pascal*, Christopher T. Degroot - *Western University*, Hassan Peerhossaini - *Western University*

Comparative Analysis of Step Change and Reduced Slew Rate Input on the Boundary Layer Response to Forcing by an Array of Plasma Actuator Vortex Generators

Technical Paper Publication: FEDSM2022-87953

Michael Varacalli - *York University*, Hossein Khanjari - *York University*, Ronald Hanson - *York University*

Effect of Periodic Flow Acceleration on the Drag of a Circular Cylinder at Subcritical Reynolds Numbers

Technical Presentation Only: FEDSM2022-87958

Andrew Shin - *York University*, Ronald Hanson - *York University*

Aerodynamic Control With Multiple Array Dielectric Barrier Discharge Plasma Actuators

Technical Paper Publication: FEDSM2022-88011

Sam Gustin - *Ontario Tech University*, Martin Agelin-Chaab - *Ontario Tech University*

02-01-03 EXPERIMENTAL FACILITIES, DATA PROCESSING, AND ALGORITHMS

10:15AM-12:15PM

ONTARIO

Chair: Alexandros Kontogiannis - *University of Cambridge*
Chair: Ivaylo Nedyalkov - *University of New Hampshire*
Chair: Soroor Karimi - *The University of Tulsa*
Chair: Yang Liu - *East Carolina University*

Quantifying Line-of-Sight Profile Nonuniformity Effect on Laser Absorption Spectroscopy Temperature Measurement via Data Analysis

Technical Paper Publication: FEDSM2022-87538

Kang Ruiyuan - *Khalifa University*, Panos Liatsis - *Khalifa University*, Dimitrios Kyritsis - *Khalifa University*

Robust Strain/Rotation-Rate Tensor Reconstruction Based on Least Squares RBF-QR for 3D Lagrangian Particle Tracking

Technical Paper Publication: FEDSM2022-87861

Lanyu Li - *University of Waterloo*, Nazums Sakib - *Utah State University*, Zhao Pan - *University of Waterloo*

Microfluidic Viscometer for Measuring the Viscosity of Small Volume Non-Newtonian Liquid Samples

Technical Presentation Only: FEDSM2022-87919

Wasim Kapadia - *University of Waterloo*, Ning Qin - *University of Waterloo*, Pei Zhao - *University of Waterloo*, Chau-Minh Phan - *University of Waterloo*, Lacey Haines - *University of Waterloo*, Lyndon Jones - *University of Waterloo*, Carolyn Ren - *University of Waterloo*

Design and Evaluation of an Active Yaw and Turbulence Generation System to Model On-Road Transients in a Wind Tunnel

Technical Presentation Only: FEDSM2022-87977

Germiel Cacho - *York University*, Joshua Marques - *York University*, Ronald Hanson - *York University*, David Van Every - *Aiolos Engineering Corporation.*, Peter Waudby-Smith - *Aiolos Engineering Corporation*

Development of Droplet Erosion Testing Facility

Technical Paper Publication: FEDSM2022-86916

Keldon Anderson - *The University of Tulsa*, Soroor Karimi - *The University of Tulsa*, Siamack Shirazi - *The University of Tulsa*

05-02-02 CFD METHODS

10:15AM-12:15PM

NIAGARA

Chair: Zhongquan Zheng - *Utah State University*
Chair: Philipp Epple - *Coburg University of Applied Sciences*
Chair: Kamran Siddiqui - *University of Western Ontario*
Chair: Haibo Dong - *University of Virginia*
Chair: Sijun Zhang - *Advanced Simulation and Modeling, Inc.*
Chair: Georg Scheuerer - *IsimQ GmbH*

Applications of Spectral Proper Orthogonal Decomposition in Flow and Acoustics Analysis

Technical Presentation Only: FEDSM2022-97696

Zhongquan Zheng - *Utah State University*, Jerry Zhou - *Utah State University*

Validation of Low and High-Fidelity Turbulence Models for Prediction of Turbulent Heat Transfer in Low Prandtl Number Flows Under Buoyant and Separated Flow Conditions

Technical Paper Publication: FEDSM2022-86863

Mohammed El Mellouki - Mississippi State University, Shanti Bhushan - Mississippi State University, Christopher Pilmaier - Mississippi State University, Keith Walters - University of Arkansas, Michael Gorman - Texas A&M University, Brent Hollrah - Texas A&M University, Yassin Hassan - Texas A&M University, Elia Mezrari - Pennsylvania State University, Aleksandr Obabko - Argonne National Laboratory, Milorad Dzodzo - Westinghouse Electric Company LLC

