Conference Program

ASTFE

5–6TH THERMAL AND FLUIDS ENGINEERING CONFERENCE (VIRTUAL)

May 26–28, 2021

www.astfe.org/tfec2021/

Preface

The **2021 American Society of Thermal and Fluids Engineers (ASTFE) Conference** will be held on May 26-28, 2021. While we were planning to hold our meeting in beautiful New Orleans LA, due to ongoing COVID-19 concerns, the conference will be a virtual conference held entirely online. Because the 5th Thermal Fluids Engineering Conferences (TFEC) was postponed due to COVID-19 pandemic, the 2021 conference will be a combination of the 5th and 6th TFEC to accommodate papers transferred from 2020.

ASTFE is the premier international society by and for professionals within the thermal and fluids science and engineering community. The 2021 ASTFE conference provides an international forum for the dissemination of the latest research and knowledge in the thermal and fluid sciences.

Authors are invited to submit abstracts covering, but not limited to, the following areas:

- Advanced Energy Systems
- Aerospace Applications
- Biomimetic and Bioinspired Engineering
- Combustion, Fire and Fuels
- Computational Methods/Tools in Thermal-Fluid Systems
- Cryogenics
- Electric, Magnetic, Flow and ThermalPhenomena in Micro and Nano-Scale Systems
- Energy and Sustainability
- Energy Storage Systems
- Energy-Water-Food Nexus
- Engineering Equipment and Environmental Systems
- Engineering Fundamentals and Methodology
- Experimental Methods/Tools and Instrumentation in Fluid Mechanics and Heat/Mass Transfer
- Flow and Heat Transfer in Biological/Biomedical Systems
- Flow and Heat Transfer in Materials Processing Science and Manufacturing
- Flow in Internal Multiphase Flows
- Flow Instability
- Fluid Flow and Heat Transfer in Industrial and Commercial Processes
- Fluid Flow and Heat Transfer Multiphase Phenomena
- Fluid Measurements and Instrumentation
- Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids
- Fuel Cells
- Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer
- Heat Exchangers: Compact, Novel, Networks
- Heat Pipes
- Heat Pumps
- Heat/Mass Transfer Enhancement Techniques
- Industry Problems: CO2 Capture
- Material Issues, Ceramics, Low Thermal Conductivity
- Measurement and Modeling of Environmental Flows
- Multiphase Flow
- Nano and Micro Fluids Applications
- Natural and Built Environments
- Plasma Physics and Engineering
- Refrigeration, Air Conditioning Systems, and Refrigerants
- Solar Energy Equipment and Processes
- Thermo-economic Analysis of Energy Systems
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- Turbulent Flows
- Wind Turbines Aerodynamics and Control

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About ASTFE

The American Society of Thermal and Fluids Engineers (ASTFE) is a U.S. nonprofit organization based in New York City. The organization is operating to arrange professional communications, support conferences and professional communities. It is supported by individual contributors, private foundations and other governmental bodies. ASTFE supports the Open Access movement.

Mission

ASTFE aims at providing opportunities to promote the dissemination of information and knowledge regarding thermal and fluids engineering, both nationally and internationally. It aligns itself with globally collaborative activities in the traditional areas of heat transfer and fluids engineering, as well as, in emerging areas such as those related to energy, environmental sustainability, manufacturing, thermal management, and micro- and nano-scale transport phenomena.

ASTFE encourages the personal and professional development of young scientists and engineers, and promotes cooperation with other engineering and technical societies to enhance interactions with industry, government agencies and the public at large. Of particular interest to the Society is the organization of conferences and workshops that bring together diverse groups in these fields.

Vision

The long-term vision of the society is to be a leading organization to bring thermal and fluids engineers together to exchange ideas and present results to impact on new, emerging and challenging problems in research and technology. It is focused on international collaborations, strong interactions with industry and providing a dynamic atmosphere for young and upcoming researchers and engineers in this field.

History

ASTFE was established in July 2014 to promote the science and applications of thermal and fluids engineering and related disciplines. ASTFE cooperates with several awards, such as the William Begell Medal, the Nukiyama Memorial Award, and the Global Energy International Prize.

The William Begell Medal is made possible by the support of the Executive Committee of the International Centre for Heat and Mass Transfer (ICHMT) and the Assembly for International Heat Transfer Conferences (AIHTC) and the generosity of Begell House Inc.

The Nukiyama Memorial Award has been established and sponsored by the Heat Transfer Society of Japan to commemorate outstanding contributions by Shiro Nukiyama as an excellent heat transfer scientist. Nukiyama addressed the challenges of the boiling phenomena and published a pioneering paper which clarified these phenomena in the form of the Nukiyama curve (boiling curve).

The Global Energy Prize annually honors outstanding achievements in energy research and technology from around the world that are helping address the world's various and pressing energy challenges. The Global Energy Prize, founded in 2002, is awarded to the most accomplished minds in the research world.

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Thermal Fluids Engineering Award

A Thermal and Fluids Engineering Award has been established to recognize substantial contributions to thermal and fluids engineering. This is the part of the honors bestowed by the society on its members for their contributions.

2021 TFEC AWARD WINNER

Joseph Katz

Department of Mechanical Engineering, Johns Hopkins University

Extensive publication on rotating flows with applications to gas turbine technology and air-sea interactions.

Experimental fluid mechanics. Cavitation phenomena and multiphase flows: Interaction between bubbles and flow structure, mixing mechanisms and droplet formation in water-fuel stratified shear flows. Transport of microscopic particles and droplets in turbulent flows. Development of optical flow diagnostics techniques, including Particle Image Velocimetry (PIV) and Holographic Particle Image Velocimetry (HPIV). Applications to turbomachine flows and oceanography. Studies of flow-induced vibrations and noise.

Long-standing service the mechanical engineering profession through the ASME Fluids Engineering Division and various Society-level appointments.

2020 TFEC AWARD WINNER

Yogesh Jaluria

Department of Mechanical and Aerospace Engineering, Rutgers-New Brunswick, The State University of New Jersey

Extensive publications of a fundamental and applied nature in convective heat transfer. Author of highly referenced books on free convection, engineering optimization, materials processing, computational heat transfer and manufacturing. Career-long service to the engineering education and the mechanical engineering profession, including the founding presidency of the ASTFE.

Leadership in engineering education via various appointments at Rutgers University.

Plenary Speakers

NORMA JEAN MATTEI

Affiliation: Department of Civil Engineering, University of New Orleans

Title: Come Hell or High Water: the Historic Floods of 2019 – Management of the Mighty Mississippi River

Abstract: The Mighty Mississippi River's watershed is the world's third largest, draining all or part of 32 US states (41% of the country) and two Canadian provinces. Twenty million people in over 50 cities depend directly on the River for their drinking water. The watershed overlays the world's most productive cropland, producing 90% of our country's agricultural exports and contributing billions of dollars to the US economy. The Mississippi continues, as it did in Mark Twain's time, to be the watery superhighway that carries bulk goods such as farm produce to foreign markets – usually. The historic rains and associated flooding of 2019 impacted life on the Mississippi. From May of 2018 through April of 2019, the contiguous US experienced its wettest year in over 124 years of record-keeping. Farmers were impacted by too much rain and flooded fields. Flooding crippled river commerce by limiting or halting river navigation due to severe high water. Perhaps the most worrisome facet of this year's high water, especially for New Orleans, is that it extended deep into the summer months. Typically the Mississippi River's annual high water season has ended before June 1, the start of the hurricane season. Factor a major hurricane's storm surge on top of an already high river, and the Mississippi River levees could be overtopped. Just how did we manage all of this water in 2019? And, perhaps, more importantly, how should we "manage" the Mighty Mississippi in the future?

Bio: Norma Jean Mattei, PhD, PE, is a Professor in the Department of Civil and Environmental Engineering at the University of New Orleans. In the past she has served as Chair of the Department of Civil Engineering and Interim Dean of the College of Engineering at UNO. She now serves as one of two civilian civil engineer Commissioners of the seven-member Mississippi River Commission, nominated by President Obama. She is the 2017 President of the American Society of Civil Engineers. Norma Jean also has chaired several National Council of Examiners for Engineers and Surveyors (NCEES) committees, most recently the NCEES Education Committee. She was named by the Governor of Louisiana to Louisiana's licensing board for professional engineers, LAPELS, and served as Chairman of that Board during the final year of her term in 2011-12. She is a lifelong resident of New Orleans, married to Richard Louis Mattei and is the proud mom of Helen Claycomb, PE in civil/structural engineering, and Genevieve Mattei, a biomedical engineer.

Day 2 — May 27, 2021
1:15-2:30 PM — TFEC Plenary Lecture

S. BALACHANDAR

Affiliation: Department of Mechanical & Aerospace Engineering, University of Florida

Title: Using Machine Learning to Solve Complex Multiphase Flows at Unprecedented Resolution

Abstract: Euler-Lagrange point-particle (EL-PP) technique has been increasingly employed for solving particle, droplet and bubble-laden flows. Since flow around the individual particles is not resolved, the accuracy of the technique depends on the fidelity of the force law used for representing the fluid-particle momentum exchange that occurs at the microscale. The main focus of this talk is the use of emerging machine learning techniques along with physical insight into methods that can yield fully-resolved accuracy at six orders of magnitude lower cost.

The traditional applicability of the standard EL-PP approach has however been limited to (i) particles of size much smaller than the grid scale and (ii) dilute flows where inter-particle interaction is weak. In this talk we will discuss recent fundamental developments that begin to ease these limitations. With increasing numerical resolution, as the grid size approaches the particle size, we face the unpleasant prospect of force law becoming less accurate. This is due to the self-induced flow generated at the particle location, which corrupts the estimation of undisturbed flow velocity that is needed in the force evaluation. We will discuss theoretical approached to properly correcting for the self-induced flow. We will also present the data-driven pairwise interaction extended point-particle (PIEP) model which rigorously extends the point-particle technique to higher volume fractions. This model systematically accounts for the precise location of all the neighboring particles in computing the hydrodynamic force on each particle. We will also present results from application of deep learning where the algorithm is trained to predict multiphase flow and its implication to subgrid modeling.

Bio: S. "Bala" Balachandar got his undergraduate degree in Mechanical Engineering at the Indian Institute of Technology, Madras in 1983 and his MS and PhD in Applied Mathematics and Engineering at Brown University in 1985 and 1989. From 1990 to 2005 he was at the University of Illinois, Urbana-Champaign, in the Department of Theoretical and Applied Mechanics. From 2005 to 2011 he served as the Chairman of the Department of Mechanical and Aerospace Engineering at the University

of Florida. Currently he is a distinguished professor at the University of Florida. He is the William F. Powers Professor of Mechanical & Aerospace Engineering and the Director of College of Engineering Institute for Computational Engineering.

Bala received the Francois Naftali Frenkiel Award from American Physical Society (APS) Division of Fluid Dynamics (DFD) in 1996 and the Arnold O. Beckman Award and the University Scholar Award from University of Illinois. He is Fellow of ASME and the American Physical Society Division of Fluid Dynamics. He was the recipient of ASME Freeman Fellow in 2017 and Gad Hetsroni Senior Award from IVMF in 2019. He is currently the co-editor-in-chief of the International Journal of Multiphase Flow and a handling editor of the Theoretical and Computational Fluid Dynamics.

Day 1 — May 26, 2021
9:00-10:00 AM — TFEC Plenary Lecture

JOSEPH KATZ

Affiliation: Department of Mechanical Engineering, Johns Hopkins University

Title: On the Breakup and Transport of Crude Oil slicks by Surface Waves and Subsurface Plumes

Abstract: The presentation summaries the findings of a series of laboratory studies aimed at characterizing the breakup surface crude oil slicks and subsurface oil plumes along with mechanisms affecting the resulting droplet size distributions. For crude oil slicks, where the breakup is dominated by turbulent shear, the characteristic droplet size distribution can be modeled using classical Weber number-based Hinze scaling. Once entrained, the temporal evolution of the concentration and size distribution of these droplets can be modeled effectively as combined effects of turbulent diffusion and buoyant rise. In contrast, mixing the crude oil with Corexit 9500 dispersant, which drastically reduces the oil-water interfacial tension, decreases the characteristic droplet scales to the micron range in a phenomenon – tip streaming, that cannot be modeled based on turbulence length scales. Continued fragmentation of entrained oil-dispersant droplets under the influence of mild residual turbulence long after the wave breaking can also be attributed to tip streaming. Aerosolization of oil is caused both by the initial wave breaking splash and by subsequent bubble bursting, as entrained bubbles rise back to the surface. Premixing the oil with dispersant increases the concentration of airborne nano-droplets by one to two orders of magnitude, raising potential health concern. In contrast, the dispersant causes a reduction in concentration of volatile organic compounds, consistent with prior studies. In subsurface oil jets exposed to cross flow, the plume width is dominated by interactions of the droplets with the counter-rotating vortex pair dominating the near field of this jet. Small droplets are entrained into the core of these vortices and define the lower boundary of the plume while large droplets escape and define the upper bounds. Hence, dispersants alter the entire configuration of the plume, increasing the fraction of oil entrained into the vortex pair, and lowering the upper boundary of the plume. The droplet sizes, location of plume breakup, and even the plume scales are Reynolds- or Weber-number dependent. Entrainment of water filaments generates oil-water compound droplets, i.e. oil droplets containing multiple smaller water droplets, causing a significant increase in the oil-water interfacial area.

Bio: Joseph Katz received his B.S. degree from Tel Aviv University, and his M.S. and Ph.D. from California Institute of Technology, all in mechanical engineering. He is the William F. Ward Sr. Distinguished Professor of Engineering, and the director and co-founder of the Center for Environmental and Applied Fluid Mechanics at Johns Hopkins University. He is a Member of the National Academy of Engineering, as well as a Fellow of the American Society of Mechanical Engineers (ASME) and the American Physical Society. He has served as the Editor of the Journal of Fluids Engineering, and as the Chair of the board of journal Editors of ASME. He has co-authored more than 350 journal and conference papers. Dr. Katz research extends over a wide range of fields, with a common theme involving experimental fluid mechanics, and development of advanced optical diagnostics techniques for laboratory and field applications. His group has studied laboratory and oceanic boundary layers, flows in turbomachines, flow-structure interactions, swimming behavior of marine plankton in the laboratory and in the ocean, as well as cavitation, bubble, and droplet dynamics, the latter focusing on interfacial phenomena associated with oil spills.

Day 2 — May 27, 2021
9:00-10:00 AM — TFEC Plenary Lecture

OM SHARMA

Affiliation: Aerodynamics and Gas Turbines, United Technologies Research Center (UTRC)

Title: The Recent Advancements and Aero-thermal Challenges for Modern Aeroengines

Abstract: Significant improvements in the performance, durability and structural integrity of gas turbine engines has been achieved through the application of controlled numerical and physical experiments. The focus of these experiments has mostly been towards improving the main gas path portion of various components of the engine. There is, however, still a need to address the present day challenges of developing engines with limited resources and operating them in non-ideal environments

In this presentation, critical contributions made to enhance the performance of each component of an engine, are discussed. Opportunities to further improve each component through enhanced understanding of loss generation mechanisms are also identified. Examples are provided to demonstrate that adverse interactions between adjacent components can result in a significant increase in the time and cost of development of an engine. Timely conducted, high-fidelity simulations can be used to predict and manage these interactions. Multi-disciplinary simulations can also be utilized to further improve the durability and structural integrity of an engine.

The importance of developing improved understanding and modeling of the secondary flow-path in an engine is highlighted and identified as one of the critical elements necessary to develop advanced gas turbine engines. There is also a need to quantify and account for the impact of the operating environment and the local weather during the design and validation phases of an engine development.

An extensive amount of data are generated during the design, validation and operation of an engine. There is a need to assemble and interrogate these data to generate guidelines for improved operation and future designs. Data analytic techniques and machine learning can be utilized to develop enhanced understanding of the physical mechanisms which can then be further used to reduce the cost of ownership of an engine.

Bio: Dr. Sharma received his Bachelors and Masters degrees in Mechanical Engineering from Indian Institute of Technology, New Delhi in India and his Ph.D. in Mechanical Engineering from the Birmingham University in Birmingham UK.

He joined Pratt & Whitney, East Hartford Connecticut in 1977 in Turbine Technology Group. In 1992 he was transferred to the Fans and Compressor Group as Chief of Aerodynamics. In 1998 he joined United Technologies Research Center as the Director of Modeling Simulation Analysis and Computational (MASC) initiative to enhance product development efforts in various divisions of the United Technology Corporation. He went back of Pratt & Whitney in 2000 to set up Center of Excellence in Aerodynamics to support the development of advanced commercial and military engines. Since 2007, he has been at the United Technologies Research Center as the Senior Technical Fellow in Aerodynamics and Gas Turbines.

He has made significant contributions to enhance the design processes used in axial flow turbines by utilizing a combination of physical and numerical experiments. He pioneered the use 3-D airfoils, clocking of airfoil rows, clocking of combustor generated hot-streaks to turbine first vanes to enhance the performance, and durability as well as structural integrity of turbines. He led the introduction of CFD based multi-stage codes to improve the performance and operability in fans and compressors including active stall avoidance demonstration in an operational gas turbine engine. In addition to providing assistance in solving tough technical problems, his current focus is on providing leadership in developing new design concepts to improve gas turbine engines by utilizing advanced high fidelity numerical simulations and controlled experiments.

Honors & Awards:

- 2019 R. Tom Sawyer Award "for contributions at the forefront of turbomachinery technology development in advanced engines for military and commercial applications through career efforts that have championed and harnessed the best available physics based analysis methods to pioneer step changes in turbomachinery capability"
- International Gas Turbine Institute Scholar Award (2011)
- International Gas Turbine Institute Aircraft Engine Technology Award (2007)
- Distinguished Alumni Award from Indian Institute of Technology, New Delhi, India (1999), presented by the Board of Governors of Indian Institute of Technology New Delhi in recognition of outstanding technical achievements in developing high performance propulsion systems for aircrafts and rockets
- United Technologies Corporation's George Mead Medal (1995) presented to Dr. Sharma and a co-worker for outstanding technical achievement in developing and demonstrating compressor stability management and control system in gas turbine engines
- Pratt & Whitney Special Award (1989) presented for outstanding contribution to the advancement of Science and Technology in developing low pressure turbine airfoil design criteria that allowed 1% improvement in Low Pressure Turbine efficiencies operating at altitude cruise conditions

Day 3 — May 28, 2021
9:00-10:00 AM — TFEC Plenary Lecture

Keynote Speakers

EFSTATHIOS E. (STATHIS) MICHAELIDES

Affiliation: Department of Engineering, Texas Christian University

Title: Substitution of Fossil Fuels with Renewables – a Sustainability Conundrum?

Abstract: A common misconception in the substitution of fossil fuels with renewables for the generation of electric power is that the amount of electric energy supplied from wind and solar sources may be increased without limit. The production of electricity from wind energy is intermittent, the production from solar irradiance is periodically variable and, oftentimes, the supply is not sufficient to satisfy the demand. In addition, the installation of large numbers of solar and wind units and the generation of a higher fraction of the total annual energy from renewables in a region meets a barrier during periods of time when the power produced by the renewable sources is high and exceeds the demand of the electricity grid. At present, this limit is reached when solar and wind units produce 25-30% of the annual quantity of electric energy used in a region. Solutions to this problem for a higher penetration of renewables in the marketplace include large scale energy storage.

This presentation examines the causes and effects of the U-shaped demand curve (the duck curve). The analysis is based on hourly data for the supply of electricity from PV cells and wind turbines and the regional demand for energy and power. The hourly energy demand is analyzed and balanced with the supply of energy. Energy storage systems ensure that sufficient energy is available to the consumers at all levels of the demand. Hourly data are presented for the demand, the supply, and the storage system capacity in the following cases:

- A region of an electric grid that includes several cities, with thousands of buildings and significant industrial output.
- The entire electricity grid of Texas (ERCOT).

Results are presented on the hourly, daily, and seasonal storage requirements; on the energy production and consumption for the wider market penetration of wind and solar units within a region; and the effect of the substitution of fossil fuels with renewables on the price of electricity in a region; and the effect on the goals for a sustainable future.

Bio: Professor Stathis Michaelides currently holds the Tex Moncrief Chair of Engineering at Texas Christian University (TCU). He was awarded a B.A. degree (honors) from Oxford University and M.S. and Ph.D. degrees from Brown University. He was awarded a M.A. degree honoris causa from Oxford University (1983); the Casberg and Schillizzi Fellowships at St. Johns College, Oxford; the student chapter ASME/Phi,Beta,Tau excellence in teaching award (1991 and 2001); the Lee H. Johnson award for teaching excellence (1995) at Tulane; a Senior Fulbright Fellowship (1997); the ASME Freeman Scholar award (2002); the Outstanding Researcher award at Tulane (2003); the ASME Outstanding Service citation (2007); the ASME Fluids engineering award (2014); and the ASME 90th Anniversary of FED Medal, 2016. He has also been the Chair of the Faculty Senate at TCU (2015-2016).

Professor Michaelides has authored more than 150 journal papers; gave more than 250 presentations in national and international conferences; and has authored six books. His latest book on Energy, the Environment, and Sustainability, (CRC Press 2018) has been adopted by several Universities as textbook in energy courses.

Day 2 — May 27, 2021
10:15-11:10 AM — Keynote Speech

HONGBIN (BILL) MA

Affiliation: Department of Mechanical & Aerospace Engineering, University of Missouri

Title: Thermally Excited Oscillating Motion and Heat Transfer Enhancement in Oscillating Heat Pipes

Abstract: Heat transfer process in an oscillating heat pipe (OHP) involves liquid-vapor interfacial phenomenon, surface forces, thermally excited mechanical vibration, evaporation and condensation heat transfer, and oscillated forced convection. The most outstanding feature is that an OHP can effectively integrate the state-of-the-art of heat transfer processes such as thin film evaporation, oscillating flow, thermally-excited mechanical vibration, high heat transfer coefficient of entrance region, vortices induced by the oscillating flow of liquid plugs and vapor bubbles, and near-wall velocity overshoot (Richardson's annular effect). Therefore, the OHP can achieve an extra high effective thermal conductivity. The oscillating/pulsating motions in the OHP depends on the surface conditions, dimensions, working fluid, operating temperature, heat flux and total heat load, orientation, number of meandering turns, and, most importantly, the filling ratio. This presentation introduces recent results of OHPs in the field including theoretical models of oscillating motion and heat transfer of single phase and two-phase flows in capillary tubes or channels, heat transfer mechanisms enhancing oscillating motions and heat transfer of two-phase flows, neutron imaging study of oscillating motions, and nanofluid's effect on the heat transfer performance in OHPs. The importance of thermally-excited oscillating motion combined with phase change heat

transfer to the extra-high heat transport capability in OHPs is emphasized.

Bio: Dr. Hongbin Ma is a Professor in the Department of Mechanical & Aerospace Engineering, and the director of the Center of Thermal Management in the College of Engineering at the University of Missouri (MU). He received his Ph.D. in 1995 from Texas A&M University. Since he joined MU in 1999, he has conducted active research in the fields of phase-change heat transfer, heat pipes, ejector refrigeration, and thermal management. His research has been supported by the National Science Foundation (NSF), the National Institutes of Health (NIH), Intel Corp., Dell, Outokumpu, Foxconn, the Defense Advanced Research Projects Agency (DARPA), Northrop Grumman, the Office of Naval Research (ONR), the Leonard Wood Institute, Rockwell Automation, Gore-Tex, the Department of Education, the MU Research Board and the University Research Council.

His research work has resulted in more than 260 publications including 1 book, 5 book chapters, and over 150 refereed journal papers. His publications are highly cited by his academic peers and are of the highest quality. The contributions he made are not only in scientific fundamental research but also in engineering applications. His research efforts led to the establishments of both companies of ThermAvant Technologies (TAT), where he is cofounder and president, and ThermAvant International (TAI), where he is cofounder and CEO, to further develop and commercialize his research results. He is a Fellow of American Society of Mechanical Engineering (ASME), Associate Editors of ASME Journal of Thermal Science and Engineering Application, and International Journal of Heat Transfer Research.

Day 3 — May 28, 2021
12:15-1:10 PM — Keynote Speech

GENNADY ZISKIND

Affiliation: Department of Mechanical Engineering, Ben-Gurion University of the Negev

Title: Heat Transfer Research for Latent-Heat Thermal Energy Storage: State-of-the-Art and Future Trends

Abstract: Thermal energy storage (TES) is essential when the energy source is intermittent. For instance, the concentrated solar power (CSP) technology becomes much more practical when a CSP plant includes a TES system, which at present is typically implemented through molten salts which are inexpensive, safe and abundant. However, these sensible-heat-based storage systems have many shortcomings, including their vast size and huge amounts of material required. For this reason, some other technologies are considered, including latent-heat thermal energy storage (LHTES) systems that utilize the phase change materials (PCM). The number of research works on all aspects of PCM use is growing very fast, but many of the studies published today in fact re-discover or re-invent the earlier knowledge, and in some cases even distort or obscure it. Thus, this talk's first aim is to present state-of-the-art knowledge for heat transfer in LHTES, based on a historical perspective of heat transfer research in this rich and important field. In particular, we discuss heat transfer enhancement in PCM: various enhancement methods are presented and their merits are evaluated. The second aim of this talk is to present the ongoing heat transfer research in the field, in an attempt to outline its more promising future directions. The presentation is based, to a very large extent, on the author's personal knowledge and experience in design and modeling of PCM systems. Our attention is dedicated to some indispensable details and subtleties, which can affect the processes significantly but are frequently overlooked.

Bio: Dr. Gennady Ziskind is Professor and Head of Department of Mechanical Engineering at Ben-Gurion University of the Negev (BGU) in Beer-Sheva, Israel. He earned his M.Sc. and D.Sc. degrees from the Technion–Israel Institute of Technology. His research deals with various aspects of heat and mass transfer and multiphase systems, including phase-change energy storage and thermal management. Dr. Ziskind has co-authored about 70 journal articles and more than 100 conference papers. He is widely recognized as an expert in heat transfer, in general, and a leading researcher in the field of thermal energy storage, in particular. Among other international activities, Dr. Ziskind is serving as Associate Editor of Journal of Heat Transfer (ASME, re-appointed to the second term in 2018) and Associate Editor of International Journal of Thermal Sciences (Elsevier, appointed in 2019). He is Delegate to the Assembly of International Heat Transfer Conferences, Member of the ASME Safety Standards Committee for Thermal Energy Storage (TES) Systems, and an active participant of several European research frameworks, including INPATH-TES and NANOUPTAKE. Dr. Ziskind co-chaired Eurotherm Seminars 99 (2014) and 112 (2019) in Spain, both entitled Advances in Thermal Energy Storage, and organized INNOSTORAGE–Advances in Thermal Energy Storage International Conference in Israel in 2016. His most recent publications include a book, Phase-Change Materials for Thermal Management of Electronic Components, published by World Scientific Publishers in 2018, as a volume in the Encyclopedia of Thermal Packaging.