Flow Simulation and Investigation Around a Estate Vehicle Using Hybrid Methods

Technical Paper Publication: FEDSM2022-86921

Francois Delassaux - M2N-CNAM, Iraj Mortazavi - M2N-CNAM, Vincent Herbert - Stellantis, Charles Ribes - Stellantis

A Wall-Modeled Large Eddy Simulation Method for High-Order Spectral Element Solvers

Technical Paper Publication: FEDSM2022-87742

D. Keith Walters - University of Arkansas, Shanti Bhushan - Mississippi State University, Wayne Strasser - Liberty University

A Method for Numerical Evaluation of Singular Integrals in Curved Hexahedra and With High-Order Source Functions

Technical Paper Publication: FEDSM2022-86742

Adrin Gharakhani - Applied Scientific Research, Mark J. Stock - Applied Scientific Research

03-10 VORTEX DYNAMICS

1:30PM-3:30PM

BALLROOM B

Chair: **S.A. Sherif** - University of Florida
 Chair: **Stefan Aus Der Wiesche** - University of Applied Sciences Muenster
 Chair: **Philipp Epple** - Coburg University of Applied Sciences
 Chair: **Fethi Aloui** - University of Valenciennes (ENSIAME)
 Chair: **Jun Chen** - Purdue University
 Chair: **Kamran Siddiqui** - University of Western Ontario

Vortex Structure Generated by a Sweeping Jet in a Cross Flow and its Creation Process

Technical Paper Publication: FEDSM2022-87002

Masaki Fuchiwaki - Kyushu Institute of Technology, Surya Raghu - Advanced Fluidics LLC

Large Eddy Simulation Study on the Application of a Whisker Structure to the Lip of a Trailing Edge Cutback

Technical Paper Publication: FEDSM2022-87552

Yuxi Luo - Harbin Institute of Technology, Fengbo Wen - Harbin Institute of Technology, Pierre Sullivan - University of Toronto, Songtao Wang - Harbin Institute of Technology, Zhongqi Wang - Harbin Institute of Technology

Effect of Actively-Controlled Trailing Edge Flap Upon Airfoil Energy Harvester

Technical Paper Publication: FEDSM2022-87577

Jordan Strahl - Oregon State University, James Liburdy - Oregon State University

Energy Harvesting Performance of Thick Oscillating Airfoils Using a Discrete Vortex Model

Technical Paper Publication: FEDSM2022-87617

Kiana Kamrani Fard - Oregon State University, Vickie Ngo - Oregon State University, Deborah Pence - Oregon State University, James Liburdy - Oregon State University

04-08 EROSION, SLURRY, SEDIMENTATION

1:30PM-3:30PM

ONTARIO

Chair: **Prashant Khare** - University of Cincinnati
 Chair: **Mark R Duignan** - Savannah River National Laboratory
 Chair: **Robert Kunz** - Penn State University
 Chair: **Bertrand Rollin** - Lawrence Livermore National Laboratory
 Chair: **Bernhard Vowinckel** - TU Braunschweig

Technical Sessions

A CFD Study on the Effects of Sand Particle Size on Erosion of an Elbow

Technical Paper Publication: FEDSM2022-86962

Ghulam Haider - *The University of Tulsa*, Thiana Sedrez - *The University of Tulsa*, Siamack Shirazi - *The University of Tulsa*

Jet Erosion of Particle Beds: Projecting Critical Suspension Velocities From Effective Clearing / Cleaning Radii

Technical Paper Publication: FEDSM2022-85965

Leonard F. Pease - *Pacific Northwest National Laboratory*, Judith Ann Bamberger - *Pacific Northwest National Laboratory*, Michael J. Minette - *Pacific Northwest National Laboratory*

Sand Erosion Measurements and Simulations Under Churn Flow Conditions in Elbows in Series

Technical Paper Publication: FEDSM2022-87714

Yeshwanth Raj Rajkumar - *The University of Tulsa*, Soroor Karimi - *The University of Tulsa*, Siamack Shirazi - *The University of Tulsa*

03-09-03 TURBULENT FLOWS (3/3)