Day 1 — May 26, 2021
10:15-11:10 AM — Keynote Speech

KAUSIK SARKAR

Affiliation: Mechanical and Aerospace Engineering, George Washington University, Washington

Title: Contrast microbubbles for ultrasound imaging, therapeutics and tissue engineering: Interfacial rheology, jet and microstreaming flows

Abstract: Intravenously injected microbubbles are used as contrast enhancing agents in diagnostic ultrasound imaging. They are coated by a nanometer-thick shell of lipids, proteins or polymers which stabilizes them against premature dissolution. In 2003, we proposed that the shell be modeled as an interface with an intrinsic interfacial rheology, characterized by properties such as interfacial viscosities and elasticities. This was a sharp contrast to the prevalent practice of modeling the microbubble coating using ad hoc parameters or as a finite-thickness layer with bulk rheological properties. We applied interfacial rheological models to commercial contrast agents, determined the values of their characteristic interfacial properties and validated the model using in vitro acoustic experiments. Over the years, we have developed a hierarchical approach of contrast agent modeling where models were progressively refined as warranted by validating experiments and the underlying physics. We have built an in-house facility for synthesizing lipid-coated microbubbles and micro- and nanodroplets of volatile perfluorocarbon liquid, and have been investigating fundamental phenomena such as acoustic droplet vaporization (ADV) and bioeffects of ultrasound and microbubbles in cancer therapy and stem cell tissue engineering.

Bio: Dr. Kausik Sarkar did his BTech from IIT Khragpur, and MS and PhD from Johns Hopkins University. After doing postdoctoral research in the University of Illinois at Urbana Champaign, he joined the faculty of Mechanical Engineering in University of Delaware. In 2011, he moved to George Washington University, where he is currently a Professor of Mechanical and Aerospace Engineering with secondary appointment in Biomedical Engineering. His research spans several areas of fluid mechanics and acoustics with focus towards biomedical imaging and therapeutic applications of microbubbles, vesicles and nanoparticles. It has been supported by National Science Foundation and National Institute of Health. He is a fellow of the American Physical Society, American Acoustical Society, American Society of Mechanical Engineers and American Institute of Medical and Biological Engineers.

Day 1 — May 26, 2021
11:15-12:10 PM — Keynote Speech

THOMAS MEE

Affiliation: Mee Industries Inc.

Title: Gas Turbine Power Augmentation by Inlet Air Fogging

Abstract: Gas turbines are often used as prime movers for electric power production. Inlet air fogging consists of spraying atomized water into the inlet air flow of a gas turbine. When the small droplets evaporate, they cool the air flow, which makes the air denser. Denser air means the air mass flow to the turbine is increased, which causes an increase in output power. Cooling the air by 20 °F can lead to a power boost of 20 percent or more. An additional power boost can be obtained by spraying water directly into the gas turbine compressor. The water evaporates inside the compressor, resulting in an intercooling effect. This presentation explains the basic science and technology of gas turbine inlet air fogging and gives examples of several of the more than one thousand installations that Mee Industries has performed to date.

Bio: Thomas is Chairman and CEO of Mee Industries Inc. Mee Industries builds custom water fogging systems for a wide variety of applications ranging from fog special effects, to building humidification, to gas turbine inlet air cooling. The company has installed more than 10000 fogging systems over the past 50 years. Mr. Mee has 38-years of experience with fog system design, manufacturing, project execution, and research and development. He has authored and coauthored many articles and several peer-reviewed papers and holds two U.S. patents relating to gas turbine fogging.

Day 3 — May 28, 2021
11:15-12:10 PM — Keynote Speech

THEODORE (TED) J. HEINDEL

Affiliation: Center for Multiphase Flow Research and Education, Department of Mechanical Engineering, Iowa State University

Title: Characterizing the Spray Near-Field Region Using X-rays

Abstract: Sprays are useful in many applications including food processing, coating, 3D printing, fire suppression, agricultural production, and combustion systems. Studying the near-field region of a spray is often hindered by its optically dense nature, rendering optical and laser diagnostics ineffective. X-ray techniques are capable of penetrating this optically dense region and providing detailed information on liquid atomization and breakup. X-rays can be produced with tube sources as well as synchrotron sources. Using tube source X-rays, 2D radiographic videos are possible showing qualitative spray information. The 2D radiographs can also provide quantitative measurements of the optical depth (OD) in the near-field region. Tube sources can also provide X-ray computed tomography imaging that can produce time-average 3D density (mass distribution) maps of the spray. X-rays from synchrotron sources can have energy fluxes up to six orders of magnitude larger than that from tube sources, which allows for high spatial and temporal measurements of the spray, but is more challenging to implement than using a common tube source. Common synchrotron X-ray measurement techniques include focused beam radiography, high-speed flow visualization and phase contrast imaging, and X-ray florescence.

This talk will detail several X-ray measurement techniques using both tube sources and synchrotron sources. Examples of each method used in spray systems will be presented. Advantages and disadvantages of the various methods will also be summarized.

Bio: Theodore (Ted) J. Heindel is a University Professor and the Bergles Professor of Thermal Science in the Department of Mechanical Engineering at Iowa State University. He is also the Director of the Center for Multiphase Flow Research and Education (CoMFRE) at ISU. His Experimental Multiphase Flow Laboratory houses a one-of-a-kind instrument for performing X-ray visualization studies of complex fluid flows. His research currently focuses on multiphase flow hydrodynamics (e.g., mixing in gas-liquid, gas-solid, and particle-particle flows) and multiphase flow visualization and characterization using X-ray imaging technology. His research program has been supported through the NSF, USDA, DOE, ONR, and industrial partners. He has co-authored one book and published 90 peer-reviewed journal papers and over 270 conference papers, abstracts, and technical reports. Ted has been recognized at Iowa State with a Regents Award for Faculty Excellence in 2018, the Exemplary Faculty Mentor Award in 2014, the College of Engineering's Superior Engineering Teacher of the Year Award in 2006, and was twice selected by graduating seniors as mechanical engineering's Professor of the Year. He is a Fellow in the American Society of Mechanical Engineers, a past associate editor for the ASME Journal of Fluids Engineering, and the past chair of the ASME Fluids Measurement and Instrumentation Technical Committee.

Day 3 — May 28, 2021
10:15-11:10 AM — Keynote Speech

JEAN S. VOSSEN

Affiliation: Chief, Engineering Division, New Orleans District, U.S. Army Corps of Engineers

Title: River Management and Flooding Sources Impacting the New Orleans Area

Abstract: A large part of the New Orleans metropolitan area, surrounded by the Mississippi River, swamps, and lakes, is below sea level. Flood risk has been greatly reduced by complex levees and flood control systems that include features such as flood gates, canals, and pump stations. The United Stated Army of Corps of Engineers (USACE) routinely works with state and local agency partners to ensure the safety of the city and surrounding areas by effectively jointly managing the flood risk management infrastructure to defend against impacts of potential inundation due to coastal storms, river floods, and interior rainfall. The presentation will provide an overview of the USACE's projects and tasks in New Orleans District's area pf responsibility, and discuss the sources of flooding, the methods of handing those floods, and the results of the performance of selected projects.

Bio: In April 2016, Mrs. Vossen was selected as Chief of Engineering Division after working 20 years as a civil engineer for the New Orleans District. As Chief, she is responsible for leading an engineering staff of over 200 employees tasked with preparing comprehensive engineering studies and the design for major hydraulic structures and earthen embankments for flood control, navigation and hurricane risk reduction projects, and environmental engineering projects related to coastal restoration; the design of river revetments, bank stability and dredging projects; the design of interior drainage and pumping stations; and mechanical / electrical features associated with engineering projects including pumping stations and gated structures. Work also includes completion of O&M manuals, Design Documentation Reports and other documentation for recently completed works, periodic inspection of structures, bridges and levees, and preparing engineering reports for levee accreditation and FEMA flood maps. A native New Orleanian, Mrs. Vossen earned her B.S. in Civil Engineering from the University of New Orleans and serves on UNO's Engineering Advisory Committee. She is a registered professional engineer in Louisiana.

Day 1 — May 26, 2021
12:15-1:10 PM — Keynote Speech

JOHN R. (JACK) HOWELL

Affiliation: Ernest Cockrell, Jr., Memorial Chair Emeritus, The University of Texas at Austin

Title: A History of the Development of Engineering Radiation Heat Transfer

Abstract: The early development of thermal radiation is outlined as seen through the contributions of important figures. The impact of these contributions not only on thermal engineering but on advances in physics, nanoscale phenomena, astrophysics, and global warming are noted. Emphasis is on the people involved and their backgrounds and foibles. This is a family-friendly presentation, with only three equations that are used for illustration.

Bio: John (Jack) Howell is retired from the Walker Department of Mechanical Engineering at The University of Texas at Austin. He spent over 50 years in research during seven years at NASA Lewis (now Glenn) Research Center, the University of Houston, and UT-Austin. His research centered on radiation transfer and inverse methods in conjugate heat transfer. He was a pioneer in bringing Monte Carlo methods into the treatment of thermal radiation. He is a member of the US National Academy of Engineering and the Russian Academy of Science and is an Honorary Life Fellow of ASME and a Fellow of AIAA. He received various honors and awards, including the NASA Special Service Award, The ASME Heat Transfer Memorial Award, the AIAA Thermophysics Medal, and the ASME/AIChE Max Jakob Award. He is presently retired, working on a new (7th) edition of the text Thermal Radiation Heat Transfer, and pursuing his hobby of researching and writing on the history of technology.

Day 2 — May 27, 2021
12:15-1:10 PM — Keynote Speech

ZAHID AYUB

Affiliation: President, Isotherm, Inc., Arlington, Texas

Title: State of industrial refrigeration under uncertain future of refrigerants in the context of global warming issues

Abstract: Since the Kigali amendment to Montreal Protocol there is confusion and an atmosphere of uncertainty regarding the future of refrigerants. This uncertainty is felt within the industrial refrigeration market which is a multi-billion dollar per year business around the world. Besides the developed world the crunch will also be heard within the developing world where efficient cold chain is will be an essential element of progressive life for the population. There is obviously a clear need for a way forward that would keep the cold chain in tact on a global scale. A brief current scenario and possible solutions will be presented.

Bio: President, Isotherm, Inc. - manufacturer of heat transfer equipment

- Ph.D. in mechanical engineering from Iowa State University, 1986
- Designed and fabricated several thousand heat exchangers/pressure vessels and systems installed worldwide
- Recognized as one of the pioneers in the field of Ammonia Enhanced Heat Transfer
- Author of over 135 International Journal and Conference papers
- Holds six United States patents and five pending at USPTO
- Recipient of Michigan New Product Award - 1989
- ASHRAE Distinguished Service Award - 1999
- ASHRAE Research Service Award - 2007
- ASME Fellow – 1998
- ASHRAE Fellow – 2008
- ASHRAE Exceptional Service Award – 2013
- ASHRAE Louise and Bill Halloday Award – 2017
- ASME Heat Transfer Memorial Award – 2017
- AIChE Kern Award – nominated 2019
- Member, Scientific Council - International Center for Heat and Mass Transfer representing United States
- US Member Delegate - International Institute of Refrigeration
- US Member Delegate - International Heat Pump
- Registered Professional Engineer in the States of Michigan and Texas
- Active member of ASME, ASHRAE, IIAR, AIChE, IoR (UK), IIR, RETA, Eurammon
- Served on ASHRAE Research Administration Committee, ASHRAE's Refrigeration Committee as Chair and Research Advisory Panel team member for Research Strategy 2010-2018
- Currently serves on ASHRAE Technical Committees TC1.3, TC8.5 and Standard 181
- Adjunct Professor - University of Texas-Arlington and GIK Pakistan
- Member – International Advisory Board, GIK Institute, Pakistan
- Founder and Director - Natural Fluids Refrigeration Center, GIKI, Pakistan
- Past Technology Editor - International Journal of Enhanced Heat Transfer
- Executive Editor - Journal of Heat Transfer Engineering
- Associate Editor – ASME Journal of Thermal Science and Engineering Applications
- Reviewer to several other Heat Transfer Journals

Day 2 — May 27, 2021
11:15-12:10 PM — Keynote Speech

TEC Talk Speakers

HONGBIN (BILL) MA

Affiliation: Department of Mechanical & Aerospace Engineering, University of Missouri

Title: An Engineer Entrepreneur

Abstract: In this presentation, Professor Ma introduces his experience that he started his two companies: ThermAvant Technologies, LLC, and ThermAvant International, LLC as a professor in the department of Mechanical &Aerospace Engineering at the University of Missouri. The presentation will discuss the nature and unique features of an engineer entrepreneur, and provide an insight into what an engineer entrepreneur is. While a real innovative technology is the foundation to start up a new company, the team effort including marketing, sales, and capital investment is a key for a small company to start up. In addition, mission, perseverance, and dedication, which will make the company's products unique and competitive, are necessary conditions for a startup company to be successful.

Bio: Dr. Hongbin Ma is a Professor in the Department of Mechanical & Aerospace Engineering, and the director of the Center of Thermal Management in the College of Engineering at the University of Missouri (MU). He has conducted active research in the fields of phase-change heat transfer, heat pipes, ejector refrigeration, and thermal management. His research work has resulted in more than 260 publications including 1 book, 5 book chapters, and over 150 refereed journal papers. The contributions he made are not only in scientific fundamental research but also in engineering applications. His research efforts led to the establishments of both companies of ThermAvant Technologies (TAT) (www.thermavant.com), where he is cofounder and president, and ThermAvant International (TAI) (www.burnoutmugs.com, www.lexolife.com, and www.amazon.com searching burnout mugs) where he is cofounder and CEO, to further develop and commercialize his research results. While TAT has become the only company in world to manufacture and sell high performance oscillating heat pipe (OHP) cooling devices to the top defense companies in USA and led to earning the 2018 100 R&D Award, TAI's drink-now technology has resulted in the temperature-controlled coffee mugs known as Burnout and Lexo Tumblers which can cool down hot beverages to the perfect drinking temperature instantly and retain this temperature for many hours. He is a Fellow of American Society of Mechanical Engineering (ASME), Associate Editors of ASME Journal of Thermal Science and Engineering Application, and International Journal of Heat Transfer Research.

Day 1 — May 26, 2021
1:15-2:30 PM — TEC Talk Session

ERIC SMITH

Affiliation: A.B. Freeman School of Business at Tulane University

Title: The use of Cryogenic distillation for meeting political power de-carbonization targets

Abstract: Much of the world believes that global warming can be mitigated through mandated de-carbonization of the atmosphere. Much of the policy effort has been focused on substituting wind and solar power generation for power produced by burning fossil fuels.

If the goal is to have at least 24 hours of economical,utility scale, stored power in order to contend with wind and solar intermittency, we are not anywhere near meeting that goal. Today, even with deep pockets, 2 hours is the target.

We, and others, propose an alternate option, similar to the proven LNG storage methodology,in order to store surplus "green" power. This approach would produce "green" hydrogen. Surplus renewable power would support the electrolysis of water. The released hydrogenwould then be liquefied and stored for future use as a fuel in generating power, initially by blending the hydrogen with pipeline natural gas and using the blended fuelin combustion turbines or larger combined cycle gas plants.Although electrolytic production of hydrogen is power intensive, even before considering the cost of liquefaction, it is viewed as a viable option for the use of "free" surplus renewable power.

While the majority of hydrogen produced today is based on processing natural gas, a green option is technically possible using electrolysis. We have been operating NASA space flights for 50 years using engines fueled with liquid hydrogen and oxygen. Perhaps the ultimate "green" fuel, this approach produces no CO2 and when the Hydrogen is combusted, the only exhaust is water.

Finally, another approach, announced by UK researchers, uses surplus renewable energy to liquefy, perhaps the most ubiquitous of all working fluids, air. Once produced, the liquefied air isstored and then re-gasified and used to generate power by feeding the high pressure air to turbo-generators during periods when wind and solar power are offline.

Our proposal expands on the British approach by using distillation columns to remove CO2 from the liquefied air prior to storage. Multiple companies, including Air Products and Air Liquide have been using cryogenic distillation to supplyhigh purity oxygen, nitrogen and argon for the better part of a century.

Bio: Eric Smith is a Professor of Practice at the A.B. Freeman School of Business at Tulane University. He also serves as the Associate Director of the Tulane Energy Institute. He is a 1965 Chemical Engineering graduate of the Georgia Institute of Technology and earned an MBA, in 1967, from the A. B. Freeman School at Tulane University. In addition to sixteen years of full time academic experience, he has over thirty years of operational experience; first, in the downstream refining and petrochemical industry and then, from 1984 until 2004, in the upstream, offshore, drilling and construction sectors.

During that upstream phase, he participated in arranging three IPOs, the largest being a combined primary-secondary offering for Saipem, SpA. He also was the head of Saipem's US subsidiary during the installation of Hoover-Diana, Exxon's first major deep water structure. He also served as a consultant to Louisiana's Department of Economic Development as well as to Greater New Orleans, Inc. a regional economic development group. He is the Energy Committee Chairman of the World Trade Center of New Orleans. Most recently, based on multiple world scale oil discoveries offshore Guyana,he was asked by the US State Department to consult with the Guyanese government.

Eric also acts as Tulane's media contact for energy issues.

Day 1 — May 26, 2021
1:15-2:30 PM — TEC Talk Session

STEPHEN M. BAJOREK

Affiliation: Senior Technical Advisor for Thermal-Hydraulics, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research

Title: The Opportunities and Challenges of Advanced Nuclear Reactors

Abstract: The nuclear industry is at a crossroads. Over the past several years some units have pre-maturely shutdown and entered into decommissioning. Other operating units are clearly stressed economically and are considering pre-mature closure. The market forces are harsh. Yet, there are compelling reasons for the nuclear industry to continue to provide an important contribution to the energy sector and possibly even expand. Global efforts to address climate change and to meet the energy needs of developing nations are likely to require large, new sources of clean, carbon-free energy. Currently, nuclear plants provide roughly 20% of the electrical power capacity in the U.S., and represent approximately 60% of U.S. carbon-free production. If world-wide demand for increased carbon-free electrical production continues, nuclear must certainly play a role.

The U.S. nuclear industry is responding by proposing a wide variety of advanced non-light water reactors; gas-cooled, liquid metal cooled, molten salt cooled, and what are termed "micro" reactors cooled using heat pipes. Both fast and thermal spectrum reactor designs are under active development, with fuels ranging from TRISO and metallic to liquid fuel salts. These designs and new fuels are built upon many years of experience with light-water reactors and offer significant improvements in safety, operation and economics. Modeling and simulation of these new designs and their behavior during hypothetical accident scenarios represents a challenge to both design and licensing, in large part to uncertainties in the thermal/fluid behavior. While the opportunities for improved safety and economics are apparent, the thermal-fluid uncertainties must be addressed.

Nuclear reactor thermal-hydraulics has always been a challenging technical area as the industry has developed both conventional and passively cooled light-water reactors and improved fuel designs. For non-LWRs, this is no exception. The nuclear industry, the U.S. Department of Energy,and the U.S. Nuclear Regulatory Commission are currently working towards an improved understanding of the safety of advanced designs, new fuel concepts, and development of the experimental database and analytical capability to simulate these new concepts.

Bio: Stephen M. Bajorek is the Senior Technical Advisor for Thermal-Hydraulics in the NRC's Office of Nuclear Regulatory Research, and has nearly forty years experience in the nuclear industry. While at the NRC he has been involved with development of the TRACE stet-of-the-art thermal-hydraulics code, advanced reactor analysis, and the NRC's thermal-hydraulic test programs and is currently leading the NRC's efforts to develop simulation codes for non-LWRs. Dr. Bajorek represents the NRC in international thermal-hydraulic research projects, and has served on U.S. State Department missions in support of U.S. industry interests. Prior to joining the NRC staff he was a member of the faculty at Kansas State University and has over 15 years of industrial experience at Westinghouse Electric Corp. as a code developer and analyst. At Westinghouse, Dr. Bajorek was the lead developer of the WCOBRA/TRAC systems code and of the first Best-Estimate LOCA methodology licensed in the U.S. He has authored or co-authored nearly 200 publications in areas ranging from boiling and two-phase flow, reactor safety, natural convection, and boiling of multi-component fluids.

Dr. Bajorek received his Ph. D. from Michigan State University, and M.S. and B.S. degrees in Mechanical Engineering from the University of Notre Dame.

Day 1 — May 26, 2021
1:15-2:30 PM — TEC Talk Session

MICHAEL J. MOORE

Affiliation: PhD, Professor of Biomedical Engineering, Tulane University, Co-Founder and Chief Science Officer, AxoSim, Inc.

Title: Microphysiological Systems and Engineering Challenges for Commercial Scale-Up

Abstract: Microphysiological systems—also called "organs-on-chips," "tissue chips," or organoids—are assemblies of living cells on the micro-scale that are engineered to mimic certain key aspects of human tissue or organ physiology, usually by engineering certain aspects of tissue structure and/or their physical and chemical microenvironment. These biological systems are being aggressively pursued as models of diseases for research and for screening drugs to better predict safety and efficacy on the path toward clinical trials. As these systems have begun to advance to commercial application, the need for scaling up has become apparent. However, unlike traditional chemical reaction processes, microphysiological systems cannot be scaled simply by volume and mixing, mainly because of transport limitations of biological processes such as the availability of oxygen and removal of metabolic by-products that greatly affect physiological outcomes. With fixed upper limits on tissue dimensions and volume, scale-up for commercialization will have to rely on massively parallel production and/or innovations in the form factor of conventional tissue cultures, necessities not typically considered by entrepreneurs entering this field.

Bio: Michael J. Moore, PhD, is a Professor of Biomedical Engineering in Tulane University's School of Science and Engineering. He is also the Founder of AxoSim, a creator of the Nerve-on-a-Chip platform that is developing disease models for neurogenerative diseases such as neurotoxicity, amyotrophic lateral sclerosis, and multiple sclerosis. He functions as a Chief Scientific Officer for the company as well. His academic research focuses on developing in vitro models of neural growth, physiology, and disease by manipulating the chemical and physical extracellular microenvironment. Toward this end, his lab employs a number of microengineering technologies such as microscale tissue engineering, novel nanomaterials, microfabrication, digital light projection microscopy, and optical modes of electrophysiological stimulation and recording. Dr. Moore was born in Kimball, NE and attended the University of Nebraska in Lincoln. He received his B.S. in Biological Systems Engineering shortly after marrying his wife Lisa. They then moved to Rochester, MN, where Michael attended the Mayo Clinic College of Medicine and Science where his dissertation research involved the development of a biodegradable spinal cord implant. Dr. Moore then went to the Massachusetts Institute of Technology where he conducted postdoctoral research in drug delivery for retinal neuroprotection in collaboration with the Schepens Eye Research Institute at Harvard Medical School. Dr. Moore joined the Tulane Biomedical Engineering faculty as an Assistant Professor in 2007. He and his wife and three daughters live in the Broadmoor neighborhood near Tulane's undergraduate campus in New Orleans, LA.

Day 1 — May 26, 2021
1:15-2:30 PM — TEC Talk Session

ASTFE
American Society of Thermal and Fluids Engineers

The Sustainability Tank Challenge: Leadership and Innovation in a Sustainable Built Environment

Session Chair: Dr. Yimin Zhu, Louisiana State University

Session Co-Chair: Dr. Tracey Rizzuto, Louisiana State University

PRESENTED BY: ASTFE AND THE CENTER OF LEADERSHIP DEVELOPMENT IN BUILT ENVIRONMENT SUSTAINABILITY (CLDBES)

THURSDAY, MAY 27, 2021, 7:00 PM (U.S. EASTERN TIME)

FRIDAY, MAY 28, 2021, 7:00 AM (HONG KONG TIME)

The **Sustainability Tank Challenge** will feature 5 international teams of students who are "pitching" their idea, product, design, etc., in support of built environment sustainability. Join us as our student teams put forth concepts to make our world more sustainable.

The Sustainability Tank Challenge features:

Green space as a preventive antidepressant during COVID-19
Fernando J. Claudio Rodriguez, University of North Carolina at Charlotte and Yuwen Yang, The University of Hong Kong

How the built environment affects older people's levels of physical activity: A research on communities in Hong Kong
Samantha Chacon, Louisiana State University and Emma Liqun Xiang, The Hong Kong Polytechnic University

Urban scale passive design modeling
Adedayo Johnson Ogungbile, The Hong Kong Polytechnic University and Kris Govertsen, Northeastern University

Rethinking the residential opening: A case study of Hong Kong
Stephen Grotz, The University of North Carolina at Charlotte and Vikrom Laovisutthichai, The University of Hong Kong

Further application of the solar window in renewable energy technology
Brian Kohut, Cleveland State University and Shu-Ping Niu, The Hong Kong Polytechnic University

NSF LSU The Hong Kong Polytechnic University 香港理工大學 ASTFE American Society of Thermal and Fluids Engineers

National Science Foundation

Generous financial support from

National Science Foundation (NSF)

is gratefully acknowledged.

This funding provided support for 58 students and early career faculty/ researchers to attend the conference.