1:30PM–3:30PM

BALLROOM A

Chair: Jun Chen - *Purdue University*

Organic Vapor as an Interesting Fluid for Compressible Flow Turbulence Research

Technical Paper Publication: FEDSM2022-87545

Stefan Aus Der Wiesche - *Muenster University of Applied Sciences*

Detached Eddy Simulation of the 28° Ahmed Body at a Low Reynolds Number

Technical Paper Publication: FEDSM2022-87647

Naseeb Ahmed Siddiqui - *Ontario Tech University*, Martin Agelin-Chaab - *Ontario Tech University*

Turbulent Characteristics of the Wake Flow Around Rectangular and Trapezoidal Prisms in Uniform Flow

Technical Paper Publication: FEDSM2022-87650

Jinhao Kang - *University of Manitoba*, Sedem Kumahor - *University of Manitoba*, Amir Sagharichi - *University of Manitoba*, Mark Tachie - *University of Manitoba*

Comparison of the Unsteady Fluctuation Characteristics Between Different Blade Arrangements in a Regenerative Flow Pump

Technical Presentation Only: FEDSM2022-96836

Qianqian Li - *Changzhou University*, Dongsheng Zhu - *Changzhou University*

The Methods for Predicting the Transition of Boundary Layer and Their Applications

Technical Paper Publication: FEDSM2022-86768

Qi Li - *Beijing Institute of Spacecraft System Engineering*, Yu Liu - *Beijing Institute of Space Mechanics & Electricity*, Sijun Zhang - *Advanced Simulation and Modeling, Inc.*

Fluid-Structure Dynamics of Body/Parachute Interactions

Technical Paper Publication: FEDSM2022-86788

Joanna Zhang - *Northrop Grumman*

05-02-03 CFD METHODS

1:30PM–3:30PM

NIAGARA

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Development of a Finite Element Solver Including a Level-Set Method for Modeling Hydrokinetic Turbines

Technical Paper Publication: FEDSM2022-87877

Ahmed Hamada - *Texas A&M University*, Mirjam Fürth - *Texas A&M University*

Immersed Boundary Method Implemented in LES for Flow Past a Sphere at Subcritical Reynolds Numbers

Technical Paper Publication: FEDSM2022-88624

H. Ali Marefat - *Memorial University of Newfoundland*, **Jahrul Alam**
- *Memorial University of Newfoundland*, **Kevin Pope** - *Memorial University of Newfoundland*

Inferring Unsteady Wake Flow Fields From Partial Data by Physics-Informed Neural Networks

Technical Paper Publication: FEDSM2022-86945

Yan Chang - *University of Chinese Academy of Science*, **Shengjun Ju**
- *Institute of Mechanics, Chinese Academy of Sciences*, **Dilong Guo**
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Physics-Informed Long-Short Term Memory Neural Network Performance on Holloman High-Speed Test Track Sled Study

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Jose Perez - *The University of Texas at El Paso*, **Rafael Baez** - *The University of Texas at El Paso*, **Jose Terrazas** - *The University of Texas at El Paso*, **Arturo Rodriguez** - *The University of Texas at El Paso*, **Daniel Villanueva** - *The University of Texas at El Paso*, **Olac Fuentes** - *The University of Texas at El Paso*, **Vinod Kumar** - *The University of Texas at El Paso*, **Brandon Paez** - *The University of Texas at El Paso*, **Abdiel Cruz** - *The University of Texas at El Paso*

Field Predictions of Hypersonic Cones Using Physics-Informed Neural Networks

Technical Paper Publication: FEDSM2022-86957

Daniel Villanueva - *The University of Texas at El Paso*, **Brandon Paez**
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Co-Chair: **Deify Law**

Cal State University Fresno

European Co-Chair: **Stefan aus der Wiesche**

FH Münster University

Track 4 Multiphase Flow

Chair: **Robert Kunz**

The Pennsylvania State University

Co-Chair: **Bertrand Rollin**

Embry Riddle University

European Co-Chair: **Bernhard Vowinckel**

Technical University of Braunschweig

Track 5 Computational Fluid Dynamics

Chair: **Haibo Dong**

University of Virginia

Co-Chair: **Sijun Zhang**

ESI CFD, Inc.