ASTFE
American Society of Thermal and Fluids Engineers

5-6TH Thermal and Fluids Engineering Conference (Virtual)

May 26-28, 2021
www.astfe.org/tfec2021/

Overview

Day 1 — May 26, 2021							
8:15-9:00 AM	Welcome and Opening Remarks						
9:00-10:00 AM	TFEC Plenary Lecture 1 - S. Balachandar						
10:15-11:10 AM	Keynote 1 - Gennady Ziskind						
11:15-12:10 PM	Keynote 2 - Kausik Sarkar						
12:15-1:10 PM	Keynote 3 - Jean S. Vossen						
1:15-2:30 PM	River Management and Flood Control Panel				TEC Talks - Hongbin Ma, Eric Smith, Stephen M. Bajorek, Michael J. Moore		
2:45-4:15 PM	Federal Research Funding Outlook/Opportunities Panel of Program Managers						
4:30-6:00 PM	Technical Session 1						
	Session 1A	Session 1B	Session 1C	Session 1D	Session 1E	Session 1F	Session 1G
6:15-7:30 PM	Technical Session 2						
	Session 2A	Session 2B	Session 2C	Session 2D	Session 2E	Session 2F	Session 2G
Day 2 — May 27, 2021							
9:00-10:00 AM	TFEC Plenary Lecture 2 - Joseph Katz						
10:15-11:10 AM	Keynote 4 - Stathis Michaelides						
11:15-12:10 PM	Keynote 5 - Zahid Ayub						
12:15-1:10 PM	Keynote 6 - Jack Howell						
1:15-2:30 PM	Awards 'Luncheon' and Seminar - Norma Jean Mattei						
2:45-4:15 PM	Technical Session 3						
	Session 3A	Session 3B	Session 3C	Session 3D	Session 3E	Session 3F	Session 3G
4:30-6:00 PM	Technical Session 4						
	Session 4A	Session 4B	Session 4C	Session 4D	Session 4E	Session 4F	Session 4G
6:00-7:00 PM	Networking Event						
	A Virtual Tour of New Orleans						
7:00-8:30 PM	The Sustainability Tank Challenge: Leadership and Innovation in a Sustainable Built Environment						
Day 3 — May 28, 2021							
9:00-10:00 AM	TFEC Plenary Lecture 3 - Om Sharma						
10:15-11:10 AM	Keynote 7 - Ted Heindel						
11:15-12:10 PM	Keynote 8 - Thomas Mee						
12:15-1:10 PM	Keynote 9 - Bill Ma						
1:15-2:30 PM	Special Session - Fluid Mechanics of Speech				Panel: Industrial Multiphase CFD: Risks, Rewards, and Remorse		
2:45-4:15 PM	Technical Session 5						
	Session 5A	Session 5B	Session 5C	Session 5D	Session 5E	Session 5F	Session 5G
4:30-6:00 PM	Technical Session 6						
	Session 6A	Session 6B	Session 6C	Session 6D	Session 6E	Session 6F	Session 6G
6:00-6:30 PM	Closing Ceremony						

Day 1 — May 26, 2021

8:15-9:00 AM	**Welcome and Opening Remarks**	
9:00-10:00 AM	**TFEC Plenary Lecture 1: Using Machine Learning to Solve Complex Multiphase Flows at Unprecedented Resolution** **S. Balachandar** (Department of Mechanical & Aerospace Engineering, University of Florida) **Moderator: Michael Plesniak** (George Washington University)	
10:15-11:10 AM	**Keynote 1: Heat Transfer Research for Latent-Heat Thermal Energy Storage: State-of-the-Art and Future Trends** **Gennady Ziskind** (Department of Mechanical Engineering, Ben-Gurion University of the Negev) **Moderator: Ankur Jain** (University of Texas at Arlington)	
11:15-12:10 PM	**Keynote 2: Contrast microbubbles for ultrasound imaging, therapeutics and tissue engineering: Interfacial rheology, jet and microstreaming flows** **Kausik Sarkar** (Mechanical and Aerospace Engineering, George Washington University) **Moderator: Michael Plesniak** (George Washington University)	
12:15-1:10 PM	**Keynote 3: River Management and Flooding Sources Impacting the New Orleans Area** **Jean S. Vossen** (Chief, Engineering Division, New Orleans District, U.S. Army Corps of Engineers) **Moderator: Ting Wang** (University of New Orleans)	
1:15-2:30 PM	**River Management and Flood Control Panel** **Water Management of the Lower Mississippi and Atchafalaya Rivers** **David Ramirez** (P.E, D.WRE, Chief, Water Management, USACE New Orleans) **Interior Flood Risk Reduction** **Dr. Jerry Shih** (P.E., PhD. Chief, Hydraulics and Hydrology Section, USACE New Orleans) **Coastal Storm Impacts to South Louisiana** **Max Agnew** (P.E., Lead Coastal Engineer, USACE New Orleans) **Moderator: Norma Jean Mattei** (University of New Orleans)	**TEC Talks** **An Engineer Entrepreneur** **Hongbin (Bill) Ma** (Department of Mechanical & Aerospace Engineering, University of Missouri) **The use of Cryogenic distillation for meeting political power de-carbonization targets** **Eric Smith** (A.B. Freeman School of Business at Tulane University) **The Opportunities and Challenges of Advanced Nuclear Reactors** **Stephen M. Bajorek** (Senior Technical Advisor for Thermal-Hydraulics, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research) **Microphysiological Systems and Engineering Challenges for Commercial Scale-Up** **Michael J. Moore** (PhD, Professor of Biomedical Engineering, Tulane University, Co-Founder and Chief Science Officer, AxoSim, Inc.) **Moderators: Ting Wang** (University of New Orleans), **John Lloyd** (Michigan State University)
2:45-4:15 PM	**Federal Research Funding Outlook/Opportunities Panel of Program Managers** **Ying Sun** (NSF), **Mark Spector** (ONR), **Joan Greve** (NIH/NIBIB) **Moderator: Michael Plesniak** (George Washington University)	

4:30–6:00 PM Technical Session 1

Session 1A **Aerospace Applications** **Chairs:** **Sandra Boetcher** Embry-Riddle Aeronautical University **Ravinder Yerram (Moderator)** GE Gas and Power	TFEC-2020-32192	**Kofi Agyemang Amankwah** Southern University and A&M College	STABILITY AND CONTROL ANALYSIS OF UNMANNED AERIAL VEHICLES	Full paper
	TFEC-2020-32225	**Xianchang Li** Lamar University	Combined Cycle with Blade Cooled Gas Turbine at Different Operation Conditions and Design Aspects	Full paper
	TFEC-2020-36720	**Sohail Zaidi** San Jose State University	Start-up Power Requirements for an Axial Grooved Thermosyphon	Full paper
	TFEC-2020-36738	**Srinivasa Rao Gurrala** Indian Naval Academy Ezhimala	COMPUTATIONAL ANALYSIS OF AFTERBURNER WITH MODIFIED V-GUTTER	Full paper
	TFEC-2020-36799	**Ardalan Javadi** The University of Waterloo	DIRECT NUMERICAL SIMULATION OF A CYLINDER ROLLING ON AHORIZONTAL SURFACE: THE EFFECT OF THICKNESS ON	Full paper
Session 1B **Combustion, Fire and Fuels** **Chairs and Moderators:** **Kazim Akyuzlu** University of New Orleans **S.A. Sherif** University of Florida	TFEC-2020-33926	**Ashwani K Gupta** University of Maryland	Performance and Emissions of Camelina Oil Derived Jet Fuel Blends under Volume Distributed Combustion (Invited)	Presentation only
	TFEC-2020-32322	**Peyman Rahimi Borujerdi** The University of Alabama in Huntsville	An investigation of the premixed combustion in a two-section non-catalytic porous medium by numerical simulation	Full paper
	TFEC-2020-32307	**Gaurav Ninawe** Sam Higginbottom University of Agriculture Technology and Sciences	Experimental investigation of a CI engine performance fueled with cotton seed biodiesel-diesel blend and multi-walled carbon nanotubes as additive	Full paper
	TFEC-2020-32388	**Akash Yadav** Indian Institute of Technology Delhi	NUMERICAL ANALYSIS OF TEMPERATURE AND VELOCITY PROFILES INSIDE AND OUTSIDE OF A DC THERMAL PLASMA TORCH	Extended Abstract

Session 1C **Computational Methods/ Tools in Thermal-Fluid Systems - I** **Chairs and Moderators:** **Ethan Languri** Tennessee Tech University **Darrell W. Pepper** University of Nevada	TFEC-2020-32032	**Like Li** Mississippi State University	Lattice Boltzmann – phase field method for dendritic growth modeling	Full paper
	TFEC-2020-32171	**Walid Aboelsoud** Ain Shams University	NUMERICAL INVESTIGATION OF THE HEAT TRANSFER ON CIRCULAR CYLINDER IN CROSS FLOW WITH SECONDARY FLOW JET	Extended Abstract
	TFEC-2020-32186	**Maziar Mosavati** University of Windsor	CFD analysis of the near-field vortex dynamics in a confined square jet	Extended Abstract
	TFEC-2020-31936	**Yogesh Jaluria** Rutgers University	Fluid Flow in a Vertical or Horizontal Deposition Process	Presentation only
	TFEC-2020-33160	**A K M Monayem Mazumder** Assistant Professor	Arbitrary Lagrangian Eulerian Method for Fluid Flow in 2D Domains Containing Moving Objects	Full paper
	TFEC-2020-36666	**Sogol Pirbastami** University of Nevada	CFD MODELING OF HYPERSONIC TURBULENT AERODYNAMICS	Presentation only
Session 1D **Computational Methods/ Tools in Thermal-Fluid Systems - II** **Chairs:** **Ken Blecker (Moderator)** CCDC-AC **Martin Guillot** University of New Orleans	TFEC-2020-31352	**Laurie Florio** US ARMY DEVCOM-AC	Developing capabilities to model solid-liquid phase change in compressible flow using computational fluid dynamics based methods	Full paper
	TFEC-2020-31831	**Ken Blecker** CCDC-AC	THERMAL CHARACTERIZATION OF ASSEMBLED PROPELLANT INCREMENTS EXPOSED TO SEVERAL DISCRETE THERMAL ENVIRONMENTS	Full paper
	TFEC-2020-31920	**Yan Su** University of Macau	Direct Numerical Simulations of Three Dimensional Secondary Streaming of Oscillating Flows through a Cylindrical Pellet	Full paper
	TFEC-2020-32366	**Carlos Castang Montiel** Professor	Aerodynamic characteristics of irregular non-spherical particles at intermediate Reynolds number range	Extended Abstract
	TFEC-2020-36173	**Lubomir Bures** Nuclear Energy and Safety, Paul Scherrer Institute, Switzerland	Marker gradient method: sharp and robust algorithm for interfacial area density calculation	Full paper
	TFEC-2020-36291	**Joshua Charles** Advanced Cooling Technologies	Loop Thermosyphon Design for Solar Thermal Desalination	Full paper
Session 1E **Energy and Sustainability - I** **Chairs:** **Todd Otanicar (Moderator)** Boise State University **Anderson Reis** Federal University of Pará	TFEC-2020-31785	**Bjørn Petter Jelle** Norwegian University of Science and Technology (NTNU) / SINTEF Community	Hollow Silica Nanospheres as a Possible Pathway Towards Thermal Super Insulation Materials	Full paper
	TFEC-2020-31955	**Vedant Joshi** University at Buffalo	IMPACT OF A DIFFUSER ON SOLAR CHIMNEY POWER PLANT OUTPUT	Full paper
	TFEC-2020-32430	**Sattam Alharbi** University of Central Florida	Energy and exergy analysis of a new combined system for power, cooling, heating and fresh water production based on gas turbine	Full paper
	TFEC-2020-32693	**Olexiy Buyadgie** Wilson Engineering Technologies Inc./V.S. Martynovsky Institute of Refrigeration, Cryogenic Technologies and Eco Energetics	SOLAR EJECTOR SYSTEM FOR HEATING AND AIR-CONDITIONING	Full paper
	TFEC-2020-36148	**Julian Howarth** University of Waterloo	Experimental Characterization of a Variable Refrigerant Flow Heat Pump for Solar-Domestic-Hot-Water Applications	Full paper
	TFEC-2020-36194	**Robert Richards** Washington State University	Thermodynamic Cost of Manufacture of Heat Engines	Full paper
Session 1F **Energy Storage Systems - I** **Chairs:** **Todd Bandhauer** Colorado State University **Fangyu Cao (Moderator)** George Mason University	TFEC-2020-32011	**Mahboobe Mahdavi** Assistant Professor	Effect of container aspect ratio on the melting process of a nanoenhanced phase change material in latent heat thermal energy storage systems	Extended Abstract
	TFEC-2020-36693	**Tomer Shockner** Ben Gurion University	Modeling of Close-Contact and Convective Melting in an Axisymmetric Cylindrical Geometry	Extended Abstract
	TFEC-2020-32215	**Ethan Languri** Tennessee Tech University	NUMERICAL AND EXPERIMENTAL STUDY OF MUSHY-ZONE CONSTANT ROLE IN MODELING SOLID-LIQUID PHASE CHANGE IN ENERGY STORAGE APPLICATIONS	Presentation only
	TFEC-2020-36100	**Aisha Sa'ad** Nigerian Defence Academy	Numerical Analysis on the Effects of Plates in the Performance of 3D Storage Tanks for Cooling Using COMSOL Multiphysics	Extended Abstract
	TFEC-2020-36525	**Shahab Rouhi** PhD Student	CFD VALIDATION OF THE THERMODYNAMIC MODEL OF A COMPRESSED GASEOUS HYDROGEN STORAGE TANK	Full paper
	TFEC-2020-32135	**Emmanuel Nsofor** Southern Illinois University, Carbondale	Heat transfer enhancement in PCM thermal energy storage via the triplex tube heat exchanger	Extended Abstract

Session 1G **Flow and Heat Transfer in Biological/Biomedical Systems** **Chairs:** **Eduardo Divo** Embry-Riddle Aeronautical University **Hansen Mansy (Moderator)** University of Central Florida	TFEC-2020-31958	**Munjal Shah** University at Buffalo	THE EFFECT OF WING CORRUGATION ON INSECT FORWARD FLIGHT	Extended Abstract
	TFEC-2020-32126	**Ashley Emery** University Washington	Design and Testing of a Thermal Phantom for Humans and Pigs for Treatment of Ischemia	Full paper
	TFEC-2020-32534	**Mohammad Owais** Indian Institute Of Technology Kanpur	Imaging spatial and temporal flow characteristics in a curved asymmetric stenosed artery	Full paper
	TFEC-2020-36282	**Sumit Kumar** National Institute of Technology Rourkela	Analytical Study of Phase Change Heat Transfer in Biological Tissue using Coordinate Transformation Technique during Cryosurgery	Full paper
	TFEC-2020-36722	**Abubakar Dankano** University of Central Florida	Tailoring Left Ventricular Assist Device Cannula Implantation Using Coupled Multi-Scale Multi-Objective Patient-Specific Optimization	Presentation only
	TFEC-2020-36776	**Reid Prichard** Liberty University	Modeling A Novel Method to Diminishing COVID-19 Transmission in a Hospital Room	Full paper
6:15–7:30 PM Technical Session 2				
Session 2A **Biomimetic and Bioinspired Engineering** **Chairs:** **Eduardo Divo** Embry-Riddle Aeronautical University **Hansen Mansy (Moderator)** University of Central Florida	TFEC-2020-32415	**Shahensha Shaik** Louisiana State University	Novel Freezing Strategies to Retain the Stem Cell Reserves of Adipose Tissues	Extended Abstract
	TFEC-2020-32518	**Wei Zhang** Cleveland State University	WAKE STRUCTURE GENERATED BY A SEAL-WHISKER-INSPIRED TURBINE BLADE	Extended Abstract
	TFEC-2020-36712	**Santosh Mallah** Indian Institute of Technology	INVESTIGATING DRAGONFLY FLIGHT DYNAMICS AT VARIOUS HEAVING FREQUENCIES OF ITS WING	Full paper
	TFEC-2020-36714	**Santosh Mallah** Indian Institute of Technology	STUDY OF DRAGONFLY FLIGHT DYNAMICS AT VARIOUS HEAVING APMLITUDE OF ITS WING	Full paper
	TFEC-2020-36780	**Jonathon Yanello** Student	Atherosclerotic artery disease and its implications towards blood flow physics	Extended Abstract
Session 2B **Engineering Equipment and Environmental Systems** **Chairs and Moderators:** **Saptarshi Basu** Staff Systems Engineer, New Product Development, Product Lifecycle, Illumina **Titan Paul** University of South Carolina Aiken	TFEC-2020-32324	**Suhrid Deshmukh** MIT	Non-intrusive cooling tower model: A validation case study	Full paper
	TFEC-2020-31937	**Yogesh Jaluria** Rutgers University	Thermal Effects on Local Water Bodies due to Changes in the Environment	Presentation only
	TFEC-2020-36317	**A K M Monayem Mazumder** Assistant Professor	Heat Transfer Enhancement by a Two Stage Electrohydrodynamic Gas Pump in a Square Channel	Full paper
	TFEC-2020-36298	**Vincent Blouin** Clemson University	A Simulated Evaluation of Turbulence Generators in Ground Heat Exchangers	Presentation only
Session 2C **Computational Methods/Tools in Thermal-Fluid Systems - III** **Chairs and Moderators:** **Ethan Languri** Tennessee Tech University **Darrell W. Pepper** University of Nevada	TFEC-2020-36699	**Mohammad Naghashnejad** University of Oklahoma	Numerical Analysis of the Transient Liquid Rise within a Capillary Channel	Full paper
	TFEC-2020-36762	**Chao Zhang** Siemens Digital Industries Software	Co-Optimization of Turbine Blade Aero and Thermal Designs Based on Computational Fluid Dynamics (CFD) Models	Full paper
	TFEC-2020-36777	**Matthew Barry** University of Pittsburgh	Fully-coupled Thermoelectric-mechanical Modeling of Thermoelectric Generators	Full paper
	TFEC-2020-36526	**Setare Sadeqi** PhD Student	Wavelet Transform Analysis Applied to Incompressible Flow Field About a Solid Cylinder	Full paper
	TFEC-2020-36778	**Matthew Barry** University of Pittsburgh	Modeling Bridgman Heating in Thermoelectric Generators	Full paper
	TFEC-2020-37016	**Hamid Sadat** University of North Texas	NUMERICAL SIMULATION OF SOLUTE TRANSPORT FROM MULTIPLE CYLINDERS	Full paper

Session 2D **Computational Methods/Tools in Thermal-Fluid Systems - IV** **Chairs:** **Ken Blecker (Moderator)** CCDC-AC **Martin Guillot** University of New Orleans	TFEC-2020-36526	**Setare Sadeqi** PhD Student	Wavelet Transform Analysis Applied to Incompressible Flow Field About a Solid Cylinder	Full paper
	TFEC-2020-36663	**Jose Lorenzo Alejandro Barba-Pina** University of Leeds	NUMERICAL MODELLING OF THE OSCILLATORY FLOW OF A BINARY GAS MIXTURE IN A STANDING WAVE ACOUSTIC RESONATOR	Full paper
	TFEC-2020-36700	**Mohammad Naghashnejad** University of Oklahoma	Numerical Modeling of Evaporative Meniscus Between Parallel Plates	Full paper
	TFEC-2020-36703	**Kandukuri Koteswara Rao** IIT Hyderabad	Automated extraction of free-surface and estimation of air entrainment using OpenFOAM	Full paper
	TFEC-2020-36768	**Emel Selamet** Researcher	EFFECT OF THE FIN LOCATION ON HEAT TRANSFER CHARACTERISTICS IN A LATERALLY AND VOLUMETRICALLY HEATED ENCLOSURE	Full paper
	TFEC-2020-36774	**Matthew Barry** University of Pittsburgh	Optimization of Variable Cross-Sectional Area Thermoelectric Elements Through Multi-method Thermal-Electric Coupled Modeling	Full paper
Session 2E **Energy and Sustainability - II** **Chairs:** **Todd Otanicar** Boise State University **Anderson Reis (Moderator)** Federal University of Pará	TFEC-2020-36531	**Kartik Bulusu** The George Washington University	An Ejector-based Refrigeration System as a Sustainable Solution for Disaster Relief	Extended Abstract
	TFEC-2020-36656	**Matthew Barry** University of Pittsburgh	Model Form and Discretization Uncertainty of Thermal-fluid-electric Coupled Thermoelectric Systems	Full paper
	TFEC-2020-31866	**Yi Zheng** Northeastern University	Spectral Selectivity of Multiple Nanoparticles Doped Thin Films	Presentation only
	TFEC-2020-33576	**Saniya LeBlanc** The George Washington University	Cost-Performance Analysis of Solid-State Thermoelectric Energy Conversion	Presentation only
	TFEC-2020-32585	**Hamidreza Shabgard** University of Oklahoma	Thermo-economic analysis of a novel eutectic freeze desalination system using an intermediate cold liquid	Full paper
	TFEC-2020-36676	**Himanshu Tyagi** IIT Ropar	Parametric Analysis between Closed Air Open Water (CAOW) and Closed Water Open Air (CWOA) HDH Cycles	Full paper
Session 2F **Energy Storage Systems - II** **Chairs:** **Todd Bandhauer (Moderator)** Colorado State University **Fangyu Cao** George Mason University	TFEC-2020-36729	**Chi Yan TSO** School of Energy and Environment, City University of Hong Kong	Study of Jumping Droplets with Electrostatic Effects on Biphilic Surfaces for Thermal Energy Storage Systems	Full paper
	TFEC-2020-36760	**Titan Paul** University of South Carolina Aiken	Effect of Water Content on Viscosity of Ionic Liquids (ILs) Based Nanofluids	Full paper
	TFEC-2020-33731	**Emmanuel Nsofor** Southern Illinois University, Carbondale	Melting of Multiple PCM Sets in a Vertically Positioned Heat Exchanger for Enhanced Thermal Energy Storage	Presentation only
	TFEC-2020-36775	**Saeed Tiari** Gannon University	Experimental Investigation of Latent Heat Thermal Energy Storage System Enhanced by Annular and Radial Fins	Presentation only
Session 2G **Condensation** **Chairs and Moderators:** **Kashif Nawaz** Oak Ridge National University **Mohsen Torabi** Baxter International	TFEC-2020-32059	**Ellyn Harges** Auburn University	Effects of surface wettability on frost nucleation under environmental conditions typical of heat pump systems	Full paper
	TFEC-2020-33793	**Alex Rattner** Pennsylvania State University	First Experimental Measurements of Fast Transients in Dropwise Condensation Startup	Presentation only
	TFEC-2020-36103	**Shyam Sunder Yadav** Birla Institute of Technology and Science	Classical Nucleation Theory Based Simulations of Non-equilibrium Condensation of Carbon Dioxide inside Converging-Diverging Nozzles	Full paper
	TFEC-2020-36272	**Hongling Deng** New Jersey Institute of Technology	Numerical simulation of vacuum generation by cooling-controlled steam-condensation	Presentation only

Day 2 — May 27, 2021

9:00-10:00 AM	**TFEC Plenary Lecture 2: On the Breakup and Transport of Crude Oil slicks by Surface Waves and Subsurface Plumes** **Joseph Katz** (Department of Mechanical Engineering, Johns Hopkins University) **Moderator: Michael Plesniak** (George Washington University)
10:15-11:10 AM	**Keynote 4: Substitution of Fossil Fuels with Renewables – a Sustainability Conundrum?** **Stathis Michaelides** (Department of Engineering, Texas Christian University) **Moderator: Ting Wang** (University of New Orleans)
11:15-12:10 PM	**Keynote 5: State of industrial refrigeration under uncertain future of refrigerants in the context of global warming issues** **Zahid Ayub** (President, Isotherm, Inc., Arlington, Texas) **Moderator: Lorenzo Cremaschi** (Auburn University)
12:15-1:10 PM	**Keynote 6: A History of the Development of Engineering Radiation Heat Transfer** **John R. (Jack) Howell** (Ernest Cockrell, Jr., Memorial Chair Emeritus, The University of Texas at Austin) **Moderator: Terry Simon** (University of Minnesota)
1:15-2:30 PM	**Awards 'Luncheon' and Seminar** **Norma Jean Mattei** (Department of Civil Engineering, University of New Orleans) **Moderator: Ting Wang** (University of New Orleans)

2:30–4:00 PM Technical Session 3

Session 3A **Solar Energy Equipment and Processes - I** **Chair and Moderator:** **Anderson Reis** Federal University of Pará	TFEC-2020-32144	**Qun Chen** Tsinghua University	Thermodynamic analyses of a solar-hydrogen energy system based on SBS PV-T and SOEC/SOFC technologies	Extended Abstract
	TFEC-2020-32179	**Ilker Tari** METU	Novel solar dryer for olive mill wastewater	Full paper
	TFEC-2020-32212	**David Hwang** State University of New York at Stony Brook	Laser-assisted manufacturing of building-integrated photovoltaic solar cells	Full paper
	TFEC-2020-36227	**Wisam Hussam** Australian College of Kuwait	Performance Evaluation of a Hybrid Solar Chimney-Photovoltaic Power Plant for Electricity Generation	Full paper
	TFEC-2020-36330	**Saeid Vafaei** Bradley University	SYNTHESIS OF ANISOTROPIC SNO2 NANOPARTICLES FOR SOLAR CELL APPLICATIONS	Full paper
	TFEC-2020-36331	**Saeid Vafaei** Bradley University	Low Temperature Synthesis of SnO2 Semiconductor Nanoparticles: Factors Determining the Characteristics of Produced SnO2	Full paper
Session 3B **Fluid Flow and Heat Transfer in Industrial and Commercial Processes** **Chair and Moderator:** **Matthew Barry** University of Pittsburgh	TFEC-2020-31631	**Wayne Strasser** Liberty University	Simple Feed Inversion Transforms a Slurry Atomizer	Full paper
	TFEC-2020-32536	**Ankur Jain** The University of Texas at Arlington	Enhanced filament-to-filament adhesion in polymer extrusion additive manufacturing through in situ heating	Presentation only
	TFEC-2020-31972	**Kevin Farrell** Heat Transfer Research, Inc.	Shellside Heat Transfer to Air in Four X-shell Heat Exchanger Configurations via 2D CFD Simulation	Full paper
	TFEC-2020-32170	**Gopinath Sahu** IIT Kanpur	HEAT TRANSFER INVESTIGATION OF SPRAY COOLING FOR THERMAL MANAGEMENT OF A HIGH POWER LED	Full paper
	TFEC-2020-32224	**Xianchang Li** Lamar University	STRESS ANALYSIS OF GAS TURBINE BLADE WITH FILM COOLING	Full paper
	TFEC-2020-32381	**Akash Ranjan Pati** NIT, Rourkela	Role of Liquid Pool Properties in Coalescence of Impacting Water Droplet	Full paper
Session 3C **Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer** **Chairs and Moderators:** **Nazia Afrin** Assistant Professor of Mechanical Engineering, ST. MARY'S UNIVERSITY **Khalil Khanafer** Australian College of Kuwait	TFEC-2020-32183	**Kazim Akyuzlu** University of New Orleans	A NUMERICAL AND EXPERIMENTAL STUDY OF LAMINAR AND INTERMITTENTLY TURBULENT BOUNDARY LAYER ON A FLAT PLATE	Full paper
	TFEC-2020-32184	**Kazim Akyuzlu** University of New Orleans	A NUMERICAL AND EXPERIMENTAL STUDY OF UNSTEADY FLOW IN A LID DRIVEN SQUARE CAVITY FOR LAMINAR AND TURBULENT CASES	Full paper
	TFEC-2020-32035	**B.C. Khoo** Professor	On drag reduction and heat transfer in turbulent channel flow over circular dimples: The shift of the deepest point of dimples	Presentation only
	TFEC-2020-36652	**Patrick H Oosthuizen** Queen's University	A Numerical Study of Assisting Mixed Convective Heat Transfer from Narrow Isothermal Inclined Flat Plates	Full paper
	TFEC-2020-32064	**Hou Kuan Tam** Faculty of Science and Technology, University of Macau	EFFECT OF HEATING ON THE FULLY-DEVELOPED FRICTION FACTORS IN HORIZONTAL MINI-TUBES	Full paper
	TFEC-2020-32173	**Anupam Mishra** University of California, Merced	A far-field boundary condition in multi-body dissipative particle dynamics	Presentation only

Session 3D **Heat Exchangers** **Chair and Moderator:** **Ri Li** University of British Columbia	TFEC-2020-32231	**Cheng-Xian Lin** Florida International University	Heat and mass transfer in cross flow transport membrane condenser based heat exchanger: a computational parametric study	Full paper
	TFEC-2020-36764	**Oronzio Manca** Universita' degli Studi della Campania	Numerical investigation on a Heat Exchanger in Aluminum Foam with Flat - Tube	Full paper
	TFEC-2020-36893	**Laith Ismael** University of Missouri Columbia	EXPERIMENTAL STUDY OF COMBINED COMPACT EVAPORATIVE COOLER WITH DESICCANT DEHUMIDIFICATION	Full paper
	TFEC-2020-32956	**Jiajun Xu** University of the District of Columbia	Design and Test of a Direct-Metal-Laser-Sintering (DMLS) Fabricated Microchannel Heat Exchanger with Nano-enhanced Heat Transfer fluid for enhanced heat transfer	Presentation only
Session 3E **Heat/Mass Transfer Enhancement Techniques - I** **Chairs and Moderators:** **Ken Blecker** CCDC-AC **Like Li** Mississippi State University	TFEC-2020-32377	**Malkeet Singh** IIT Kanpur	Influence of Richardson Number on Heat Transfer Characteristics of Impinging Axisymmetric Synthetic Jet	Full paper
	TFEC-2020-32394	**Shankar Durgam** College of Engineering Pune	Conjugate heat transfer enhancement using optimal placement of heated modules under forced convection	Full paper
	TFEC-2020-32462	**Shankar Durgam** College of Engineering Pune	Numerical simulation using multiple printed circuit boards for high heat fluxes air cooling systems	Full paper
	TFEC-2020-36705	**Li Chen** Xi'an Jiaotong University, School of energy and power engineering	Topology optimization for thermal flow based on adjoint lattice Boltzmann method and level set method	Full paper
	TFEC-2020-32535	**Ankur Jain** The University of Texas at Arlington	Theoretical modeling of phase change heat transfer enhancement through a fin	Presentation only
Session 3F **Multiphase Flows** **Chairs and Moderators:** **Nazia Afrin** Assistant Professor of Mechanical Engineering, ST. MARY'S UNIVERSITY **Aziz Rahman** Texas A&M University at Qatar	TFEC-2020-36810	**Carlton Adam** US Army ARDEC	Simulation of Multiphase Flow Regime Transition in a Horizontal Pipe	Full paper
	TFEC-2020-38503	**Yakang Xia** University of British Columbia	INFLUENCE OF SURFACE WETTABILITY ON BUBBLE BEHAVIORS IN POOL BOILING	Presentation only
	TFEC-2020-32139	**Harris Wong** Louisiana State University	The motion of long drops in rectangular microchannels at low capillary numbers	Presentation only
	TFEC-2020-32432	**Gabriela Bran Anleu** Sandia National Labs	Numerical Modeling of Emergency Hydrogen Refueler for Fuel Cell Electric Vehicles	Presentation only
	TFEC-2020-32513	**Han Hu** University of Arkansas	Effect of Nanostructures on the Contact Line Dynamics During Nucleate Boiling	Presentation only
	TFEC-2020-36466	**Armin Bodaghkhani** University of Prince Edward Island	Two-Dimensional Maximum Entropy Principle to Predict Spray Characteristics Due to Wave-Body Interactions	Full paper
Session 3G **Thermo-Fluid Education** **Chairs:** **Yogesh Jaluria (Moderator)** Rutgers University **Mahmud Hasan** University of Houston-Downtown (UHD)	TFEC-2020-32055	**Briana Fisk** USMA	Undergraduate Heat Exchanger Laboratory	Full paper
	TFEC-2020-32230	**Liyong Sun** Penn State Erie	Enhancing Students Learning in Thermal-fluid Sciences Courses Through Daily Life Examples	Extended Abstract
	TFEC-2020-32675	**Jiajun Xu** University of the District of Columbia	Design and development of a subsurface melting head for use in Martian atmospheric conditions	Full paper
	TFEC-2020-36169	**Yongjian Gu** US Merchant Marine Academy	Analysis of Air Cooling and Dehumidification Process Through Cooling Coils	Full paper
	TFEC-2020-36805	**Matthew Burge** University at Buffalo	HANDS-ON HEAT TRANSFER: TRANSIENT LUMPED NATURAL CONVECTION WITH AN EQUIVALENT DIAMETER	Extended Abstract
	TFEC-2020-36806	**Matthew Burge** University at Buffalo	HANDS-ON HEAT TRANSFER: 2D FINITE VOLUME CONDUCTION WITH CONVECTIVE LOSSES	Extended Abstract

4:00–5:30 PM Technical Session 4				
Session 4A **Solar Energy Equipment and Processes - II** **Chair and Moderator:** **Anderson Reis** Federal University of Pará	TFEC-2020-36679	**Apurv Kumar** University of Maryland	Eulerian granular CFD modelling of hydrodynamics of a free-falling particle curtain with particle size distribution	Full paper
	TFEC-2020-36716	**Ravi K** Indian Institute of Technology Delhi	MODELING AND SIMULATION OF DIRECT STEAM GENERATION IN PARABOLIC TROUGH SOLAR COLLECTOR	Full paper
	TFEC-2020-37252	**Saeid Vafaei** Bradley University	Sintering Strategies for Creating 3D TiO2 Nanomaterials for Photovoltaic Applications	Full paper
	TFEC-2020-38471	**Nesrin Ozalp** University of Minnesota Duluth	An Experimental and Numerical Study of a Counter-Current Flow Solar Reactor With Heat Recuperation	Presentation only
Session 4B **Fluid Flow and Heat Transfer in Industrial and Commercial Processes** **Chair and Moderator:** **Matthew Barry** University of Pittsburgh	TFEC-2020-32414	**Angela Ourivio Nieckele** PUC-Rio	Events analysis of unilateral depressurization of pipelines in the presence of condensate	Extended Abstract
	TFEC-2020-36274	**Hongling Deng** New Jersey Institute of Technology	Vacuum-aided spray flash desalination	Full paper
	TFEC-2020-36547	**Marc Olivier Delchini** Oak Ridge National Laboratory	Advanced Thermal-Hydraulic Model of Heat Recovery Steam Generators	Full paper
	TFEC-2020-36751	**Eric Turman** Liberty University	Reducing Ethylene Decompositions in LDPE Reactor Using CFD	Full paper
	TFEC-2020-36767	**Jobaidur Khan** University at Buffalo	PREDICTION OF EROSION AND ACCRETION FROM SOLUTION OF SALT AND WATER OVER PIPE WALLS OF CONDENSER IN A THERMAL POWER PLANT	Full paper
	TFEC-2020-36851	**Hamed Abdul Majeed** University of New Orleans	Experimental Study of Effect of Void Fraction on Flow Continuity in a Siphon	Full paper
Session 4C **Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II** **Chair and Moderator:** **Chris Kobus** Oakland University	TFEC-2020-31716	**Thomas Reif** Reif Industries, P.L.	HEAT-SOURCE DRIVEN CONVECTION IN A CAVITY WITH VARIABLE FIXED/FREE UPPER SURFACE	Full paper
	TFEC-2020-33818	**Derli Amaral** SMU	Disc-shaped body bifurcation flow loss effect on a tree-shaped network	Presentation only
	TFEC-2020-31987	**Fei Duan** Nanyang Technological University	Experiments and Simulation of Drying Patterns for a Sessile Colloidal Droplet	Presentation only
	TFEC-2020-32047	**Ramon Frederick** Universidad de Chile	Horizontal convection in limited domains with two types of boundary condition	Full paper
	TFEC-2020-32461	**Gerardo Diaz** University of California - Merced	A Fundamental Parametric Study And Reaction Kinetics Of Toluene Decomposition Using Non Thermal Plasma	Full paper
	TFEC-2020-36866	**Chris Kobus** Oakland University	An Investigation Into Natural Convection Heat Transfer From Isoflux Horizontal Circular Surfaces Facing Upward	Extended Abstract
Session 4D **Nano and Micro Fluid Applications** **Chair and Moderator:** **Saeid Vafaei** Bradley University	TFEC-2020-36591	**Sohel Murshed** University of Lisbon	An overview of performance and application of nanofluids in compact heat exchangers	Full paper
	TFEC-2020-36592	**Arkadeep Mitra** The University of Texas at Dallas	Facile micro-fabrication techniques for rapid manufacturing of gallium-based liquid metal passive frequency selective surfaces	Presentation only
	TFEC-2020-36669	**Sohel Murshed** University of Lisbon	Convective Heat Transfer Characteristics of Al2O3 Nanofluid in Minitube	Full paper
	TFEC-2020-36792	**Mohammad Mansur Rahman** Sultan Qaboos University	Free convection heat transfer of Al2O3-Cu/water hybrid nanofluid in a rectotrapezoidal enclosure heated uniformly from the bottom wall	Full paper
	TFEC-2020-36694	**Tomer Shockner** Ben Gurion University	Theoretical and Numerical Analysis of Time-Dependent Heat Transfer in Microscale Systems	Presentation only

Session 4E **Heat/Mass Transfer Enhancement Techniques - II** **Chairs and Moderators:** **Khalil Khanafer** Australian College of Kuwait **Rakesh Ranjan** Esgee Technologies, Inc.	TFEC-2020-33558	**Steven Eckels** Kansas State University	Modeling Micro-structured Roughness for Heat Transfer Enhancement	Presentation only
	TFEC-2020-31894	**Oronzio Manca** Universita' degli Studi della Campania	Numerical Investigation on Confined Impinging Slot Jets with Nanofluids in Porous Media	Full paper
	TFEC-2020-31996	**Feng C Lai** University of Oklahoma	Effect of Buoyancy on EHD-Enhanced Forced Convection in a Vertical Channel with Non-Symmetric Electric Field	Full paper
	TFEC-2020-32072	**Paolo Di Marco** University of Pisa	CRITICAL HEAT FLUX ON MICROSTRUCTURED SURFACES IN MICROGRAVITY AND IN THE PRESENCE OF ELECTRIC FIELD: PRELIMINARY RESULTS OF A PARABOLIC FLIGHT CAMPAIGN	Extended Abstract
	TFEC-2020-36527	**Stefano Morcelli** Auburn University	Modeling of Enhanced Air Dehumidification through Electrically Charged Vapor Capturing Electrostatic Droplets	Full paper
	TFEC-2020-36731	**Corey Klinkhamer** University of Windsor	Effects of Stand-off Distance and Jet-to-Jet Spacing on the Heat Transfer Performance of an In-line Array of Submerged Impinging Jets	Full paper
Session 4F **Multiphase Flows** **Chairs and Moderators:** **Kazim Akyuzlu** University of New Orleans **Wayne Strasser** Liberty University **Harris Wong** Louisiana State University	TFEC-2020-31971	**Thibaud Vazquez-Gonzalez** CEA	A VARIATIONAL APPROACH TO DESIGN AN ALE SCHEME FOR N-FLUID FLOWS	Extended Abstract
	TFEC-2020-32101	**Manish Bhendura** Department of Mechanical Engineering, Indian Institute of Technology Kanpur	Estimation of the evaporative heat flux from a heated water body placed within an enclosure	Full paper
	TFEC-2020-32121	**Oyeniyi A. Oyewunmi** Clean Energy Processes (CEP) Laboratory, Imperial College London	Modelling two-phase flows in renewable power generation systems	Full paper
	TFEC-2020-32486	**Riccardo Mereu** Politecnico di Milano	Numerical analysis of stratified two-phase flow in horizontal pipes	Full paper
	TFEC-2020-36020	**Orlando Ayala** Old Dominion University	NUMERICAL STUDY OF WEAR BY EROSION ON BUTTERFLY VALVE DISCS WITH PARTICLE-LADEN LAMINAR FLUID FLOWS	Full paper
	TFEC-2020-36753	**Daniel Wilson** Liberty University	Smart Atomization: Implementation of PID Control in Biosludge Atomizer	Full paper
Session 4G **Refrigeration, Air Conditioning Systems and Refrigerants** **Chair and Moderator:** **Kartik Bulusu** The George Washington University	TFEC-2020-31966	**Chi Yan TSO** School of Energy and Environment, City University of Hong Kong	Numerical Investigation of an Adsorption Cooling System powered by Renewable Energy for Use in a Cavern Environment	Full paper
	TFEC-2020-32105	**Vedant Joshi** University at Buffalo	ESTABLISHING THE NEED FOR CONTEXT-AWARE ADAPTIVE CONTROL FOR ENERGY EFFICIENT HVAC SYSTEMS	Extended Abstract
	TFEC-2020-33577	**Vikrant Aute** University of Maryland	Applications of a novel algorithm for optimization of refrigerant flow configuration in air-to-refrigerant heat exchangers	Presentation only
	TFEC-2020-36531	**Kartik Bulusu** The George Washington University	An Ejector-based Refrigeration System as a Sustainable Solution for Disaster Relief	Extended Abstract
6:00-7:00 PM **Moderators:** **Ting Wang** University of New Orleans **Yogesh Jaluria** Rutgers University	**Networking**			
	A Virtual Tour of New Orleans			
7:00-8:30 PM **The Sustainability Tank Challenge: Leadership and Innovation in a Sustainable Built Environment** **Session Chair:** **Dr. Yimin Zhu** Louisiana State University **Session Co-Chair:** **Dr. Tracey Rizzuto** Louisiana State University	**Green space as a preventive antidepressant during COVID-19** **Fernando J. Claudio Rodriguez** (University of North Carolina at Charlotte), **Yuwen Yang** (The University of Hong Kong)			
	How the built environment affects older people's levels of physical activity: A research on communities in Hong Kong **Samantha Chacon** (Louisiana State University), **Emma Liqun Xiang** (The Hong Kong Polytechnic University)			
	Urban scale passive design modeling **Adedayo Johnson Ogungbile** (The Hong Kong Polytechnic University), **Kris Govertsen** (Northeastern University)			
	Rethinking the residential opening: A case study of Hong Kong **Stephen Grotz** (The University of North Carolina at Charlotte), **Vikrom Laovisutthichai** (The University of Hong Kong)			
	Further application of the solar window in renewable energy technology **Brian Kohut** (Cleveland State University), **Shu-Ping Niu** (The Hong Kong Polytechnic University)			

Day 3 — May 28, 2021

9:00-10:00 AM	**TFEC Plenary Lecture 3: The Recent Advancements and Aero-thermal Challenges for Modern Aeroengines** **Om Sharma** (Aerodynamics and Gas Turbines, United Technologies Research Center (UTRC)) **Moderator: Ting Wang** (University of New Orleans)			
10:15-11:10 AM	**Keynote 7: Characterizing the Spray Near-Field Region Using X-rays** **Theodore (Ted) J. Heindel** (Center for Multiphase Flow Research and Education, Department of Mechanical Engineering, Iowa State University) **Moderator: Francine Battaglia** (University of Buffalo)			
11:15-12:10 PM	**Keynote 8: Gas Turbine Power Augmentation by Inlet Air Fogging** **Thomas Mee** (Mee Industries Inc.) **Moderator: Ting Wang** (University of New Orleans)			
12:15-1:10 PM	**Keynote 9: Thermally Excited Oscillating Motion and Heat Transfer Enhancement in Oscillating Heat Pipes** **Hongbin (Bill) Ma** (Department of Mechanical & Aerospace Engineering, University of Missouri) **Moderator: Ting Wang** (University of New Orleans)			
1:15–3:45 PM Special Session				
Special Session - Fluid Mechanics of Speech **Chairs:** **Byron Erath** Clarkson University **Sean Peterson** University of Waterloo	TFEC-2020-37130	**Xudong Zheng** University of Maine	Multi-physics computational modeling of speech - from neuromuscular muscle activation to flow-structure-acoustic interaction of voice production	Presentation only
	TFEC-2020-37111	**Anil Kumar Palaparthi** University of Utah	Wave reflection and transmission line algorithms for time-domain speech simulation	Presentation only
	TFEC-2020-37505	**Scott Thomson** Brigham Young University	Recent advances in synthetic vocal fold modeling	Presentation only
	TFEC-2020-33580	**Byron Erath** Clarkson University	High-fidelity intraglottal pressure measurements in a synthetic, self-oscillating silicone model of the vocal folds	Presentation only
	TFEC-2020-33582	**Matias Zanartu** Universidad Tecnica Federico Santa Maria	Why is the clinical assessment of vocal aerodynamics relevant?	Presentation only
	TFEC-2020-33773	**Sean Peterson** University of Waterloo	Influence of fluid flow model on finite element model parameter estimates using Bayesian inference	Presentation only
	TFEC-2020-37068	**Zhaoyan Zhang** University of California	Toward the development of reduced-order models of the glottal flow during voice production	Presentation only
	TFEC-2020-38187	**Sid Khosla** University of Cincinnati	The assumption of atmospheric pressure downstream of the flow separation point is likely only valid for lower subglottal pressures (soft phonation)	Presentation only
	TFEC-2020-38551	**Liran Oren** University of Cincinnati	Effects of velopharyngeal openings on flow characteristics and aeroacoustics sound mechanisms during sibilant sound with audible nasal emission	Presentation only
1:15–2:30 PM Panel: Industrial Multiphase CFD				
Panel: Industrial Multiphase CFD: Risks, Rewards, and Remorse **Chair:** **Wayne Strasser** Liberty University	TFEC-2020-33725	**Pascal Brocheny** Framatome	CFD in the Nuclear Industry: the good, the bad, and the ugly	Presentation only
	TFEC-2020-33675	**Kevin Farrell** Heat Transfer Research, Inc.	Simulating Two-phase Flow in Heat Exchanger Applications: Value of Xist®	Presentation only
	TFEC-2020-33592	**Haiwen Ge** Texas Tech University	3D CFD modeling of spray combustion for internal combustion engines	Presentation only
	TFEC-2020-33891	**Rigoberto Morales** Federal University of Technology – Paraná (UTFPR)	Some Limitations of CFD to predict Gas-Liquid Flows	Presentation only
2:30–4:00 PM Technical Session 5				
Session 5A **Turbulent Flows** **Chair:** **Ethan Languri (Moderator)** Tennessee Tech University	TFEC-2020-32185	**Basheer Ahmad Khan** IIT Kanpur	The turbulent flow and heat transfer over a heated cube placed in non- heated surrounding cubes by varying streamwise and spanwise pitch: A DNS study	Full paper
	TFEC-2020-32374	**Hitoshi Suto** Central Research Institute of Electric Power Industry	Interactions between free-stream turbulence and turbulent boundary layer generated by PID control and linear forcing	Extended Abstract
	TFEC-2020-36217	**Rozie Zangeneh** Lawrence Tech University	Numerical Simulation of Laminar-Turbulent Transition in Hypersonic Flows: A Wall-modeled LES Approach	Full paper
	TFEC-2020-36522	**Ardalan Javadi** The University of Waterloo	Incorporating Cross-flow Effects into the Spalart-Allmaras Turbulent Transition Model	Full paper
	TFEC-2020-36698	**Vishal Srikanth** North Carolina State University	Turbulent microscale flow field prediction in porous media using Convolutional Neural Networks	Full paper
	TFEC-2020-36761	**Ching-Wei Huang** NC State Univeristy	EFFECT OF MICROSCALE TURBULENT STRUCTURES DYNAMICS ON FORCED CONVECTION IN TURBULENT POROUS MEDIA FLOW	Full paper

Session 5B **Advanced Energy Systems** **Chair and Moderator:** **Aziz Rahman** Texas A&M University at Qatar	TFEC-2020-31982	**Yoichi Murakami** Tokyo Institute of Technology	Thermoelectrochemical Conversion Integrated into Forced Convection Cooling	Presentation only
	TFEC-2020-36015	**Aisha Sa'ad** Nigerian Defence Academy	EXERGY ANALYSIS OF A GAS TURBINE POWER PLANT USING JATROPHA BIODIESEL, CONVENTIONAL DIESEL AND NATURAL GAS	Extended Abstract
	TFEC-2020-36727	**Mahyar Pourghadsemi** PhD candidate	Water flow and heat transfer within micro-scale heat sinks with hydrophobic surfaces	Full paper
Session 5C **Fluid Flow and Heat Transfer in Materials Processing and Manufacturing** **Chair and Moderator:** **Laurie Florio** US ARMY DEVCOM-AC	TFEC-2020-32772	**Patrick Mensah** Southern University and A&M College	Effect of Annealing on Thermal Properties of Selective Laser Melting Processed Materials: Aluminum 316L Stainless Steel and Titanium Alloys	Presentation only
	TFEC-2020-32196	**Gretar Tryggvason** Johns Hopkins University	Computational Studies of Froth Flotation	Extended Abstract
	TFEC-2020-32270	**Luyang (peter) Ren** MAME	Heat Transfer at casting/mold interface in pressurized solidification of Al Alloy A380	Full paper
	TFEC-2020-36670	**Nithin S Panicker** UT battelle	Computational modeling and simulation of Aluminium smelting process using OpenFOAM	Full paper
	TFEC-2020-36770	**Martin Guillot** University of New Orleans	INCIDENT HEAT FLUX CHARACTERIZATION DURING PHOTONIC CURING	Full paper
	TFEC-2020-32032	**Like Li** Mississippi State University	Lattice Boltzmann – phase field method for dendritic growth modeling	Full paper
Session 5D **Radiation Heat Transfer and Computational Methods/ Tools in Thermal-Fluid Systems** **Chair and Moderator:** **Darrell W. Pepper** University of Nevada	TFEC-2020-36114	**Vikas Ramesh Patil** ETH Zurich	COUPLING THE MONTE CARLO METHOD WITH FLUID FLOW MODELING IN A HIGH-TEMPERATURE VOLUMETRIC SOLAR AIR RECEIVER	Presentation only
	TFEC-2020-33760	**Yue Guan** Texas Tech University	A New Meshless "Fragile Points Method" and A Local Variational Iteration Method for General Transient Heat Conduction in Anisotropic Nonhomogeneous Media	Presentation only
	TFEC-2020-32290	**Marcia Huber** National Institute of Standards and Technology	TOOLS FOR THERMODYNAMIC AND TRANSPORT MODELS FOR WORKING FLUIDS	Presentation only
	TFEC-2020-32085	**Youn-Jea Kim** Sungkyunkwan University	EFFECTS OF NOZZLE CONFIGURATIONS ON THE PERFORMANCE OF LOW-HEAD HYDROTURBINE	Presentation only
	TFEC-2020-32065	**Youn-Jea Kim** Sungkyunkwan University	An Investigation of the Liquid Forced Convection Cooling of a Lithium-ion Battery Using the Multi-scale Multi-domain Method	Presentation only
	TFEC-2020-32051	**Darrell W. Pepper** University of Nevada	A Combined Meshless, Boundary Element, and Finite Element Method for Computational Heat Transfer	Presentation only
Session 5E **Transportation** **Chair and Moderator:** **Nazia Munir** PhD candidate, Virginia Polytechnic Institute and State University	TFEC-2020-35444	**Nnamdi Okafor** University of Alabama at Birmingham	Solar and Multi-Generation Modeling Based on a Natural Gas Driven Internal Combustion Engine	Extended Abstract
	TFEC-2020-36662	**Ratnak Sok** Waseda University	A Modeling Study on Fuel Consumption Improvement of a Light-Duty CNG Truck Equipped with a Hybrid Powertrain	Full paper
Session 5F **Heat Pipes and Related Devices** **Chair and Moderator:** **Martin Guillot** University of New Orleans	TFEC-2020-32191	**Xu Huang** KU Leuven	A ONE-DIMENSIONAL MODEL FOR LOOP HEAT PIPES CONSIDERING THE LIQUID-VAPOR INTERFACE MOVEMENT	Full paper
	TFEC-2020-32134	**Salar Saadatian** Louisiana State University	Heat and mass transfer in a flat heat pipe with a circular-capillary wick under small imposed temperature differences	Presentation only