Track 6 Micro & Nano Fluid Dynamics

Chair: **Mohammad Hossan**

University of Central Oklahoma

Co-Chair: **Rasim Guildiken**

University of Florida

Track 7 Flow Visualization Competition

Chair: **Philipp Epple**

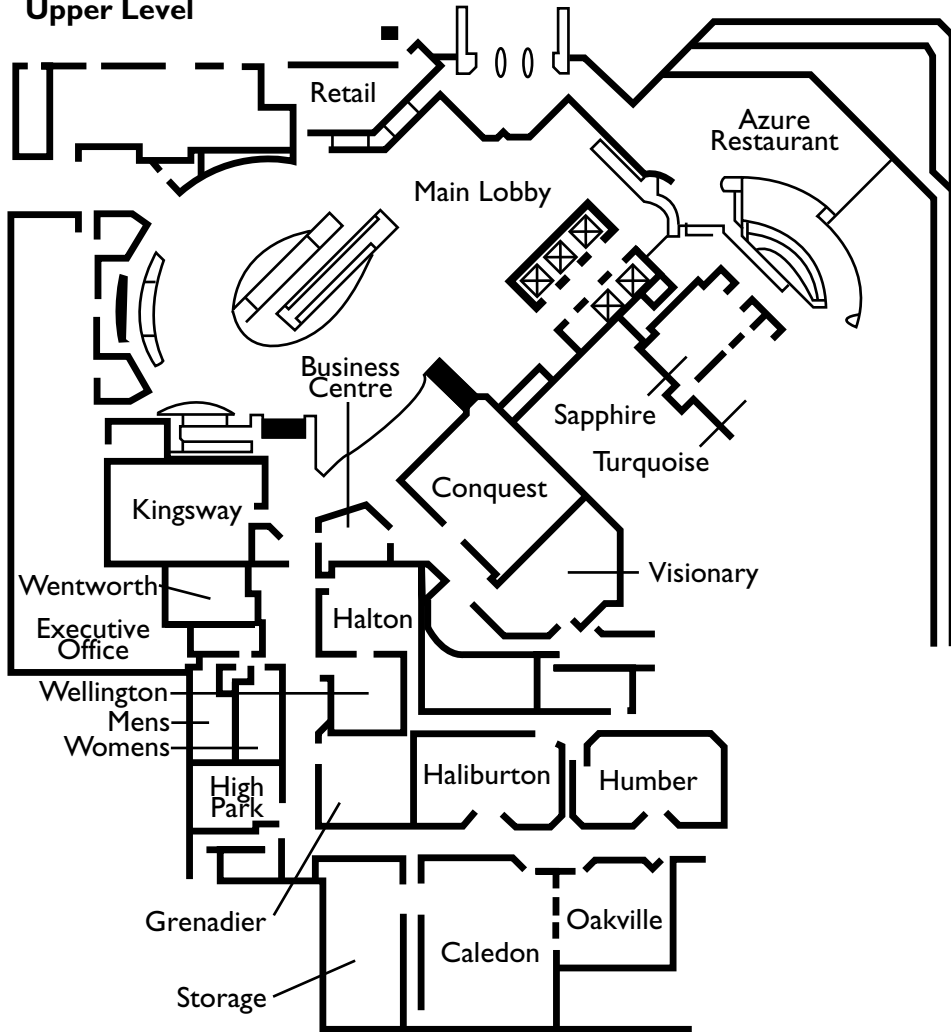