4:00–5:30 PM Technical Session 6				
Session 6A **Natural and Built Environments** **Chair and Moderator:** **Saptarshi Basu** Staff Systems Engineer, New Product Development, Product Lifecycle, Illumina	TFEC-2020-32539	**Yong Tao** Cleveland State University	Effect of Occupant's Acoustic Comfort on Energy Consumption of Building Systems	Extended Abstract
	TFEC-2020-32855	**Anatoliy Pavlenko** Kielce University of Technology	Thermodynamic features of the formation of hydrocarbon hydrates	Full paper
	TFEC-2020-36784	**Jorge Kurita** Universidad Nacional de Asuncion	Ventilation CFD Analysis at a Pharmaceutical Plant as a Tool for Air Safety Verification under COVID-19 context, a Case Study	Full paper
Session 6B **Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids** **Chair and Moderator:** **Laurie Florio** US ARMY DEVCOM-AC	TFEC-2020-32097	**S A Patel** IIT Ropar	Laminar natural convection from differentially heated horizontal cylinders in a viscoplastic fluid filled square enclosure	Full paper
	TFEC-2020-36118	**Mohammad Huque** Memorial University of Newfoundland	Study of formation damage with Flowzan bio polymer as drilling mud using experimental and computational methods	Full paper
Session 6C **Boiling** **Chair and Moderator:** **Saeid Vafaei** Bradley University	TFEC-2020-32115	**Andrea Lucchini** Politecnico di Milano	Flow patterns during flow boiling and convective condensation of R1234ze(E) inside a microfin tube	Full paper
	TFEC-2020-32221	**Krishna Kota** New Mexico State University	Considerations for achieving boiling heat transfer enhancements on binary surfaces	Presentation only
	TFEC-2020-32256	**Ri Li** University of British Columbia	Boiling of Liquid Drops Impacting Heated Micro-textured Surfaces	Presentation only
	TFEC-2020-36174	**Lubomir Bures** Nuclear Energy and Safety, Paul Scherrer Institute, Switzerland	Analysis of dynamics of microlayer formation and destruction in nucleate boiling	Full paper
	TFEC-2020-36258	**Nathan Eason** The University of Memphis	Experimental Study of Confined Pool Boiling Heat Transfer	Full paper
Session 6D **Heat/Mass Transfer Enhancement Techniques - II** **Chair and Moderator:** **Martin Guillot** University of New Orleans	TFEC-2020-36785	**Turki Almudhhi** Pennsylvania State University	Heat Transfer Enhancement of a Zirconium Heater Rod Using a Chromium Coating During Quenching	Full paper
	TFEC-2020-36836	**Ramy Abdelmaksoud** Energy Conversion and Conservation Center	A Review on Thermal-Fluid Behavior in Sweeping Jet Fluidic Oscillators	Full paper
	TFEC-2020-33054	**Haibo Ma** Purdue University Northwest	Investigation of Spray Cooling Uniformity and Intensity during Continuous Casting of Steel	Presentation only
	TFEC-2020-32462	**Shankar Durgam** College of Engineering Pune	Numerical simulation using multiple printed circuit boards for high heat fluxes air cooling systems	Full paper
Session 6E **Flow and Heat Transfer in Biological/Biomedical Systems** **Chair and Moderator:** **Hansen Mansy** University of Central Florida	TFEC-2020-36779	**Arka Das** PhD candidate	Computational Investigation of Magneto-Hydrodynamic Assist Device for Actively Powered Fontan Circulations	Full paper
	TFEC-2020-33613	**Nazia Afrin** Assistant Professor of Mechanical Engineering, ST. MARY'S UNIVERSITY	Optimization of thermal damage to living biological tissues by Kriging Surrogate Model	Presentation only
	TFEC-2020-36300	**Sathish Kumar** Gurupatham	Thermal Properties Of Clove Seed	Full paper
	TFEC-2020-36675	**Himanshu Tyagi** IIT Ropar	Numerical Investigation of Influence of Surface Deposition of Nanoparticles in Tumors during Nanofluid Injection	Extended Abstract
	TFEC-2020-36772	**Arka Das** PhD candidate	Multiscale Investigation of Hybrid Comprehensive Stage II Circulation	Presentation only
Session 6F **Experiments Measurements in Fluid Mechanics** **Chair and Moderator:** **Wayne Strasser** Liberty University	TFEC-2020-32455	**Riccardo Mereu** Politecnico di Milano	Integrated Numerical Approach for Wind Energy Aerodynamics and Energy Output Estimation	Full paper
	TFEC-2020-32520	**Robert Ahlman** Cleveland State University	EFFECTS OF TERRAIN AND ATMOSPHERIC THERMAL STABILITY ON WIND VELOCITY PROFILES	Extended Abstract
6:00-6:30 PM	**Closing Ceremony**			

Accepted Articles

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-30961	**Conductive thermal diode based on two phase-change materials**	Heat/mass transfer enhancement techniques - PO	**Suraju Olawale Kasali** Institute Pprime	
TFEC-2020-30962	**Counterintuitive Concepts of Thermofluids: Vorticity and Vortex**	Thermo-fluid education - PO	**Bijay Sultanian** Takaniki Communications, LLC	
TFEC-2020-30964	**A Quick Method to Draw Dimensionless Velocity Diagrams for Axial-Flow Compressors and Turbines for the Specified Flow Coefficient, Loading Coefficient, and Degree of Reaction**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Bijay Sultanian** Takaniki Communications, LLC	
TFEC-2020-31352	**Developing capabilities to model solid-liquid phase change in compressible flow using computational fluid dynamics based methods**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Laurie Florio** US ARMY DEVCOM-AC	
TFEC-2020-31418	**Performance Analysis of Thermal Power Plant Condenser and its monitoring under Variable Parameters**	Engineering Equipment and Environmental Systems - I	**Sidharth Chakrabarti** Professor	Deepak Patel
TFEC-2020-31431	**The influence of Reynolds number and gravity on the distribution of settling, inertial particles in turbulent flow**	Turbulent flows - I	**Mohammadreza Momenifar** Duke University	
TFEC-2020-31439	**DESIGN OF A REMOTELY OPERATED FLYING AMBULANCE WITH HIGH PAYLOAD CAPACITY**	Aerospace Applications	**Mohammed Mayeed** Kennesaw State University	
TFEC-2020-31470	**MIXED CONVECTION FLUID FLOW OVER A VERTICAL CONE SATURATED IN POROUS MEDIUM WITH DOUBLE DISPERSION AND CHEMICAL REACTION EFFECTS**	Multiphase Flow - PO	**Om Prakash Meena** Shaheed Bhagat Singh College, University of Delhi	Pranitha J.
TFEC-2020-31485	**Prediction of CHF in Helical Coils**	Multiphase flow - II	**Mirza Shah** Engineering Research Associates	
TFEC-2020-31631	**Simple Feed Inversion Transforms a Slurry Atomizer**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Wayne Strasser** Liberty University	
TFEC-2020-31707	**An experimental investigation of the turbulent flow past two transverse bars in close proximity**	Turbulent Flows - PO	**Ali Hamed** Union College	
TFEC-2020-31716	**HEAT-SOURCE DRIVEN CONVECTION IN A CAVITY WITH VARIABLE FIXED/FREE UPPER SURFACE**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II	**Thomas Reif** Reif Industries, P.L.	Abdelkhalik Shabayek
TFEC-2020-31784	**THE EFFECT OF EVAPORATOR_CONDENSER COUPLED PATTERN ON THE PERFORMANCE OF A CLOSED LOOP PULSATING HEAT PIPE AT VARIOUS HEAT LOADS**	Heat Pipes - PO	**Sungyong Jung** Chosun University	Hlbal Ahmad, Seongkuen Kim
TFEC-2020-31785	**Hollow Silica Nanospheres as a Possible Pathway Towards Thermal Super Insulation Materials**	Energy and Sustainability - I	**Bjørn Petter Jelle** Norwegian University of Science and Technology (NTNU) / SINTEF Community	Sohrab Alex Mofid, Tao Gao, Mathieu Grandcolas
TFEC-2020-31797	**Optimal tilt angle of a vortex generator using metaheuristic techniques**	Heat/mass transfer enhancement techniques - PO	**Alberto Menéndez Pérez** Universidad Tecnológica de la Habana	
TFEC-2020-31815	**A REVIEW ON LOW TEMPERATURE PRODUCTION OF TIO2 NANOPARTICLES FOR PEROVSKITE SOLAR CELLS**	Energy and Sustainability - I	**Saeid Vafaei** Bradley University	Kazuhiro Manseki, Takashi Sugiura
TFEC-2020-31816	**Nanofluid boiling and sintering for Dye-Sensitized and Perovskite solar cells**	Energy and Sustainability - I	**Saeid Vafaei** Bradley University	Kazuhiro Manseki, Takashi Sugiura, Blen Teferi, Bryan Olefsky, Robert Svidron, Udo Schnupf
TFEC-2020-31821	**DYNAMICS OF NANOFLUID TRIPLE LINE: EFFECTS OF NANOPARTICLES**	Nano and Micro Fluid Applications - II	**Saeid Vafaei** Bradley University	
TFEC-2020-31831	**THERMAL CHARACTERIZATION OF ASSEMBLED PROPELLANT INCREMENTS EXPOSED TO SEVERAL DISCRETE THERMAL ENVIRONMENTS**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Ken Blecker** CCDC-AC	Hamid Hadim
TFEC-2020-31889	**Sublimating Paradichlorobenzene Spheres in a Natural Convection Environment**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II	**William Janna** University of Memphis	Jeffry Marchetta, Chris Anderson
TFEC-2020-31893	**Gaseous Slip Flow in Rectangular Microchannel Effected by Inclined Low Magnetic Field Using First Order Boundary conditions**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II	**Khaleel Al Khasawneh** Associate Professor, Department of Mechanical Engineering, Jordan University of Science and Technology	Duaa Kharouf, Mohammad Tarawneh Tarawneh
TFEC-2020-31894	**Numerical Investigation on Confined Impinging Slot Jets with Nanofluids in Porous Media**	Heat/mass transfer enhancement techniques - II	**Oronzio Manca** Universita' degli Studi della Campania	Bernardo Buonomo, Anna di Pasqua, Ghofrane Sekrani, Sébastien Poncet
TFEC-2020-31895	**Lithium-ion batteries thermal control by metal foam with phase change materials**	Engineering Equipment and Environmental Systems - I	**Oronzio Manca** Universita' degli Studi della Campania	Bernardo Buonomo, Davide Ercole, Ferdinando Menale
TFEC-2020-31917	**Thermal Analysis of the Internal Climate Condition of a House Using a Computational Model**	Natural and Built Environments	**Tunde Bello-Ochende** University of Cape Town	Christopher Knutsen

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-31920	**Direct Numerical Simulations of Three Dimensional Secondary Streaming of Oscillating Flows through a Cylindrical Pellet**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Yan Su** University of Macau	Liyong Sun
TFEC-2020-31934	**Energy Savings in Office Building by Solar Window Films in Summer of Kuwait**	Natural and Built Environments	**Seyed Amir Abbas Oloomi** Assistant Professor, Department of Mechanical Engineering,Yazd Branch, Islamic Azad University	Ahmad Sedaghat, S.A.A. Oloomi, Mahdi Ashtian Malayer, Farhad Sabri, Fadi Alkhatib, Hayder Salem, Mohammad Sabati, Waqar Jan Zafar, Amirhossein Negahi
TFEC-2020-31936	**Fluid Flow in a Vertical or Horizontal Deposition Process**	Impact of Brian Spalding on Fluid & Thermal Sciences	**Yogesh Jaluria** Rutgers University	
TFEC-2020-31937	**Thermal Effects on Local Water Bodies due to Changes in the Environment**	Engineering Equipment and Environmental Systems - PO	**Yogesh Jaluria** Rutgers University	
TFEC-2020-31955	**IMPACT OF A DIFFUSER ON SOLAR CHIMNEY POWER PLANT OUTPUT**	Energy and Sustainability - I	**Vedant Joshi** University at Buffalo	Francine Battaglia, Darsh Nathawani
TFEC-2020-31958	**THE EFFECT OF WING CORRUGATION ON INSECT FORWARD FLIGHT**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Munjal Shah** University at Buffalo	Francine Battaglia, Javid Bayandor
TFEC-2020-31963	**Flow dynamical study of high-solids sludge in an anaerobic digester by experiment and numerical simulation**	Engineering Equipment and Environmental Systems - I	**Zhuo Li** Tongji University	Zhigen Wu, Jingsi Zhang, Wenquan Tao
TFEC-2020-31966	**Numerical Investigation of an Adsorption Cooling System powered by Renewable Energy for Use in a Cavern Environment**	Refrigeration, Air conditioning systems and refrigerants - I	**Chi Yan TSO** School of Energy and Environment, City University of Hong Kong	Shengxi Bai, Tsz Chung Ho, Hau Him Lee
TFEC-2020-31971	**A VARIATIONAL APPROACH TO DESIGN AN ALE SCHEME FOR N-FLUID FLOWS**	Multiphase flow - II	**Thibaud Vazquez-Gonzalez** CEA	Antoine Llor
TFEC-2020-31972	**Shellside Heat Transfer to Air in Four X-shell Heat Exchanger Configurations via 2D CFD Simulation**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Kevin Farrell** Heat Transfer Research, Inc.	
TFEC-2020-31975	**Numerical simulation of heat transfer for thermal developing flow in elliptical microchannels with constant heat flux**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - II	**Liangbin Su** Beijing Jiaotong University	Zhipeng Duan, Hao Ma
TFEC-2020-31982	**Thermoelectrochemical Conversion Integrated into Forced Convection Cooling**	Advanced Energy Systems - PO	**Yoichi Murakami** Tokyo Institute of Technology	Yutaka Ikeda, Kazuki Fukui
TFEC-2020-31987	**Experiments and Simulation of Drying Patterns for a Sessile Colloidal Droplet**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - II	**Fei Duan** Nanyang Technological University	Junheng Ren, Alexandru Crivoi, Lu Shen
TFEC-2020-31988	**Local Heat Transfer inside Moving Liquid Film Upon Drops Impact**	Multiphase flow - II	**Gangtao Liang** Dalian University of Technology	Liuzhu Chen, Tianjiao Wang, Shengqiang Shen
TFEC-2020-31990	**A study on the heat exchanger for gas engine heat recovery using the corona wind**	Heat exchangers: Compact, novel, networks - PO	**Dongho Shin** Korea Institute of Science and Technology	Youwhan Shin, Sun Uk Kim
TFEC-2020-31992	**A Differential Evolution Algorithm for Parameter Retrieval in Solar Thermal Collector with Single Glass Cover**	Energy and Sustainability - I	**Ranjan Das** Indian Institute of Technology Ropar	
TFEC-2020-31996	**Effect of Buoyancy on EHD-Enhanced Forced Convection in a Vertical Channel with Non-Symmetric Electric Field**	Heat/mass transfer enhancement techniques - II	**Feng C Lai** University of Oklahoma	S. T. Cheng, J. C. Leong
TFEC-2020-31999	**Numerical investigation on the effect of magnetic field in convective heat transfer in ferrofluids**	Nano and Micro Fluid Applications - II	**Oronzio Manca** Universita' degli Studi della Campania	Bernardo Buonomo, Davide Ercole, Salvatore Pragliola
TFEC-2020-32000	**Thermally Developing Laminar Liquid Flow and Heat Transfer in Microtubes at Slip Regime**	Heat/mass transfer enhancement techniques - II	**Wenchi Gong** Chinese Academy of Sciences University	
TFEC-2020-32001	**Thermal blanket on Alpha Magnetic Spectrometer**	Aerospace Applications	**Fei Yang** Shandong University	Qie Sun, Lin Cheng, Burger Joseph
TFEC-2020-32004	**PARABOLIC TROUGH COLLECTOR (PTC) INTEGRATED SOLAR HEAT FOR INDUSTRIAL PROCESSES (SHIP) APPLICATION: A CASE STUDY**	Solar energy equipment and processes - PO	**Deniz Pinarli** Middle East Technical University	Özgür Bayer
TFEC-2020-32006	**Numerical Optimization of a Heat Exchanger with Slit Fins and Vortex Generators using Genetic Algorithms.**	Heat exchangers: Compact, novel, networks - PO	**Ruben Borrajo** Technological University of Habana José Antonio Echeverría	Alberto Menéndez Pérez, Roberto Rios Moreno
TFEC-2020-32023	**Steady flow of Bingham plastic fluids past a sphere in a tapered tube**	Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids	**Lubhani Mishra** Pandit Deendayal Petroleum University	
TFEC-2020-32031	**A finite element method for compressible, turbulent multiphase flow with heat transfer**	Multiphase flow - II	**David Carrington** Los Alamos National Laboratory	Jiajia Waters
TFEC-2020-32032	**Lattice Boltzmann – phase field method for dendritic growth modeling**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Like Li** Mississippi State University	Nanqiao Wang

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32035	**On drag reduction and heat transfer in turbulent channel flow over circular dimples: The shift of the deepest point of dimples**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - PO	**B.C. Khoo** Professor	Jonathan Chien Ming Tay, Yong Eng
TFEC-2020-32047	**Horizontal convection in limited domains with two types of boundary condition**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - II	**Ramon Frederick** Universidad de Chile	
TFEC-2020-32048	**Steady – state quantitative and qualitative characteristics of geothermal energy extracted by Heat Pumps: Geothermal Energy Limit**	Heat Pump	**Eugene Nikiforovich** Head of Department	Olga Kordas
TFEC-2020-32049	**Higher-order LES of supersonic under-expanded impinging jets**	Aerospace Applications	**Abhilash Chandy** Indian Institute of Technology Bombay	Aniruddha Sinha, Shabeeb NP, Jnan Bhaskar, Ranjit Singh
TFEC-2020-32051	**A Combined Meshless, Boundary Element, and Finite Element Method for Computational Heat Transfer**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Darrell W. Pepper** University of Nevada	
TFEC-2020-32054	**An Efficiency Optimization of a Modular Vertical Axis Wind Turbine**	Wind turbine aerodynamics and control	**Luz Amaya-Bower** CCSU	Jefferson Bien-Aime, Corey Clark, Franklin MacDonald
TFEC-2020-32055	**Undergraduate Heat Exchanger Laboratory**	Thermo-fluid education - I	**Briana Fisk** USMA	
TFEC-2020-32057	**Flow of a non-Newtonian suspension in wellbore**	Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids	**Chengcheng Tao** CCSU	Barbara Kutchko, Eilis Rosenbaum, Mehrdad Massoudi
TFEC-2020-32059	**Effects of surface wettability on frost nucleation under environmental conditions typical of heat pump systems**	Condensation	**Ellyn Harges** Auburn University	Burak Adanur, Lorenzo Cremaschi
TFEC-2020-32063	**Optimal pin-fin arrays with variable fin density in natural convection**	Heat/mass transfer enhancement techniques - I	**Young Jin Lee** Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology	Sung Jin Kim
TFEC-2020-32064	**EFFECT OF HEATING ON THE FULLY-DEVELOPED FRICTION FACTORS IN HORIZONTAL MINI-TUBES**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - PO	**Hou Kuan Tam** Faculty of Science and Technology, University of Macau	Lap Mou Tam, Afshin J. Ghajar, Yu Xiang Xu
TFEC-2020-32065	**An Investigation of the Liquid Forced Convection Cooling of a Lithium-ion Battery Using the Multi-scale Multi-domain Method**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Youn-Jea Kim** Sungkyunkwan University	
TFEC-2020-32068	**Entropy Generation Analysis of Recharging Microchannel Using Water-Based Nanofluids**	Nano and Micro Fluid Applications - II	**Manoj Kumar Moharana** National Institute of Technology Rourkela	Sangram Kumar Samal
TFEC-2020-32072	**CRITICAL HEAT FLUX ON MICROSTRUCTURED SURFACES IN MICROGRAVITY AND IN THE PRESENCE OF ELECTRIC FIELD: PRELIMINARY RESULTS OF A PARABOLIC FLIGHT CAMPAIGN**	Heat/mass transfer enhancement techniques - II	**Paolo Di Marco** University of Pisa	Alekos I. Garivalis, Giacomo Manfredini, Artyom Kossolapov, Matteo Bucci
TFEC-2020-32075	**Heat penetration reduction by bubble injections in PCM walls of buildings**	Energy Storage Systems - I	**Sarng Woo Karng** Korea Institute of Science & Technology	
TFEC-2020-32077	**Effect of metal nanoparticles addition on alternative and conventional jet fuel sprays at high operating conditions**	Nano and Micro Fluid Applications - II	**Kumaran Kannaiyan** Texas A&M University at Qatar	Reza Sadr
TFEC-2020-32080	**Lattice Boltzmann Simulation on Heat and Mass Transfer of Nanofluids**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Yong Shi** University of Nottingham Ningbo China	Hang Kang
TFEC-2020-32084	**Experimental and numerical study of heat transfer characteristics of an oil-free valved linear compressor**	Refrigeration, Air conditioning systems and refrigerants - I	**Jian Sun** Institute of Physics and Chemistry, Chinese Academy of Sciences	Jianguo Li, Chengzhan Li, Jinghui Cai
TFEC-2020-32085	**EFFECTS OF NOZZLE CONFIGURATIONS ON THE PERFORMANCE OF LOW-HEAD HYDROTURBINE**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Youn-Jea Kim** Sungkyunkwan University	
TFEC-2020-32086	**Inverse heat conduction during quenching of moving metal plate by array of water jets**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Suresh babu Gopalkrishna** Institute of Fluid Dynamics and Thermodynamics, Otto von Guericke University Magdeburg	Eckehard Specht
TFEC-2020-32090	**Effect of the self-rewetting fluids on the flat plate pulsating heat pipe operation under microgravity conditions**	Heat Pipes	**Maksym Slobodeniuk** IPSA, Direction de la Recherche et de l'Innovation de l'IPSA; Pprime Institute Université de Poitiers	Vincent Ayel, Remi Bertossi, Cyril Romestant, Yves Bertin
TFEC-2020-32097	**Laminar natural convection from differentially heated horizontal cylinders in a viscoplastic fluid filled square enclosure**	Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids	**S A Patel** IIT Ropar	R P Chhabra, A K Baranwal
TFEC-2020-32101	**Estimation of the evaporative heat flux from a heated water body placed within an enclosure**	Multiphase flow - II	**Manish Bhendura** Department of Mechanical Engineering, Indian Institute of Technology Kanpur	Sameer Khandekar, Manish Bhendura, Krishnamurthy Muralidhar

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32104	**THERMAL CHARACTERIZATION OF EQUIVALENT WALLS IN EXISTING BUILDING USING OPTIMIZATION APPROACH**	Energy and Sustainability - I	**Khalil Khanafer** Australian College of Kuwait	
TFEC-2020-32105	**ESTABLISHING THE NEED FOR CONTEXT-AWARE ADAPTIVE CONTROL FOR ENERGY EFFICIENT HVAC SYSTEMS**	Refrigeration, Air conditioning systems and refrigerants - I	**Vedant Joshi** University at Buffalo	Farrokh Jazizadeh, Francine Battaglia
TFEC-2020-32106	**Diagnostics of defects of thermal protections inflatable re-entry vehicles**	Aerospace Applications	**Alena Morzhukhina** Moscow Aviation Institute	Oleg Alifanov, Aleksey Nenarokomov, Dmitry Titov, Valery Finchenko, Kirill Nenarokomov
TFEC-2020-32107	**Thermal Characteristics of a Novel Piezoelectric Fan**	Heat/mass transfer enhancement techniques - I	**Jingru Benner** Western New England University	
TFEC-2020-32108	**REFRIGERATION WITH WASTE HEAT BY USING A THERMAL-COMPRESSION HEAT PUMP**	Heat Pump	**Hanfei Chen** ThermoLift, Inc.	Jon P. Longtin, Peter Hofbauer
TFEC-2020-32111	**Taylor Dispersion of Miscible CO2 Enhanced Oil Recovery in Nanopores: A Molecular Dynamics Study**	Nano and Micro Fluid Applications - II	**Min Chen** Tsinghua University	Yusi Zhou
TFEC-2020-32115	**Flow patterns during flow boiling and convective condensation of R1234ze(E) inside a microfin tube.**	Boiling	**Andrea Lucchini** Politecnico di Milano	Luigi Colombo, Alfonso Niro, Thanh Phan, Paola Pittoni, Luca Molinaroli
TFEC-2020-32116	**Entropy Generation in nanofluid flow in an inclined channel filled with porous medium having variable permeability considering wall heat flux**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - I	**Lalrinpuia Tlau** National Institute of Technology Mizoram	Surender Ontela
TFEC-2020-32121	**Modelling two-phase flows in renewable power generation systems**	Multiphase flow - II	**Oyeniyi A. Oyewunmi** Clean Energy Processes (CEP) Laboratory, Imperial College London	
TFEC-2020-32124	**Ground Test Strategy for a Nuclear Thermal Propulsion Engine**	Aerospace Applications - PO	**David Coote** NASA	
TFEC-2020-32126	**Design and Testing of a Thermal Phantom for Humans and Pigs for Treatment of Ischemia**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Ashley Emery** University Washington	Ketan Mhetre, Abhijith Shasheendra, Shahram Aarabi, Nathan White, Xu Wang
TFEC-2020-32127	**Numerical Simulation of Multiphase Flow in a Pipe with Varying Cross Section**	Multiphase Flow - I	**Carlton Adam** US Army ARDEC	Hamid Hadim
TFEC-2020-32130	**Multi-fractal analysis of surface temperature time series to predict the Critical Heat Flux**	Multiphase Flow - I	**Ankit Saini** University of Minnesota Twin Cities	Vinod Srinivasan
TFEC-2020-32132	**New Method to Simulate Scattering of Sunlight by Water (H2O) Aerosols Using the MCRT Method Enhanced by Machine Learning**	Radiation Heat Transfer	**Nazia Munir** PhD candidate, Virginia Polytechnic Institute and State University	Mehran Yarahmadi, Patrick Meehan, J. Robert Mahan, Kory Priestley, Joel Fronk
TFEC-2020-32134	**Heat and mass transfer in a flat heat pipe with a circular-capillary wick under small imposed temperature differences**	Heat Pipes - PO	**Salar Saadatian** Louisiana State University	Harris Wong
TFEC-2020-32135	**Heat transfer enhancement in PCM thermal energy storage via the triplex tube heat exchanger**	Energy Storage Systems - I	**Emmanuel Nsofor** Southern Illinois University, Carbondale	Jasim Mahdi
TFEC-2020-32137	**Computational modelling of Urban Heat Island Effect: A case study for London Olympic Park**	Engineering Equipment and Environmental Systems - I	**Azin Hosseinzadeh** The University of Manchester	Amir Keshmiri, Nima Shokri
TFEC-2020-32139	**The motion of long drops in rectangular microchannels at low capillary numbers**	Multiphase Flow - PO	**Harris Wong** Louisiana State University	Sai Rao
TFEC-2020-32140	**Effects of Resonant Vibrations on Droplet Shedding for Enhanced Condensation**	Condensation - PO	**Jorge Alvarado** Texas A&M University	Sarojeet Deb, Xiaoyu Hu, Chun-Wei Yao
TFEC-2020-32142	**Comprehensive study of nanofluid forced convection heat transfer**	Nano and Micro Fluid Applications - I	**Saeid Vafaei** Bradley University	Jonathan Yeager, Peter Daluga
TFEC-2020-32144	**Thermodynamic analyses of a solar-hydrogen energy system based on SBS PV-T and SOEC/SOFC technologies**	Solar energy equipment and processes - I	**Qun Chen** Tsinghua University	Zheng Liang, Kai Wang, Christos N. Markides, Gan Huang
TFEC-2020-32145	**Performance simulation and distribution strategy of solar and wind coupled power generation systems in Northwest China**	Solar energy equipment and processes - I	**Fei Cao** Hohai University	Jialing Qiu, Tian Yang, Zixu Jing, Jianbo Bai, Tianyu Zhu
TFEC-2020-32154	**EFFECT OF STRIP ORIENTATIONS AND GEOMETRY ON THE CRITICAL HEAT FLUX IN POOL BOILING**	Boiling	**Bikash Pattanayak** Department of Mechanical Engineering, Indian Institute of Technology Jodhpur	Harsh Deswal, Vivek Saxena, Hardik Kothadia
TFEC-2020-32158	**Thermal gradient influenced modulated evaporation dynamics of saline sessile droplets**	Multiphase Flow - PO	**Abhishek Kaushal** Indian Institute of Technology Ropar	Purbarun Dhar
TFEC-2020-32159	**DESIGN AND INVISTIGATION OF CENTRAL AIR JET FLAMELESS COMBUSTOR**	Combustion, Fire and Fuels - I	**Hazem Haroun** Combustion	
TFEC-2020-32160	**COMBINED EFFECTS OF INCLINATION ANGLE AND HEATING ON THE TRANSITIONAL FLOW HEAT TRANSFER THROUGH A SMOOTH TUBE**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - I	**Abubakar Idris Bashir** Department of Mechanical and Aeronautical Engineering, University of Pretoria	Josua Petrus Meyer, Marilize Everts

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32161	**Numerical Study on Charging Performance of Nano-Enhanced Phase Change Material in Metal Foam for Dual Source Heat Recovery**	Energy Storage Systems - I	**Laxman Mishra** National Institute of Technology Mizoram	Abhijit Sinha, Rajat Gupta
TFEC-2020-32163	**UASB (Upflow Anaerobic Sludge Blanket) Reactors Simulator Based on ADM1**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Gabriel Oliveira** Universidade do Estado do Rio de Janeiro	Mariana Rocha, Carlos Kattar, Norberto Mangiavacchi
TFEC-2020-32165	**Effect of micro-nanostructured surface of Cu-Al2O3 nanoparticles on flow boiling heat transfer performance**	Boiling	**Sanjay Kumar Gupta** Research Scholar	Rahul Dev Misra
TFEC-2020-32167	**Numerical Simulation of Large Scale Compressible Turbulent Combustion Framework**	Combustion, Fire and Fuels - PO	**Wei-Hsiang Wang** NCHU, Taiwan	
TFEC-2020-32169	**ARTIFICIAL NEURAL NETWORK BASED INTELLIGENT FLOW SENSOR FOR LIQUID ROCKET ENGINE**	Aerospace Applications	**Jessy Flora** Scientist	Jeraldin Auxillia
TFEC-2020-32170	**HEAT TRANSFER INVESTIGATION OF SPRAY COOLING FOR THERMAL MANAGEMENT OF A HIGH POWER LED**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Gopinath Sahu** IIT Kanpur	Sameer Khandekar, Krishnamurthy Muralidhar, Elizaveta Gatapova
TFEC-2020-32171	**NUMERICAL INVESTIGATION OF THE HEAT TRANSFER ON CIRCULAR CYLINDER IN CROSS FLOW WITH SECONDARY FLOW JET**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Walid Aboelsoud** Ain Shams University	Mohanned Yaman, Mahmoud Abo Elnasr
TFEC-2020-32173	**A far-field boundary condition in multi-body dissipative particle dynamics**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - PO	**Anupam Mishra** University of California, Merced	Yanbao Ma, Ting Liu, Ahmed A. Hemeda
TFEC-2020-32177	**Phase-Change Heat Transfer Characteristics of Thin Sintered-Particle Wick on Downward Facing Surfaces**	Heat Pipes - PO	**Gisuk Hwang** Wichita State University	Munonyedi Egbo, Yahya Nasersharifi
TFEC-2020-32178	**BOILING HEAT TRANSFER: THREE-STAGE MODEL OF PUMPING EFFECT OF GROWING BUBBLE**	Boiling	**Giorgi Gigineishvili** Georgian Technical University	Irakli Shekriladze, Evtikhi Machavariani, David Shekriladze
TFEC-2020-32179	**Novel solar dryer for olive mill wastewater**	Solar energy equipment and processes - I	**Ilker Tari** METU	Selin Erdogan
TFEC-2020-32182	**EXPERIMENTAL STUDY AND NUMERICAL SIMULATION OF METHANE-OXYGEN COMBUSTION INSIDE A LOW PRESSURE ROCKET MOTOR**	Aerospace Applications - PO	**Kazim Akyuzlu** University of New Orleans	Mine Kaya
TFEC-2020-32183	**A NUMERICAL AND EXPERIMENTAL STUDY OF LAMINAR AND INTERMITTENTLY TURBULENT BOUNDARY LAYER ON A FLAT PLATE**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - I	**Kazim Akyuzlu** University of New Orleans	Shivank Srivastava, Jonathan Eastridge, Brandon Taravella
TFEC-2020-32184	**A NUMERICAL AND EXPERIMENTAL STUDY OF UNSTEADY FLOW IN A LID DRIVEN SQUARE CAVITY FOR LAMINAR AND TURBULENT CASES.**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - I	**Kazim Akyuzlu** University of New Orleans	Abdullah Naeem, Shivank Srivastava
TFEC-2020-32185	**The turbulent flow and heat transfer over a heated cube placed in non- heated surrounding cubes by varying streamwise and spanwise pitch: A DNS study**	Turbulent flows - I	**Basheer Ahmad Khan** IIT Kanpur	
TFEC-2020-32186	**CFD analysis of the near-field vortex dynamics in a confined square jet**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Maziar Mosavati** University of Windsor	Ronald Barron, Ram Balachandar
TFEC-2020-32187	**COMPARISON OF TWO-PHASE AND SINGLE-PHASE FLOW IN OPTIMIZED HORIZONTAL MICROCHANNELS**	Multiphase Flow - I	**Tunde Bello-Ochende** University of Cape Town	David O Ariyo
TFEC-2020-32191	**A ONE-DIMENSIONAL MODEL FOR LOOP HEAT PIPES CONSIDERING THE LIQUID-VAPOR INTERFACE MOVEMENT**	Heat Pipes	**Xu Huang** KU Leuven	Geert Buckinx, Maria Rosaria Vetrano, Martine Baelmans
TFEC-2020-32192	**STABILITY AND CONTROL ANALYSIS OF UNMANNED AERIAL VEHICLES**	Aerospace Applications	**Kofi Agyemang Amankwah** Southern University and A&M College	Stephen Akwaboa, Patrick Mensah
TFEC-2020-32196	**Computational Studies of Froth Flotation**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Gretar Tryggvason** Johns Hopkins University	Jiacai Lu
TFEC-2020-32197	**TARGETED PARTICLE DELIVERY IN CEREBRAL ARTERY**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Pawan Kumar Pandey** Indian Institute of Technology Kanpur	Malay K Das
TFEC-2020-32198	**STUDY OF BLOOD FLOW THROUGH EXPANDING POROUS MEDIA**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Pawan Kumar Pandey** Indian Institute of Technology Kanpur	Malay K Das
TFEC-2020-32200	**EFFECT OF INPUT PARAMETERS ON ENERGY REQUIREMENTS OF PHASE CHANGE MATERIAL INTEGRATED LOCAL HEATING SYSTEM**	Natural and Built Environments	**Pushpendra Kumar Shukla** Indian Institute of Technology (IIT) Mandi	P. Anil Kishan
TFEC-2020-32207	**VϖLES – Vortex Particle Intensified Large Eddy Simulation**	Turbulent flows - I	**Nikolai Kornev** University of Rostock	Sina Samarbakhsh
TFEC-2020-32210	**Flow around two square cylinders in a tandem configuration in the free stream Reynolds number for the different velocity displacement of the second one**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - I	**Renata Gnatowska** Czestochowa University of Technology	
TFEC-2020-32212	**Laser-assisted manufacturing of building-integrated photovoltaic solar cells**	Solar energy equipment and processes - I	**David Hwang** State University of New York at Stony Brook	Seungkuk Kuk, Zhen Wang, Won Mok Kim, Jeung-hyun Jeong
TFEC-2020-32213	**Elephant Ear-inspired Thermal Storage System Using Phase Change Materials**	Energy Storage Systems - I	**Ethan Languri** Tennessee Tech University	Vinit Parbhu, Spencer Hammons
TFEC-2020-32215	**NUMERICAL AND EXPERIMENTAL STUDY OF MUSHY-ZONE CONSTANT ROLE IN MODELING SOLID-LIQUID PHASE CHANGE IN ENERGY STORAGE APPLICATIONS**	Energy Storage Systems - I	**Ethan Languri** Tennessee Tech University	Vinit Parbhu, Kashif Nawaz

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32217	**Numerical Analysis of Evaporation in Liquid-Saturated and Heat-Localized Porous Layer**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Ethan Languri** Tennessee Tech University	Divya Jaladi, Kashif Nawaz
TFEC-2020-32218	**Sustainable Distillation Using Heat-Localized Evaporation from Saturated Porous Media**	Solar energy equipment and processes - I	**Ethan Languri** Tennessee Tech University	Divya Jaladi, Mason Smith, Bob Piras
TFEC-2020-32219	**Discrete Element Modeling – CFD Coupled Study of the Rheology of Functionalized Nanoparticle Colloids**	Nano and Micro Fluid Applications - I	**Ethan Languri** Tennessee Tech University	Aaron Bain, Jim Davidson, David Kerns, Lino Costa
TFEC-2020-32220	**Experimental Characterization of Functionalized Nanodiamond Suspensions in Ethylene Glycol Coolants**	Nano and Micro Fluid Applications - I	**Ethan Languri** Tennessee Tech University	Aaron Bain, Jim Davidson, David Kerns, Lino Costa
TFEC-2020-32221	**Considerations for achieving boiling heat transfer enhancements on binary surfaces**	Boiling	**Krishna Kota** New Mexico State University	Lazar Cvijovic, Pranav Sivakumar
TFEC-2020-32223	**A new correlation for instantaneous heat transfer between refrigerant gas and cylinder in an oil-free valved linear compressor**	Refrigeration, Air conditioning systems and refrigerants - I	**Jian Sun** Institute of Physics and Chemistry, Chinese Academy of Sciences	Jianguo Li, Chengzhan Li, Jinghui Cai
TFEC-2020-32224	**STRESS ANALYSIS OF GAS TURBINE BLADE WITH FILM COOLING**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Xianchang Li** Lamar University	Diwakar Awate
TFEC-2020-32225	**Combined Cycle with Blade Cooled Gas Turbine at Different Operation Conditions and Design Aspects**	Aerospace Applications	**Xianchang Li** Lamar University	Maryam Besharati-Givi
TFEC-2020-32230	**Enhancing Students Learning in Thermal-fluid Sciences Courses Through Daily Life Examples**	Thermo-fluid education - I	**Liyong Sun** Penn State Erie	
TFEC-2020-32231	**Heat and mass transfer in cross flow transport membrane condenser based heat exchanger: a computational parametric study**	Heat exchangers: Compact, novel, networks - I	**Cheng-Xian Lin** Florida International University	Saja Al-Rifai
TFEC-2020-32232	**Effective thermal conductivity of high-porosity octet-truss lattice structures**	Heat/mass transfer enhancement techniques - I	**Prashant Singh** Mississippi State University	Inderjot Kaur, Like Li, Matthew Priddy, Nanqiao Wang
TFEC-2020-32237	**Additive manufacturing of heat exchangers for modular power generation systems**	Flow and Heat Transfer in Materials Processing Science and Manufacturing - PO	**Kashif Nawaz** Oak Ridge National University	
TFEC-2020-32238	**Enhanced condensation through laser treated surfaces**	Condensation	**Kashif Nawaz** Oak Ridge National University	
TFEC-2020-32239	**Aiding and opposing buoyancy mixed convection in power-law fluids across a periodic array of circular cylinders**	Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids	**Lubhani Mishra** Pandit Deendayal Petroleum University	Chandrahas Rao, Lovish Jain, Chaitanya Patel
TFEC-2020-32242	**ESTIMATION OF THE SKIN FRICTION IN TURBULENT BOUNDARY LAYER UNDER THE ADVERSE PRESSURE GRADIENT**	Turbulent Flows - PO	**Artur Drozdz** Czestochowa University of Technology	Paweł Niegodajew, Witold Elsner
TFEC-2020-32243	**PERFORMANCE ANALYSIS OF VERTICAL AXIS WIND TURBINE UNDER NON UNIFORM WIND CONDITIONS**	Wind turbine aerodynamics and control	**Zakria Toor** King Fahd University of Petroleum and Minerals	Haitham Bahaidarah
TFEC-2020-32245	**The numerical analysis of natural convection heat transfer in the presence of magnetic field using OpenFOAM**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - I	**Trushar Gohil** Assistant Professor	Ranjit Singh
TFEC-2020-32251	**Thermal plasma system applied to destroy C-based pollutants**	Engineering Equipment and Environmental Systems - PO	**Maria Laura Mastellone** Università degli studi della Campania Luigi Vanvitelli	Lucio Zaccariello, Biagio Morrone, Antonio Mariani
TFEC-2020-32254	**A REDUCED COMBUSTION MECHANISM FOR BIOFUELS AND ITS APPLICATION ON HCCI ENGINE SIMULATIONS**	Combustion, Fire and Fuels - I	**Juan Carlos Prince** Instituto Tecnológico y de Estudios Superiores de Monterrey	Mario Díaz González
TFEC-2020-32256	**Boiling of Liquid Drops Impacting Heated Micro-textured Surfaces**	Boiling	**Ri Li** University of British Columbia	Aiqing Lan, Xuan Gaoi, Yakang Xia
TFEC-2020-32270	**Heat Transfer at casting/mold interface in pressurized solidification of Al Alloy A380**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Luyang (peter) Ren** MAME	Xuezhi Zhang, Li Fang, Henry Hu
TFEC-2020-32280	**Numerical Simulations of a Paper-Based Fuel Cell System**	Fuel Cells	**Arturo Pacheco-Vega** California State University	Danny Clemons
TFEC-2020-32286	**Boiling flow characteristics in microchannel evaporators of two different shapes for spacecraft application**	Boiling	**Simhachala Rao Chikkala** ISRO	A R Anand, Alok kumar shrivastava, Prasanta Kumar Das
TFEC-2020-32290	**TOOLS FOR THERMODYNAMIC AND TRANSPORT MODELS FOR WORKING FLUIDS**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Marcia Huber** National Institute of Standards and Technology	Eric Lemmon, Ian Bell, Mark McLinden
TFEC-2020-32298	**COMPONENT-SYSTEM SYNERGY OPTIMIZATION OF THE THERMAL MANAGEMENT SYSTEM BASED ON HEAT CURRENT METHOD**	Heat exchangers: Compact, novel, networks - I	**Junhong Hao** North China Electric Power University	Qun Chen, Zhihua Ge
TFEC-2020-32307	**Experimental investigation of a CI engine performance fueled with cotton seed biodiesel-diesel blend and multi-walled carbon nanotubes as additive**	Combustion, Fire and Fuels - I	**Gaurav Ninawe** Sam Higginbottom University of Agriculture Technology and Sciences	Mohammad Tariq

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32315	**Effects of the nanoparticles and magnetic field on the blood flow in stenosis artery**	Flow and Heat Transfer in Biological/ Biomedical Systems - PO	**Abdulhamid Bala Ma'aji** Nigerian Army University Biu	Mohammed Abdulhameed, Bankole Babatunde Adeniyi
TFEC-2020-32320	**Experimental study on thermal management of cylindrical Li-ion battery with flexible microchannel cold plates**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Li Jia** Beijing Jiaotong University	Liting Wei, Chao Dang
TFEC-2020-32321	**Experimental study on heat transfer characteristics of vapor chambers with sintered copper powder wick**	Heat Pipes	**Li Jia** Beijing Jiaotong University	Dou Huang, Zhuo Cui
TFEC-2020-32322	**An investigation of the premixed combustion in a two-section non-catalytic porous medium by numerical simulation**	Combustion, Fire and Fuels - I	**Peyman Rahimi Borujerdi** The University of Alabama in Huntsville	Hadi Akbari
TFEC-2020-32324	**Non-intrusive cooling tower model: A validation case study**	Engineering Equipment and Environmental Systems - I	**Suhrid Deshmukh** MIT	Leon R. Glicksman, Leslie Norford
TFEC-2020-32336	**Investigation on the location of heat source and inclined angles of cavity in partial heating phase change using enthalpy based lattice Boltzmann method**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - I	**Min Zeng** Xi'an Jiaotong Uniersity	Renkun Dai
TFEC-2020-32337	**STUDY OF HEAT TRANSFER CHARACTERISTICS AND VAPOR WAKE DYNAMICS IN SATURATED FILM BOILING OVER AN ARRAY OF TUBES**	Multiphase flow - II	**S M Thamil Kumaran** IIT Delhi	Balachandran Premachandran
TFEC-2020-32338	**Effect of heater waviness on interface dynamics and heat transfer in horizontal film boiling**	Boiling	**Nikhil Kumar Singh** Indian Institute of Technology, Delhi	Balachandran Premachandran
TFEC-2020-32341	**Study of heat transfer characteristics inside air heater channel in the presence of drying product at the exit of natural convection based solar air heater**	Solar energy equipment and processes - I	**Digpal Kumar** Indian Institute of Technology, Delhi	Balachandran Premachandran
TFEC-2020-32342	**Numerical Study on Heat Transfer Enhancement Characteristics of a Fin Punched with Curved Trapezoidal Vortex Generators at the Rear of Tubes**	Heat/mass transfer enhancement techniques - II	**Zhimin Lin** Lanzhou Jiaotong University	
TFEC-2020-32344	**NUMERICAL SIMULATION OF DROPLET IMPACT ONTO A CURVED LIQUID FILM**	Multiphase flow - II	**Weihao Chen** Dalian University of Technology	Xingsen Mu, Shengqiang Shen
TFEC-2020-32347	**Experimental investigation on pouch Li-ion battery cooled by cold plate with multiple mini-channels**	Advanced Energy Systems	**Li Jia** Beijing Jiaotong University	Chengliang Yang, Honglei Ren
TFEC-2020-32350	**Numerical simulation of separation process of non-condensable gas in pure water**	Multiphase flow - II	**Shi Chen** Key Laboratory of Ocean Energy Utilization and Energy Conservation of Ministry of Education, Dalian University of Technology	Shengqiang Shen, Kaichao Lei
TFEC-2020-32365	**Differential Technoecomomic Principles for Analyzing Mutually Exclusive Energy Technologies**	Energy and Sustainability - PO	**Todd Bandhauer** Colorado State University	Alex Grauberger
TFEC-2020-32366	**Aerodynamic characteristics of irregular non-spherical particles at intermediate Reynolds number range**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Carlos Castang Montiel** Professor	Santiago Laín Beatove, Diego Garcia
TFEC-2020-32370	**Hurricane Flood Flow Mitigation Using a Remotely Operated Siphon System**	Flow Instability - I	**Krishna Sai Vutukuru** FIU	Vivek Verma, Arturo Leon, Linlong Bian, Aditia Rojali, Dogukan Ozecik, Sumit Zanje,
TFEC-2020-32374	**Interactions between free-stream turbulence and turbulent boundary layer generated by PID control and linear forcing**	Turbulent flows - I	**Hitoshi Suto** Central Research Institute of Electric Power Industry	Yasuo Hattori, Keisuke Nakao
TFEC-2020-32377	**Influence of Richardson Number on Heat Transfer Characteristics of Impinging Axisymmetric Synthetic Jet**	Heat/mass transfer enhancement techniques - I	**Malkeet Singh** IIT Kanpur	Arun K. Saha
TFEC-2020-32379	**PARAMETRIC INVESTIGATION OF VERTICAL AXIS WIND TURBINE: A NUMERICAL SIMULATION**	Wind turbine aerodynamics and control	**Abdur Rahim** JMI, New Delhi	MD Imran Alam
TFEC-2020-32381	**Role of Liquid Pool Properties in Coalescence of Impacting Water Droplet**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Akash Ranjan Pati** NIT, Rourkela	Soumya Sanjeeb Mohapatra
TFEC-2020-32384	**LARGE EDDY SIMULATION OF TURBULENT FORCED CONVECTION IN A PILLOW PLATE CHANNEL**	Turbulent flows - I	**Sourabh Kumar** IIT Delhi	Balachandran Premachandran, P. M. V. Subbarao
TFEC-2020-32388	**NUMERICAL ANALYSIS OF TEMPERATURE AND VELOCITY PROFILES INSIDE AND OUTSIDE OF A DC THERMAL PLASMA TORCH**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Akash Yadav** Indian Institute of Technology Delhi	Mayank Kumar, Satyananda Kar, Sujay Karmakar, Nitin B Lal
TFEC-2020-32393	**ANALYSIS OF THE DUMP COMBUSTOR IN VARIED STEP ANGLE FOR REACTING AND NON – REACTING FLOW**	Combustion, Fire and Fuels - PO	**Tushar kant Swain** Indian Institute of Technology Mandi	Anil Kishan P
TFEC-2020-32394	**Conjugate heat transfer enhancement using optimal placement of heated modules under forced convection**	Heat/mass transfer enhancement techniques - I	**Shankar Durgam** College of Engineering Pune	Shakkottai Venkateshan, Thirumalachari Sundararajan, Milankumar Nandgaonkar, Chandrasekhar Sewatkar, Mohan Khond
TFEC-2020-32399	**All-Solid-State and Flexible Supercapacitor for Extreme Temperature Applications Operating from -70 B°C to 220 B°C**	Energy Storage Systems - PO	**Ardalan Chaichi** Louisiana State University	Gokul Venugopalan, Ram Devireddy, Christopher Arges, Manas Gartia
TFEC-2020-32400	**Experimental study of the heat transfer of human sole in sports shoes under conditions of warming microclimate**	Experimental Methods/Tools and Instrumentation in Fluid Mechanics and Heat/Mass Transfer	**Irina Cherunova** University of Rostock	Nikolai Kornev
TFEC-2020-32404	**COMPARISON OF STARTUP PERFORMANCE OF TWO SODIUM POTASSIUM ALLOY HEAT PIPES WITH DIFFERENT WORKING FLUID RATIO**	Heat Pipes	**Fang Ye** Beijing University of Technology	Hong Zhe Zhang, Hang Guo, Xiao Ke Yan, Chong Fang Ma

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32411	**Numerical Study on heat transfer enhancement with Perforated micro-pin fins for laminar flow**	Heat/mass transfer enhancement techniques - II	**Deepa Gupta** Indian Institute Of Technology Patna	Probir Saha, Somnath Roy
TFEC-2020-32412	**Numerical investigation of combined natural convection with radiation in 2D cavity with different aspect ratios of collimated beam**	Radiation Heat Transfer - PO	**Chandrasekhara Pratap G C** IIT mandi	Pradeep Kumar
TFEC-2020-32413	**Influence of Non-linear Boussinesq Approximation on Mixed Convection Flow of Micropolar Fluid Mediated with Nanoparticles**	Nano and Micro Fluid Applications - I	**Vasu B** Department of Mathematics, Motilal Nehru National Institute of Technology Allahabad	Rama Subba Reddy Gorla
TFEC-2020-32414	**Events analysis of unilateral depressurization of pipelines in the presence of condensate**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Angela Nieckele** PUC-Rio	Tuanny Cotias, Luis Fernando Pires, Leandro Valim, Claudio Veloso, Frederico Tavares, Iuri Soter Viana Segtovich, Rafael Pereira do Carmo, Vinicius Menez Da Silva, Roberto Fonseca Jr
TFEC-2020-32415	**Novel Freezing Strategies to Retain the Stem Cell Reserves of Adipose Tissues**	Biomimetic and bioinspired engineering	**Shahensha Shaik** Louisiana State University	Xiying Wu, Jeffrey Gimble, Ram Devireddy
TFEC-2020-32430	**Energy and exergy analysis of a new combined system for power, cooling, heating and fresh water production based on gas turbine**	Energy and Sustainability - I	**Sattam Alharbi** University of Central Florida	Louis Chow, Mohamed Elsayed
TFEC-2020-32432	**Numerical Modeling of Emergency Hydrogen Refueler for Fuel Cell Electric Vehicles**	Multiphase Flow - PO	**Gabriela Bran Anleu** Sandia National Labs	
TFEC-2020-32444	**A first experience in characterization of local native additives for solid rocket motors in Paraguay**	Thermo-fluid education - PO	**Jorge Kurita** Universidad Nacional de Asuncion	Eladio Ferrer
TFEC-2020-32453	**Two-phase pressure drop in a horizontal tube during condensation**	Multiphase Flow - I	**Luyuan Gong** Dalian University of Technology	Yali Guo, Shengqiang Shen
TFEC-2020-32455	**Integrated Numerical Approach for Wind Energy Aerodynamics and Energy Output Estimation**	Wind turbine aerodynamics and control	**Riccardo Mereu** Politecnico di Milano	Stefano Passoni, Fabio Inzoli
TFEC-2020-32461	**A Fundamental Parametric Study And Reaction Kinetics Of Toluene Decomposition Using Non Thermal Plasma**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II	**Gerardo Diaz** University of California - Merced	
TFEC-2020-32462	**Numerical simulation using multiple printed circuit boards for high heat fluxes air cooling systems**	Heat/mass transfer enhancement techniques - I	**Shankar Durgam** College of Engineering Pune	Mohan Khond, Milankumar Nandgaonkar, Chandrasekhar Sewatkar, Prashant Deshmukh, Sunil Tapase
TFEC-2020-32472	**Physics of drop coalescence on a surface with graded wettability**	Nano and Micro Fluid Applications - I	**Manjinder Singh** IIT Delhi	
TFEC-2020-32477	**The comparison of the cooling processes of hot bodies from different metals in subcooled and saturated liquids.**	Boiling	**Arslan Zabirov** Department of Engineering Thermophysics, NRU MPEI	
TFEC-2020-32482	**Application of Lattice Boltzmann Method to different boundary conditions in a two dimensional enclosure**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Sagnik Banik** Student	Jean Yves Trepanier
TFEC-2020-32483	**Experimental and CFD analysis to investigate the performance of a cryogenic turboexpander**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Manoj Kumar** NIT Rourkela	Suraj Kumar Behera, Amitesh Kumar, R.K. Sahoo
TFEC-2020-32486	**Numerical analysis of stratified two-phase flow in horizontal pipes**	Multiphase flow - II	**Riccardo Mereu** Politecnico di Milano	Stefano Passoni, Luigi Colombo, Igor Matteo Carraretto
TFEC-2020-32500	**A Systematic Approach for the Optimization of Heat Exchanger Networks**	Heat exchangers: Compact, novel, networks - I	**Ahmad Fakheri** Bradley University	
TFEC-2020-32505	**Nanofluid Forced Convection Heat Transfer in Microchannels: Comparison Between Theoretical Models and Experimental**	Nano and Micro Fluid Applications - I	**Saeid Vafaei** Bradley University	Lucas Splingaire, Blen Teferi, Jonathan Yeager, Peter Daluga
TFEC-2020-32513	**Effect of Nanostructures on the Contact Line Dynamics During Nucleate Boiling**	Multiphase Flows - PO	**Han Hu** University of Arkansas	
TFEC-2020-32516	**The effect of thermal radiation on heat transfer of high pressure turbine nozzle guide vane**	Radiation Heat Transfer	**Yasong Sun** Northwestern Polytechnical University	Jiazi Zhao, Xinyu Li
TFEC-2020-32518	**WAKE STRUCTURE GENERATED BY A SEAL-WHISKER-INSPIRED TURBINE BLADE**	Biomimetic and bioinspired engineering	**Wei Zhang** Cleveland State University	Robert Ahlman, Curtis Flack, Vikram Shyam
TFEC-2020-32519	**Integration of Molten Salt Energy Storage for a Small Modular Nuclear Reactor with Alternative Energy Sources**	Energy Storage Systems - I	**William Culbreth** University of Nevada	Kimberly Gonzalez
TFEC-2020-32520	**EFFECTS OF TERRAIN AND ATMOSPHERIC THERMAL STABILITY ON WIND VELOCITY PROFILES**	Wind turbine aerodynamics and control	**Robert Ahlman** Cleveland State University	Wei Zhang, Corey Markfort
TFEC-2020-32521	**Multiscale Porous High-temperature Heat Exchanger Design using Ceramic Co-extrusion**	Heat exchangers: Compact, novel, networks - PO	**Xiangyu Li** MIT	Chad Wilson, Lenan Zhang, Lin Zhao, Bikram Bhatia, Evelyn Wang
TFEC-2020-32529	**Effect of pool temperature on condensation cycle of n-hexane vapour bubble in a subcooled pool of water**	Condensation	**Abhik Majumder** National Institute of Technology Agartala	Prasanta Kumar Das