Coburg University of Applied Sciences

Track 8 Who's Who Competition

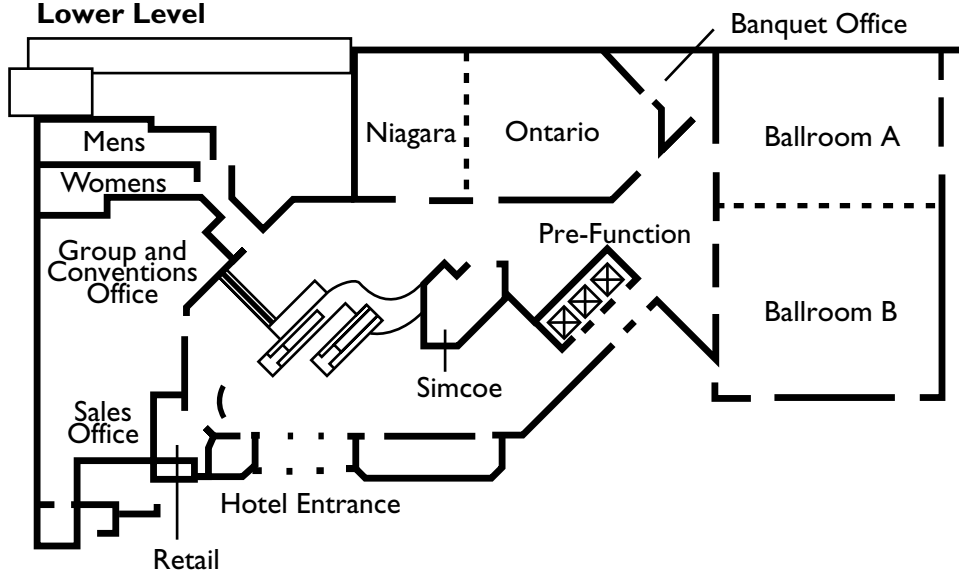
Chair: **Zhongquan Charlie Zheng**

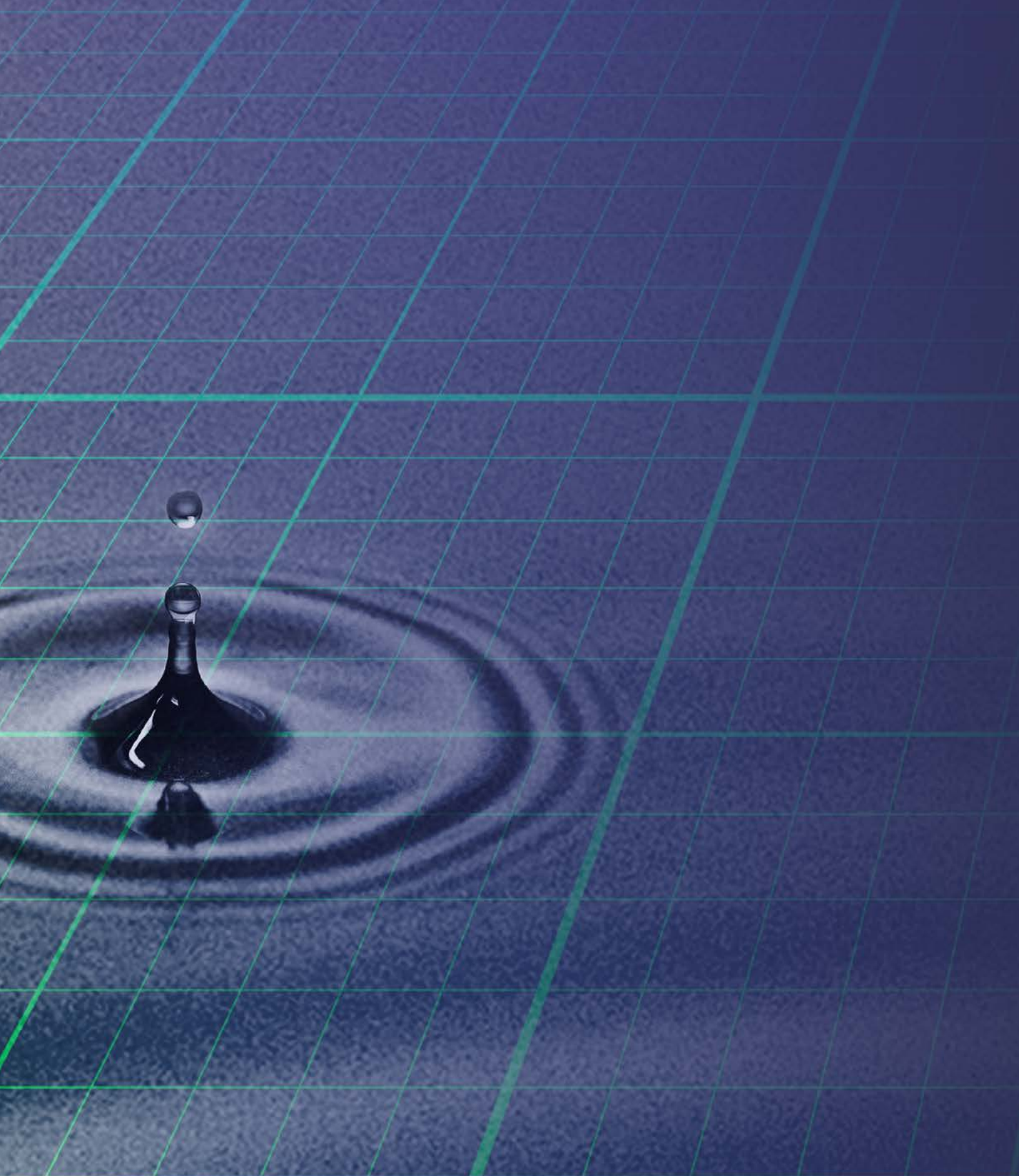
Utah State University

Upper Level



Lower Level





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