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-32532	**Interfacial instabilities during the flashing front propagation**	Multiphase Flow - I	**Kush Dewangan** Department of Mechanical Engineering, Indian Institute of Technology Kharagpur	Prasanta Das
TFEC-2020-32534	**Imaging spatial and temporal flow characteristics in a curved asymmetric stenosed artery**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Mohammad Owais** Indian Institute of Technology Kanpur	Krishnamurthy Muralidhar, Abdullah Y Usmani
TFEC-2020-32535	**Theoretical modeling of phase change heat transfer enhancement through a fin**	Heat/mass transfer enhancement techniques - PO	**Ankur Jain** The University of Texas at Arlington	Amirhossein Mostafavi, Mohammad Parhizi
TFEC-2020-32536	**Enhanced filament-to-filament adhesion in polymer extrusion additive manufacturing through in situ heating**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Ankur Jain** The University of Texas at Arlington	Darshan Ravoori, Hardikkumar Prajapati
TFEC-2020-32539	**Effect of Occupants Acoustic Comfort on Energy Consumption of Building Systems**	Natural and Built Environments	**Yong Tao** Cleveland State University	Pratik Sancheti
TFEC-2020-32552	**Characterizing turbulence in buoyant plumes at high Reynolds numbers**	Turbulent flows - I	**Kiran Bhaganagar** University of Texas	
TFEC-2020-32555	**Numerical study on coupled fluid-thermal characteristics and thermoelectric response of constant-temperature hot-wire anemometer for mine ventilation measurement**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Yanming Wang** China University of Mining & Technology	
TFEC-2020-32567	**A Numerical Study for an Optimization of Copper Conductive Shield for a Drone Liquid Hydrogen Storage**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Gwang Hoon Rhee** University of Seoul	
TFEC-2020-32585	**Thermo-economic analysis of a novel eutectic freeze desalination system using an intermediate cold liquid**	Energy-Water-Food Nexus - I	**Hamidreza Shabgard** University of Oklahoma	Ramkumar Parthasarathy, Jie Cai
TFEC-2020-32597	**Design of a solid-state hydrogen storage system**	Energy Storage Systems - PO	**Moon-Sun Chung** Korea Institute of Energy Research	
TFEC-2020-32607	**LatticeLattice Boltzmann Computations of Natural Convection Heat Transfer of Nanofluid in a Square Cavity Heated by Protruding Heat Source**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Faraji Mustapha** University of Hassan II Casablanca	
TFEC-2020-32621	**Soot emission calculations of heavy duty engines with 1D thermodynamic models**	Combustion, Fire and Fuels - I	**Hasan Bedir** Bogazici University	Emre Oz
TFEC-2020-32625	**DESIGN OF SUBWAVELENGTH METALLIC PARTICLES USING EVOLUTIONARY TOPOLOGY OPTIMIZATION FOR MAXIMUM NARROWBAND AND BROADBAND LIGHT SCATTERING**	Radiation Heat Transfer - PO	**Shima Hajimirza** Texas A& M University	Mine Kaya
TFEC-2020-32628	**A CFD APPROACH FOR OPTIMIZATION OF HEAVY DUTY DIESEL ENGINE SPRAY CHARACTERISTICS USING BIOFUELS**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Imran Shafi** NUST College of EME	Jamil Ahmad, Muteeb Ulhaq
TFEC-2020-32675	**Design and development of a subsurface melting head for use in Martian atmospheric conditions**	Thermo-fluid education - I	**Jiajun Xu** University of the District of Columbia	Sasan Haghani, Giancarlo Dorazio
TFEC-2020-32692	**Theoretical analysis of the liquid hydrogen production using ejector technologies**	Energy and Sustainability - I	**Olexiy Buyadgie** Wilson Engineering Technologies Inc./V.S. Martynovsky Institute of Refrigeration, Cryogenic Technologies and Eco Energetics	Dmytro Buyadgie, Oleksii Drakhnia, Sergiy Artemenko
TFEC-2020-32693	**SOLAR EJECTOR SYSTEM FOR HEATING AND AIR-CONDITIONING**	Energy and Sustainability - I	**Olexiy Buyadgie** Wilson Engineering Technologies Inc./V.S. Martynovsky Institute of Refrigeration, Cryogenic Technologies and Eco Energetics	Dmytro Buyadgie, Oleksii Drakhnia, Valeriy Maisotsenko, Natalia Povarova
TFEC-2020-32707	**Productivity augmentation of a solar still using rectangular fins and bamboo cotton wick**	Solar energy equipment and processes - I	**Avadhesh Yadav** NIT Kurukshetra	Mohit Bhargva
TFEC-2020-32715	**Design and Development of ZnCo2O4 based High-Performance symmetric supercapacitors**	Energy Storage Systems - I	**Anurag Gaur** National Institute of Technology Kurukshetra	Meenu Sharma
TFEC-2020-32772	**Effect of Annealing on Thermal Properties of Selective Laser Melting Processed Materials: Aluminum 316L Stainless Steel and Titanium Alloys**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Patrick Mensah** Southern University and A&M College	Stephen Akwaboa, Nigel Amoafo-Yeboah, Selami Emanet, Samuel Ibekwe
TFEC-2020-32795	**Numerical investigation of the fluid flow behavior in the Plain journal bearing at textured and not textured surface**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Bendaoud Nadia** Université des Sciences et de la Technologie d'Oran	Mehala Kadda
TFEC-2020-32855	**Thermodynamic features of the formation of hydrocarbon hydrates**	Natural and Built Environments	**Anatoliy Pavlenko** Kielce University of Technology	
TFEC-2020-32956	**Design and Test of a Direct-Metal-Laser-Sintering (DMLS) Fabricated Microchannel Heat Exchanger with Nano-enhanced Heat Transfer fluid for enhanced heat transfer**	Heat exchangers: Compact, novel, networks - PO	**Jiajun Xu** University of the District of Columbia	Jaime Rios, Takele Gemeda

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-33054	**Investigation of Spray Cooling Uniformity and Intensity during Continuous Casting of Steel**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Haibo Ma** Purdue University Northwest	Chenn Q. Zhou, Armin Silaen
TFEC-2020-33057	**STUDY OF CAVITATION IN HYDROTURBINE RUNNER**	Multiphase Flow - PO	**Ryo Amano** University of Wisconsin-Milwaukee	
TFEC-2020-33090	**Numerical investigation of a square back Ahmed body equipped with a single cavity and multi-cavity**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Naveen K S** Birla Institute of Technology and Science	
TFEC-2020-33093	**BIOMASS ENERGY POWERED LOW TEMPERATURE COOLING SYSTEM FOR RURAL APPLICATIONS**	Energy and Sustainability - PO	**Bhavesh Patel Pandit** Deendayal Petroleum University	
TFEC-2020-33133	**Functional Modification of Phase Change Microcapsules for Enhancing Photo-thermal Conversion Performance**	Energy Storage Systems - PO	**Kunjie Yuan** Peking University	
TFEC-2020-33160	**Arbitrary Lagrangian Eulerian Method for Fluid Flow in 2D Domains Containing Moving Objects**	Computational Methods/Tools in Thermal-Fluid Systems - I	**A K M Monayem Mazumder** Assistant Professor	
TFEC-2020-33166	**Towards lattice Boltzmann simulation of forced convective flow in a Darcy-Brinkman-Forchheimer porous channel including a phase change material**	Multiphase Flow - PO	**Hassane NAJI** University of Artois	Riheb Mabrouk, Hacen Dhahri, Zohir Younsi
TFEC-2020-33167	**NUMERICAL MODELING OF A SOLID-GAS FLUIDISED BED REACTOR FOR THERMOCHEMICAL WATER SPLITTING PROCESS**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Priyanka Swarnkar** Indian Institute of Technology Madras and Queensland University of Technology Australia	Thomas Rainey, Sundararajan Tirumalachari, Anthony O'Mullane
TFEC-2020-33300	**Heat transfer enhancement mechanisms of water spray cooling with optimal concentrations of alcohol additives**	Multiphase Flow - PO	**Chang Cai** Dalian University of Technology	Hong Liu, Han Chen, Yan'an Yan, Chuanqi Zhao
TFEC-2020-33353	**Development of an OpenFOAM CFD Solver for Phase Change and Two-Phase Flow in Porous Media**	Heat Pipes - PO	**Mustafa Hadj-Nacer** University of Nevada Reno	M. Iffat Hasan, Kegan Rahe
TFEC-2020-33452	**Investigation of exergy analysis of three-fluid tubular heat exchanger with nanofluid using numerical approach**	Heat/mass transfer enhancement techniques - PO	**Tarikayehu Amanuel** Indian Institute of Technology Roorkee	
TFEC-2020-33475	**IMPROVING ADIABATIC FILM-COOLING EFFECTIVENESS BY USING AN UPSTREAM PYRAMID**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - PO	**Zineb Hammami** Thermal Science	Zineddine Ahmed Dellil, Azzi Abbes
TFEC-2020-33511	**Experimental study and numerical modeling of heat transfer in a wood sample**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Azeddine Echchikhi** Physics Doctor	Kamal Gueraoui, El Housseine Elrhaleb, El Hassane EL Kafsaoui, Hamid Benbih, Adil Bounouar
TFEC-2020-33526	**Pressure drop measurement of porous layers in a scrubber for scrubbing exhaust gas from a marine engine**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Tae Hoon Kim** Korea Institute of Machinery and Materials	Kyu Hyung Do, Seok Min Choi, Kyungyul Chung
TFEC-2020-33532	**Modeling of Convection Transport in Metal Foams for Power Electronics Thermal Management**	Impact of Brian Spalding on Fluid & Thermal Sciences	**Yogendra Joshi** Georgia Institute of Technology	
TFEC-2020-33542	**Enhanced Air Dehumidification through Electrically Charged Rotating Vortexes and Vapor Capturing Electrostatic Droplets**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Lorenzo Cremaschi** Auburn University	
TFEC-2020-33555	**Boiling heat transfer with data-driven method**	Multiphase Flows - PO	**Jerol Soibam** MDH University	
TFEC-2020-33558	**Modeling Micro-structured Roughness for Heat Transfer Enhancement.**	Heat/mass transfer enhancement techniques - PO	**Steven Eckels** Kansas State University	Matthew Campbell
TFEC-2020-33563	**DYNAMIC HEAT LOADING OF A MULTI-MICROCHANNEL EVAPORATOR**	Multiphase Flow - PO	**Todd Bandhauer** Colorado State University	Joshua Richey, Caleb Anderson
TFEC-2020-33564	**Modeling of the Onset of Nucleate Boiling in a Multi-Microchannel Evaporator under Dynamic Heat Loads**	Multiphase Flow - PO	**Todd Bandhauer** Colorado State University	Joshua Richey, Kevin McCarthy
TFEC-2020-33567	**Study of the combustion performance of Jet Stirred Reactor (JSR) by burning biodiesel fuel based on 118 species reduced skeletal mechanism**	Combustion, Fire and Fuels - PO	**Nazia Afrin** Assistant Professor of Mechanical Engineering, ST. MARY'S UNIVERSITY	
TFEC-2020-33573	**Modelling and analysis of buoyancy-driven heat exchange systems**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Akhil Dass D** Research Scholar	Sateesh Gedupudi
TFEC-2020-33575	**Multi-physics computational modeling of speech - from neuromuscular muscle activation to flow-structure-acoustic interaction of voice production**	Fluid Mechanics of Speech	**Xudong Zheng** University of Maine	
TFEC-2020-33577	**Applications of a novel algorithm for optimization of refrigerant flow configuration in air-to-refrigerant heat exchangers**	Refrigeration, Air conditioning systems and refrigerants - PO	**Vikrant Aute** University of Maryland	Zhenning Li
TFEC-2020-33579	**Thermal Analysis of partially insulated piston for Improved Diesel Engine Efficiency**	Heat/mass transfer enhancement techniques - PO	**Arif Taibani** PhD Scholar	
TFEC-2020-33580	**High-fidelity intraglottal pressure measurements in a synthetic, self-oscillating silicone model of the vocal folds.**	Fluid Mechanics of Speech	**Byron Erath** Clarkson University	Mohsen Motie-Shirazi

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-33582	**Why is the clinical assessment of vocal aerodynamics relevant?**	Fluid Mechanics of Speech	**Matias Zanartu** Universidad Tecnica Federico Santa Maria	Daryush D. Mehta, Robert E. Hillman
TFEC-2020-33584	**Recent advances in modeling vocal fold fluid-structure interactions**	Fluid Mechanics of Speech	**Scott Thomson** Brigham Young University	
TFEC-2020-33592	**3D CFD modeling of spray combustion for internal combustion engines**	Industrial Multiphase CFD: Risks, Rewards, and Remorse	**Haiwen Ge** Texas Tech University	
TFEC-2020-33613	**Optimization of thermal damage to living biological tissues by Kriging Surrogate Model**	Flow and Heat Transfer in Biological/ Biomedical Systems - PO	**Nazia Afrin** Assistant Professor of Mechanical Engineering, ST. MARY'S UNIVERSITY	
TFEC-2020-33675	**Simulating Two-phase Flow in Heat Exchanger Applications: Value of XistB®**	Industrial Multiphase CFD: Risks, Rewards, and Remorse	**Kevin Farrell** Heat Transfer Research, Inc.	
TFEC-2020-33686	**Theoretical and Experimental Modeling of Cylindrical Heat Pipes**	Heat Pipes - PO	**Maryam Shafahi** California State Polytechnic University, Pomona	
TFEC-2020-33711	**A Dynamic Electrothermal Model of a Thermopile Detector for Earth Radiation Budget Applications**	Radiation Heat Transfer - PO	**Anum Ashraf** NASA Langley/Virginia Tech	Brian Vick, J. Robert Mahan, Kory Priestley
TFEC-2020-33720	**TRANSIENT MODELLING OF LAMINAR-TURBULENT TRANSITIONAL REGIME OF MIXED CONVECTION FOR ASSISTING AND OPPOSING FLOWS WITHIN A PIPE**	Impact of Brian Spalding on Fluid & Thermal Sciences	**Somenath Gorai** Indian Institute of Technology Ropar	Devranjan Samanta, Sarit K. Das
TFEC-2020-33725	**CFD in the Nuclear Industry: the good, the bad, and the ugly**	Industrial Multiphase CFD: Risks, Rewards, and Remorse	**Pascal Brocheny** Framatome	
TFEC-2020-33731	**Melting of Multiple PCM Sets in a Vertically Positioned Heat Exchanger for Enhanced Thermal Energy Storage**	Energy Storage Systems - PO	**Emmanuel Nsofor** Southern Illinois University, Carbondale	Omer Elsanusi
TFEC-2020-33758	**Study of a high-reliability dual-fan system for cooling aerospace electromechanical actuators**	Aerospace Applications - PO	**Mohamed Abdelkareem** University of Central Florida	
TFEC-2020-33760	**A New Meshless "Fragile Points Method" and A Local Variational Iteration Method for General Transient Heat Conduction in Anisotropic Nonhomogeneous Media**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Yue Guan** Texas Tech University	Rade Grujicic, Xuechuan Wang, Leiting Dong, Satya N. Atluri
TFEC-2020-33764	**MODELLING OF VIBRATORY CHARACTERISTICS OF A SINGLE LOOP OSCILLATING HEAT PIPE AND COMPARISON WITH EXPERIMENTAL DATA**	Heat Pipes - PO	**Harikumar A R** APJ Abdul Kalam Technological University	MEGHNA P G, Athul Antony
TFEC-2020-33773	**Influence of fluid flow model on finite element model parameter estimates using Bayesian inference**	Fluid Mechanics of Speech	**Sean Peterson** University of Waterloo	Paul Hadwin
TFEC-2020-33793	**First Experimental Measurements of Fast Transients in Dropwise Condensation Startup**	Condensation - PO	**Alex Rattner** Pennsylvania State University	Sanjay Adhikari
TFEC-2020-33818	**Disc-shaped body bifurcation flow loss effect on a tree-shaped network**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - PO	**Derli Amaral** SMU	Jose' L. Lage
TFEC-2020-33870	**Integral Transform Benchmarks of Diffusion, Convection-Diffusion, and Conjugated Problems in Complex Domains**	Impact of Brian Spalding on Fluid & Thermal Sciences	**Renato M. Cotta** Universidade Federal do Rio de Janeiro	
TFEC-2020-33891	**Some Limitations of CFD to predict Gas-Liquid Flows**	Industrial Multiphase CFD: Risks, Rewards, and Remorse	**Rigoberto Morales** Federal University of Technology – Paraná (UTFPR)	Henrique Stel
TFEC-2020-33926	**Performance and Emissions of Camelina Oil Derived Jet Fuel Blends under Volume Distributed Combustion**	Advanced Energy Systems - PO	**Ashwani K Gupta** University of Maryland	Joseph S. Feser, Zhiwei Wang
TFEC-2020-35444	**Solar and Multi-Generation Modeling Based on a Natural Gas Driven Internal Combustion Engine**	Transportation	**Nnamdi Okafor** University of Alabama at Birmingham	Taherian Hessam
TFEC-2020-35720	**Development of multiple Orifices in Series for an Aeroderivative Gas Turbine Bleed Systems**	Aerospace Applications	**Ravinder Yerram** GE Gas Power	Nuha Abousam, Balakrishnan Ponnuraj
TFEC-2020-35781	**Non-Boiling Heat Transfer Characteristics of Water Sprays Impinging on a Heated Surface**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Subhash Chander** National Institute of Technology	Neeraj Kumar
TFEC-2020-36015	**EXERGY ANALYSIS OF A GAS TURBINE POWER PLANT USING JATROPHA BIODIESEL, CONVENTIONAL DIESEL AND NATURAL GAS**	Advanced Energy Systems	**Aisha Sa'ad** Nigerian Defence Academy	Ejeheri V. Oghenemarho, Wunuken C. Solomon, Hamisu M. Tukur
TFEC-2020-36020	**NUMERICAL STUDY OF WEAR BY EROSION ON BUTTERFLY VALVE DISCS WITH PARTICLE-LADEN LAMINAR FLUID FLOWS**	Multiphase flow - II	**Orlando Ayala** Old Dominion University	
TFEC-2020-36100	**Numerical Analysis on the Effects of Plates in the Performance of 3D Storage Tanks for Cooling Using COMSOL Multiphysics**	Energy Storage Systems - I	**Aisha Sa'ad** Nigerian Defence Academy	Muhammad Tukur Hamisu, Nasir Saidu Galadanci
TFEC-2020-36103	**Classical Nucleation Theory Based Simulations of Non-equilibrium Condensation of Carbon Dioxide inside Converging-Diverging Nozzles**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Shyam Sunder Yadav** Birla Institute of Technology and Science	Kapil Dev Choudhary, Mani Sankar Dasgupta
TFEC-2020-36114	**COUPLING THE MONTE CARLO METHOD WITH FLUID FLOW MODELING IN A HIGH-TEMPERATURE VOLUMETRIC SOLAR AIR RECEIVER**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Vikas Ramesh Patil** ETH Zurich	Aldo Steinfeld

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-36118	**Study of formation damage with Flowzan bio polymer as drilling mud using experimental and computational methods**	Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids	**Mohammad Huque** Memorial University of Newfoundland	Mohammad Azizur Rahman
TFEC-2020-36133	**Generation and Dynamics of Janus Droplets in shear-Thinning Fluid Flow in a Cross-Type Microchannel**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - PO	**Fan Bai** Yeungnam University, School of Mechanical Engineering	Hongna Zhang, Sang Woo Joo
TFEC-2020-36148	**Experimental Characterization of a Variable Refrigerant Flow Heat Pump for Solar-Domestic-Hot-Water Applications**	Energy and Sustainability - I	**Julian Howarth** University of Waterloo	Michael R. Collins
TFEC-2020-36152	**ELECTROOSMOTIC DRIVEN CANALICULAR FLUID FLOW IN LACUNAR-CANALICULAR SYSTEM OF BONE**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - PO	**Rakesh Kumar** Manipal University Jaipur	Naman Sharma
TFEC-2020-36169	**Analysis of Air Cooling and Dehumidification Process Through Cooling Coils**	Thermo-fluid education - I	**Yongjian Gu** US Merchant Marine Academy	
TFEC-2020-36173	**Marker gradient method: sharp and robust algorithm for interfacial area density calculation**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Lubomir Bures** Nuclear Energy and Safety, Paul Scherrer Institute, Switzerland	Yohei Sato
TFEC-2020-36174	**Analysis of dynamics of microlayer formation and destruction in nucleate boiling**	Boiling	**Lubomir Bures** Nuclear Energy and Safety, Paul Scherrer Institute, Switzerland	Yohei Sato
TFEC-2020-36194	**Thermodynamic Cost of Manufacture of Heat Engines**	Energy and Sustainability - I	**Robert Richards** Washington State University	
TFEC-2020-36199	**Towards lattice Boltzmann simulation of forced convective flow in a Darcy-Brinkman-Forchheimer porous channel including a phase change material**	Multiphase flow - II	**Hassane Naji** University of Artois	Riheb Mabrouk, Hacen Dhahri
TFEC-2020-36215	**Digital Droplet Microfluidics with Programmable Liquid Handling Based on Contact Charge Electrophoresis**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - PO	**Fan Bai** Yeungnam University, School of Mechanical Engineering	Huai Zheng, Sang Woo Joo
TFEC-2020-36217	**Numerical Simulation of Laminar-Turbulent Transition in Hypersonic Flows: A Wall-modeled LES Approach**	Turbulent flows - I	**Rozie Zangeneh** Lawrence Tech University	Sarhan Musa
TFEC-2020-36218	**An OpenFOAM Numerical Solver for Phase-Change and Two-Phase Flow in Porous Media**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Mustafa Hadj-Nacer** University of Nevada Reno	Kegan Rahe, M. Iffat Hasan
TFEC-2020-36227	**Performance Evaluation of a Hybrid Solar Chimney-Photovoltaic Power Plant for Electricity Generation**	Solar energy equipment and processes - I	**Wisam Hussam** Australian College of Kuwait	Khalil Khanafer, Hayder Salem, Adel Mohammed redha, Ali Khlefat
TFEC-2020-36228	**ENHANCED REBOUND OF AQUEOUS POLYMER DROPLETS IMPACTING ON HEATED SUPERHYDROPHOBIC SURFACE**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - I	**Bin Li** Yeungnam University	Sang W. Joo, Longquan Chen
TFEC-2020-36248	**Meshfree parallel simulation to MHD Nano fluid flow & Heat transfer in Wavy enclosure with sinusoidal heating**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Rama Bhargava** Professor	
TFEC-2020-36258	**Experimental Study of Confined Pool Boiling Heat Transfer**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - II	**Nathan Eason** The University of Memphis	J G Marchetta, William Janna
TFEC-2020-36271	**Numerical Investigation of Direct Liquid Cooling System for High Density Chassis with Microchannel and Return Jet Impingement Configurations**	Energy and Sustainability - PO	**Zach Gilvey** Colorado State University	Todd Bandhauer
TFEC-2020-36272	**Numerical simulation of vacuum generation by cooling-controlled steam-condensation**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Hongling Deng** New Jersey Institute of Technology	Guangyu Guo, Chao Zhu, Zhiming Ji
TFEC-2020-36274	**Vacuum-aided spray flash desalination**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Hongling Deng** New Jersey Institute of Technology	Guangyu Guo, Chao Zhu, Zhiming Ji
TFEC-2020-36282	**Analytical Study of Phase Change Heat Transfer in Biological Tissue using Coordinate Transformation Technique during Cryosurgery**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Sumit Kumar** National Institute of Technology Rourkela	Abhigyan Majumdar
TFEC-2020-36285	**Computational Fluid Dynamics Simulation of Pin Hole Leaks in Air Pipelines and Its Validation**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Burak Ayyildiz** Texas A&M University	
TFEC-2020-36291	**Loop Thermosyphon Design for Solar Thermal Desalination**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Joshua Charles** Advanced Cooling Technologies	Nathan Van Velson
TFEC-2020-36297	**Galerkin Based green's function method for solving inverse heat conduction of stir welding process.**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Nasser Ghariban** Virginia State University	
TFEC-2020-36298	**A Simulated Evaluation of Turbulence Generators in Ground Heat Exchangers**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Vincent Blouin** Clemson University	Rohit Rao, Richard Miller

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-36300	**Thermal Properties Of Clove Seed**	Experimental Methods/Tools and Instrumentation in Fluid Mechanics and Heat/Mass Transfer	**Sathish Kumar Gurupatham** Kennesaw State University	
TFEC-2020-36302	**Using Markov Chain Monte Carlo Procedures to Estimate Model Parameters for a Heat Storage System**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Ashley Emery** University Washington	
TFEC-2020-36315	**NUMERICAL THERMO-HYDRAULIC COMPARISON OF TREE-SHAPED AND RADIAL FLOW NETWORKS FOR COOLING UNIFORMLY HEATED DISCS**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Derli Amaral** SMU	Jose' L. Lage
TFEC-2020-36317	**Heat Transfer Enhancement by a Two Stage Electrohydrodynamic Gas Pump in a Square Channel**	Heat/mass transfer enhancement techniques - I	**A K M Monayem Mazumder** Assistant Professor	
TFEC-2020-36321	**Film cooling effectiveness for air supplied into a serrated trench with double-curvature lips**	Advanced Energy Systems	**Leping Zhou** North China Electric Power University	Runsheng Zhang, Xiaoze Du
TFEC-2020-36330	**SYNTHESIS OF ANISOTROPIC SNO2 NANOPARTICLES FOR SOLAR CELL APPLICATIONS**	Solar energy equipment and processes - I	**Saeid Vafaei** Bradley University	Concetta Gendusa, Harshini Vasudevanallur, Udo Schnupf, Kazuhiro Manseki, Takashi Sugiura, Branden Scherer
TFEC-2020-36331	**Low Temperature Synthesis of SnO2 Semiconductor Nanoparticles: Factors Determining the Characteristics of Produced SnO2**	Solar energy equipment and processes - I	**Saeid Vafaei** Bradley University	Alexander Wolosz, Dalton Thomas, Udo Schnupf, Kazuhiro Manseki, Takashi Sugiura
TFEC-2020-36342	**ANALYSIS OF ACTIVE PRESSURIZATION METHODS FOR A CRYOGENIC PROPELLANT TANK**	Aerospace Applications - PO	**Jeswin Joseph** LPSC, ISRO	Deepak Agarwal, T John Tharakan
TFEC-2020-36395	**Similarity in unsteady shock wave reflection**	Aerospace Applications	**Elad Koronio** Ben-Gurion University	
TFEC-2020-36466	**Two-Dimensional Maximum Entropy Principle to Predict Spray Characteristics Due to Wave-Body Interactions**	Flow Instability - I	**Armin Bodaghkhani** University of Prince Edward Island	Yuri Muzychka
TFEC-2020-36522	**Incorporating Cross-flow Effects into the Spalart-Allmaras Turbulent Transition Model**	Turbulent flows - I	**Ardalan Javadi** The University of Waterloo	
TFEC-2020-36525	**CFD VALIDATION OF THE THERMODYNAMIC MODEL OF A COMPRESSED GASEOUS HYDROGEN STORAGE TANK.**	Energy Storage Systems - I	**Shahab Rouhi** PhD Student	Nikolaos Xiros, Setare Sadeqi, Juliette Ioup, James VanZwieten, Cornel Sultan
TFEC-2020-36526	**Wavelet Transform Analysis Applied to Incompressible Flow Field About a Solid Cylinder.**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Setare Sadeqi** PhD Student	Nikolaos Xiros, Shahab Rouhi, Juliette Ioup, James VanZwieten, Cornel Sultan
TFEC-2020-36527	**Modeling of Enhanced Air Dehumidification through Electrically Charged Vapor Capturing Electrostatic Droplets**	Heat/mass transfer enhancement techniques - II	**Stefano Morcelli** Auburn University	Lorenzo Cremaschi
TFEC-2020-36531	**An Ejector-based Refrigeration System as a Sustainable Solution for Disaster Relief**	Energy and Sustainability - I	**Kartik Bulusu** The George Washington University	Ethan Frink
TFEC-2020-36547	**Advanced Thermal-Hydraulic Model of Heat Recovery Steam Generators**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Marc Olivier Delchini** Oak Ridge National Laboratory	Nithin Panicker, Thomas Sambor, Prashant Jain, Adrian Sabau
TFEC-2020-36581	**CFD INVESTIGATION ON RE-WETTING HOT SURFACES WITH WATER JET IMPINGEMENT**	Multiphase Flow - I	**Ajoy Debbarma** National Institute of Technology Hamirpur	Dharavath Lava Kishan, Sohan Lal Sharma
TFEC-2020-36591	**An overview of performance and application of nanofluids in compact heat exchangers**	Nano and Micro Fluid Applications - I	**Sohel Murshed** University of Lisbon	Wagd Ajeeb
TFEC-2020-36592	**Facile micro-fabrication techniques for rapid manufacturing of gallium-based liquid metal passive frequency selective surfaces**	Nano and Micro Fluid Applications - I	**Arkadeep Mitra** The University of Texas at Dallas	Jeong-Bong Lee
TFEC-2020-36648	**Development of Radio-frequency Powered Plasma Engine for Spacecraft Propulsion**	Aerospace Applications - PO	**Pranav Nath** Liquid Propulsion Systems Centre	Nipin L, C K Muthukumaran, Deepak Kumar Agarwal, Umesh R. Kadhane, Shibu Mathew, T John Tharakan, S Sunil Kumar, Unnikrishnan Nair P
TFEC-2020-36651	**Single-phase convective heat transfer in brazed plate heat exchangers with R1233zd(E)**	Heat exchangers: Compact, novel, networks - I	**Angela Mutumba** Brunel University	Tassos Karayiannis, Francesco Coletti, Alex Reip
TFEC-2020-36652	**A Numerical Study of Assisting Mixed Convective Heat Transfer from Narrow Isothermal Inclined Flat Plates**	Fundamentals in Fluid Flow and Heat/Mass and Momentum Transfer - I	**Patrick H Oosthuizen** Queen's University	Mohamed Elkhmri
TFEC-2020-36656	**Model Form and Discretization Uncertainty of Thermal-fluid-electric Coupled Thermoelectric Systems**	Energy and Sustainability - I	**Matthew Barry** University of Pittsburgh	Corey Clifford, Shervin Sammak
TFEC-2020-36662	**A Modeling Study on Fuel Consumption Improvement of a Light-Duty CNG Truck Equipped with a Hybrid Powertrain**	Transportation	**Ratnak Sok** Waseda University	Jin Kusaka, Makoto Akaike, Hisaharu Nakashima
TFEC-2020-36663	**NUMERICAL MODELLING OF THE OSCILLATORY FLOW OF A BINARY GAS MIXTURE IN A STANDING WAVE ACOUSTIC RESONATOR**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Jose Lorenzo Alejandro Barba-Pina** University of Leeds	Xiaoan Mao, Alan Burns, Zinedine Khatir
TFEC-2020-36666	**CFD MODELING OF HYPERSONIC TURBULENT AERODYNAMICS**	Turbulent Flows - PO	**Sogol Pirbastami** University of Nevada	Darrell W. Pepper
TFEC-2020-36669	**Convective Heat Transfer Characteristics of Al2O3 Nanofluid in Minitube**	Nano and Micro Fluid Applications - I	**Sohel Murshed** University of Lisbon	Wagd Ajeeb, Diogo Roque

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-36670	**Computational modeling and simulation of Aluminium smelting process using OpenFOAM**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Nithin S Panicker** UT battelle	Rajneesh Chaudhary, Prashant K Jain, Vivek M Rao, Marc O Delchini
TFEC-2020-36675	**Numerical Investigation of Influence of Surface Deposition of Nanoparticles in Tumors during Nanofluid Injection**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Himanshu Tyagi** IIT Ropar	Mettu Sagar, Sanjeev Soni, Sarit Kumar Das
TFEC-2020-36676	**Parametric Analysis between Closed Air Open Water (CAOW) and Closed Water Open Air (CWOA) HDH Cycles**	Energy and Sustainability - I	**Himanshu Tyagi** IIT Ropar	Ravi Beniwal, Kapil Garg, Sarit Kumar Das
TFEC-2020-36678	**Calibration of Eulerian-Eulerian two-phase model to predict repose angle of particles in a multistage free-falling particle receiver**	Multiphase Flow - I	**Apurv Kumar** University of Maryland	Ankit Patel, Vishalkumar Patel
TFEC-2020-36679	**Eulerian granular CFD modelling of hydrodynamics of a free-falling particle curtain with particle size distribution**	Solar energy equipment and processes - I	**Apurv Kumar** University of Maryland	Ankit Patel, Vishalkumar Patel
TFEC-2020-36693	**Modeling of Close-Contact and Convective Melting in an Axisymmetric Cylindrical Geometry**	Energy Storage Systems - I	**Tomer Shockner** Ben Gurion University	Gennady Ziskind
TFEC-2020-36694	**Theoretical and Numerical Analysis of Time-Dependent Heat Transfer in Microscale Systems**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - PO	**Tomer Shockner** Ben Gurion University	Gennady Ziskind
TFEC-2020-36695	**A COMPARATIVE NUMERICAL STUDY OF GAS TURBINE COMBUSTOR-DIFFUSER FLOW INTERACTION**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Mohit Bansal** Jamia Millia Islamia New Delhi	Abdur Rahim
TFEC-2020-36698	**Turbulent microscale flow field prediction in porous media using Convolutional Neural Networks**	Turbulent flows - I	**Vishal Srikanth** North Carolina State University	Ching-Wei Huang, Ryan Harradine, Andrey Kuznetsov
TFEC-2020-36699	**Numerical Analysis of the Transient Liquid Rise within a Capillary Channel**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Mohammad Naghashnejad** University of Oklahoma	Hamidreza Shabgard
TFEC-2020-36700	**Numerical Modeling of Evaporative Meniscus Between Parallel Plates**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Mohammad Naghashnejad** University of Oklahoma	Hamidreza Shabgard, Hootan Rahimi
TFEC-2020-36703	**Automated extraction of free-surface and estimation of air entrainment using OpenFOAM**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Kandukuri Koteswara Rao** IIT Hyderabad	Jampana Phanindra
TFEC-2020-36705	**Topology optimization for thermal flow based on adjoint lattice Boltzmann method and level set method**	Heat/mass transfer enhancement techniques - I	**Li Chen** Xi'an Jiaotong University, School of energy and power engineering	Wen-Quan Tao, Ji-Wang Luo, Qinjun Kang
TFEC-2020-36707	**ELECTROCHEMICAL THERMAL MODELLING OF Li-ION BATTERY CELL AT DIFFERENT DISCHARGE RATES - A COMPARATIVE STUDY**	Energy Storage Systems - PO	**Samarjeet Chanda** Indian Institute of Technology Palakkad	Arundas Odungat
TFEC-2020-36708	**EXPERIMENTAL EVALUATION OF THE FLOW BOILING HEAT TRANSFER COEFFICIENT OF R600a, R290 AND R134A INSIDE A 9.43 MM INNER DIAMETER SMOOTH TUBE.**	Refrigeration, Air conditioning systems and refrigerants - PO	**Guilherme Oliveira** USP	Tiago Moreira, Gherhardt Ribatski
TFEC-2020-36712	**INVESTIGATING DRAGONFLY FLIGHT DYNAMICS AT VARIOUS HEAVING FREQUENCIES OF ITS WING**	Biomimetic and bioinspired engineering	**Santosh Mallah** Indian Institute of Technology	Amit Agrawal, Majid Hassan Khan
TFEC-2020-36714	**STUDY OF DRAGONFLY FLIGHT DYNAMICS AT VARIOUS HEAVING APMLITUDE OF ITS WING**	Biomimetic and bioinspired engineering	**Santosh Mallah** Indian Institute of Technology	Amit Agrawal, Sooraj Padinjattayil, Atul Sharma
TFEC-2020-36715	**NUMERICAL INVESTIGATION OF COMBUSTION AND HEAT TRANSFER IN 7 ELEMENT GCH4/GOX ROCKET COMBUSTOR**	Combustion, Fire and Fuels - I	**Abhishek Sharma** Liquid Propulsion Systems Center	Varghese Mathew Thannickal
TFEC-2020-36716	**MODELING AND SIMULATION OF DIRECT STEAM GENERATION IN PARABOLIC TROUGH SOLAR COLLECTOR**	Solar energy equipment and processes - I	**Ravi K** Indian Institute of Technology Delhi	Ram Kumar Pal
TFEC-2020-36720	**Start-up Power Requirements for an Axial Grooved Thermosyphon**	Aerospace Applications	**Sohail Zaidi** San Jose State University	Nicole Okamoto, Eric Chu
TFEC-2020-36722	**Tailoring Left Ventricular Assist Device Cannula Implantation Using Coupled Multi-Scale Multi-Objective Patient-Specific Optimization**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Abubakar Dankano** University of Central Florida	Ray Prather, Blake Lozinski, Eduardo Divo, William Decampli, Alain Kassab
TFEC-2020-36723	**QUANTIFYING THE PARTIAL-PENETRATION PSEUDO SKIN FOR EVALUATING THE COMPLETION EFFICIENCY OF VERTICAL OIL WELLS**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - II	**Ekhwaiter Abobaker** Memorial University	
TFEC-2020-36727	**Water flow and heat transfer within micro-scale heat sinks with hydrophobic surfaces**	Advanced Energy Systems	**Mahyar Pourghadsemi** PhD Candidate	Nima Fathi, Mani Razi
TFEC-2020-36729	**Study of Jumping Droplets with Electrostatic Effects on Biphilic Surfaces for Thermal Energy Storage Systems**	Energy Storage Systems - I	**Chi Yan TSO** School of Energy and Environment, City University of Hong Kong	Yihao Zhu, Tsz Chung Ho
TFEC-2020-36731	**Effects of Stand-off Distance and Jet-to-Jet Spacing on the Heat Transfer Performance of an In-line Array of Submerged Impinging Jets**	Heat/mass transfer enhancement techniques - II	**Corey Klinkhamer** University of Windsor	Abishek Sridhar, Lakshmi Iyer, Ram Balachandar, Ron M. Barron
TFEC-2020-36738	**COMPUTATIONAL ANALYSIS OF AFTERBURNER WITH MODIFIED V-GUTTER**	Aerospace Applications	**Srinivasa Rao Gurrala** Indian Naval Academy Ezhimala	Srinivas Tummala, Srinivasa Rao Putti

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-36744	**Thermal analysis of air gap diffusion distillation device driven by waste heat**	Advanced Energy Systems	**Ping Wang** Dalian university of technology	
TFEC-2020-36746	**Estimation of Thermal Efficiency, Emission Factors and Heat Losses from a Forced Draft Gasifier Stove**	Combustion, Fire and Fuels - I	**Himanshu** IIT Delhi	Sanjeev Jain, Sudhir Tyagi
TFEC-2020-36751	**Reducing Ethylene Decompositions in LDPE Reactor Using CFD**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Eric Turman** Liberty University	Wayne Strasser
TFEC-2020-36753	**Smart Atomization: Implementation of PID Control in Biosludge Atomizer**	Multiphase flow - II	**Daniel Wilson** Liberty University	Wayne Strasser
TFEC-2020-36760	**Effect of Water Content on Viscosity of Ionic Liquids (ILs) Based Nanofluids**	Energy Storage Systems - I	**Titan Paul** University of South Carolina Aiken	Melanie Howe
TFEC-2020-36761	**EFFECT OF MICROSCALE TURBULENT STRUCTURES DYNAMICS ON FORCED CONVECTION IN TURBULENT POROUS MEDIA FLOW**	Turbulent flows - I	**Ching-Wei Huang** NC State Univeristy	Vishal Srikanth, Andrey Kuznetsov
TFEC-2020-36762	**Co-Optimization of Turbine Blade Aero and Thermal Designs Based on Computational Fluid Dynamics (CFD) Models**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Chao Zhang** Siemens Digital Industries Software	Justin Hodges, Matthew Janeway
TFEC-2020-36764	**Numerical investigation on a Heat Exchanger in Aluminum Foam with Flat - Tube**	Heat exchangers: Compact, novel, networks - I	**Oronzio Manca** Universita' degli Studi della Campania	Bernardo Buonomo, Anna di Pasqua, Sergio Nardini
TFEC-2020-36767	**PREDICTION OF EROSION AND ACCRETION FROM SOLUTION OF SALT AND WATER OVER PIPE WALLS OF CONDENSER IN A THERMAL POWER PLANT**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Jobaidur Khan** University at Buffalo	Eshwanth Asok
TFEC-2020-36768	**EFFECT OF THE FIN LOCATION ON HEAT TRANSFER CHARACTERISTICS IN A LATERALLY AND VOLUMETRICALLY HEATED ENCLOSURE**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Emel Selamet** Researcher	Ahmet Selamet
TFEC-2020-36769	**Energy Efficiency Study of an Off-Road Vehicle Hydraulic Systems**	Energy and Sustainability - PO	**Mathan Kumar Kaliappan** Student	Alamgir Choudhury
TFEC-2020-36770	**INCIDENT HEAT FLUX CHARACTERIZATION DURING PHOTONIC CURING**	Fluid Flow and Heat Transfer in Materials Processing Science and Manufacturing - I	**Martin Guillot** University of New Orleans	John Passiak, Rob Hendricks
TFEC-2020-36772	**Multiscale Investigation of Hybrid Comprehensive Stage II Circulation**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Arka Das** PhD candidate	Ray Prather, Marwan Hameed, Eduardo Divo, Alain J. Kassab, William Decampli
TFEC-2020-36774	**Optimization of Variable Cross-Sectional Area Thermoelectric Elements Through Multi-method Thermal-Electric Coupled Modeling**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Matthew Barry** University of Pittsburgh	Arsha Mamoozadeh, Sarah Wielgosz, Kevin Yu, Fivos Drymiotis
TFEC-2020-36775	**Experimental Investigation of Latent Heat Thermal Energy Storage System Enhanced by Annular and Radial Fins**	Energy Storage Systems - PO	**Saeed Tiari** Gannon University	Addison Hockins, Samantha Moretti
TFEC-2020-36776	**Modeling A Novel Method to Diminishing COVID-19 Transmission in a Hospital Room**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Reid Prichard** Liberty University	Wayne Strasser, Brian Walsh, Scott Leonard
TFEC-2020-36777	**Fully-coupled Thermoelectric-mechanical Modeling of Thermoelectric Generators**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Matthew Barry** University of Pittsburgh	Shane Riley, Edward Ledesma, Kevin Yu, Fivos Drymiotis
TFEC-2020-36778	**Modeling Bridgman Heating in Thermoelectric Generators**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Matthew Barry** University of Pittsburgh	Edward Ledesma, Shervin Sammak
TFEC-2020-36779	**Computational Investigation of Magneto-Hydrodynamic Assist Device for Actively Powered Fontan Circulations**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Arka Das** PhD Candidate	Harvey Waters, Ray Prather, Eduardo Divo, Alain J. Kassab, Anthony Nunez
TFEC-2020-36780	**Atherosclerotic artery disease and its implications towards blood flow physics**	Biomimetic and bioinspired engineering	**Jonathon Yanello** Student	Manuel Salinas, Rebecca Cox
TFEC-2020-36781	**EFFECT OF INTERNAL HEAT GENERATION ON NUSSELT NUMBER AND NUMERICAL INVESTIGATION OF PRESSURE DROP FOR MOLTEN SALT FLOW INSIDE A CIRCULAR PIPE**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes - PO	**Maryam Besharati Givi** Terrestrial Energy Inc.	Shubham Banik, Akash Dhandhukia, William Smith
TFEC-2020-36783	**Comprehensive modeling of thermionic energy conversion with micro/nanoscale vacuum gaps**	Electric, Magnetic, Flow and Thermal Phenomena in Micro and Nano-Scale Systems - PO	**Moh'd-Eslam Dahdolan** University of Nebraska-Lincoln	Mohammad Ghashami
TFEC-2020-36784	**Ventilation CFD Analysis at a Pharmaceutical Plant as a Tool for Air Safety Verification under COVID-19 context, a Case Study**	Computational Methods/Tools in Thermal-Fluid Systems - I	**Jorge Kurita** Universidad Nacional de Asuncion	Nicolas Ferreira, Mirna Limousin, Luis Centurion
TFEC-2020-36785	**Heat Transfer Enhancement of a Zirconium Heater Rod Using a Chromium Coating During Quenching**	Heat/mass transfer enhancement techniques - II	**Turki Almudhhi** Pennsylvania State University	Fan-Bill Cheung, Mustafa Almadih, Douglas Wolfe, Shikha Ebrahim
TFEC-2020-36792	**Free convection heat transfer of Al2O3-Cu/water hybrid nanofluid in a rectotrapezoidal enclosure heated uniformly from the bottom wall**	Nano and Micro Fluid Applications - II	**Mohammad Mansur Rahman** Sultan Qaboos University	M. Ziad Saghir, Ioan Pop
TFEC-2020-36793	**Two wavelength digital holographic interferometry for investigation of dynamic processes in fluid mechanics**	Experimental Methods/Tools and Instrumentation in Fluid Mechanics and Heat/Mass Transfer	**Pavel Psota** Technical University of Liberec	Gramoz Cubreli, Jan Kredba, Marek Stašík, Vít Lédl
TFEC-2020-36799	**DIRECT NUMERICAL SIMULATION OF A CYLINDER ROLLING ON AHORIZONTAL SURFACE: THE EFFECT OF THICKNESS ON**	Aerospace Applications	**Ardalan Javadi** The University of Waterloo	

Article ID	Article Title	Session	Corresponding Author	Co-authors
TFEC-2020-36800	**The Numerical Analysis of the Effects of Metal Foam Inserts on the Performance of a Double Pipe Heat Exchanger**	Heat exchangers: Compact, novel, networks - I	**Mahboobe Mahdavi** Assistant Professor	Anamol Koirala, Joseph Rubaker
TFEC-2020-36805	**HANDS-ON HEAT TRANSFER: TRANSIENT LUMPED NATURAL CONVECTION WITH AN EQUIVALENT DIAMETER**	Thermo-fluid education - I	**Matthew Burge** University at Buffalo	Amy Faville
TFEC-2020-36806	**HANDS-ON HEAT TRANSFER: 2D FINITE VOLUME CONDUCTION WITH CONVECTIVE LOSSES**	Thermo-fluid education - I	**Matthew Burge** University at Buffalo	Amy Faville
TFEC-2020-36810	**Simulation of Multiphase Flow Regime Transition in a Horizontal Pipe**	Multiphase Flow - I	**Carlton Adam** US Army ARDEC	Hamid Hadim
TFEC-2020-36813	**Evaluation of valve coefficient for a control valve with varying stem profiles using computational fluid dynamics simulation**	Computational Methods/Tools in Thermal-Fluid Systems - PO	**Palash Acharya** University of Texas at Austin	Manojkumar Lokanathan, Arjang Shahriari, Vaibhav Bahadur
TFEC-2020-36816	**Prediction of clathrate hydrate phase equilibria in the presence of electrolytes using machine learning-based approaches**	Energy and Sustainability - PO	**Palash Acharya** University of Texas at Austin	Vaibhav Bahadur
TFEC-2020-36818	**Heat Transfer and Pressure Drop Characteristics in a Channel with GRIP Metal Surfaces**	Heat/mass transfer enhancement techniques - PO	**Omar Khaled** York Univerisity	John Swift, Roger Kempers
TFEC-2020-36824	**Behaviors of vortex breakdown in steady-state and oscillatory flow with an axial magnetic field'**	Flow Instability - I	**Mahfoud Brahim** University of Bouira	
TFEC-2020-36829	**SIMULTANEOUS EFFECTS OF SLIP AND RADIATION ON MAGNETO-BLOOD FLOW THROUGH POROUS MEDIUM WITH VARIABLE VISCOSITY**	Flow and Heat Transfer in Biological/ Biomedical Systems	**Bhupendra Sharma** BITS, Pilani	Madhu Sharma
TFEC-2020-36836	**A Review on Thermal-Fluid Behavior in Sweeping Jet Fluidic Oscillators**	Heat/mass transfer enhancement techniques - II	**Ramy Abdelmaksoud** Energy Conversion and Conservation Center	Ting Wang
TFEC-2020-36846	**Optimization of the effects of nanoparticles: Thermal conductivity and viscosity**	Nano and Micro Fluid Applications - II	**Saeid Vafaei** Bradley University	Ryan Fulmer, Kevin Apmann
TFEC-2020-36851	**Experimental Study of Effect of Void Fraction on Flow Continuity in a Siphon**	Fluid Flow and Heat Transfer in Industrial and Commercial Processes	**Hamed Abdul Majeed** University of New Orleans	Ting Wang, Joseph V. D'Amico
TFEC-2020-36866	**An Investigation Into Natural Convection Heat Transfer From Isoflux Horizontal Circular Surfaces Facing Upward**	Fundamentals in Fluid Flow and Heat/ Mass and Momentum Transfer - II	**Chris Kobus** Oakland University	
TFEC-2020-36888	**STUDY ON THE ADDITION OF NANOPARTICLES ON FORCED CONVECTION HEAT TRANSFER AS A FUNCTION OF DISTANCE IN MICROCHANNELS**	Nano and Micro Fluid Applications - II	**Saeid Vafaei** Bradley University	Branden Scherer, Trevor Smith, Peter Daluga, Jonathan Yeager
TFEC-2020-36893	**EXPERIMENTAL STUDY OF COMBINED COMPACT EVAPORATIVE COOLER WITH DESICCANT DEHUMIDIFICATION**	Heat exchangers: Compact, novel, networks - I	**Laith Ismael** University of Missouri Columbia	Amged Al Ezzi, Hongbin (Bill) Ma
TFEC-2020-37016	**NUMERICAL SIMULATION OF SOLUTE TRANSPORT FROM MULTIPLE CYLINDERS**	Computational Methods/Tools in Thermal-Fluid Systems - II	**Hamid Sadat** University of North Texas	Kamau Kingora
TFEC-2020-37068	**Toward the development of reduced-order models of the glottal flow during voice production**	Fluid Mechanics of Speech	**Zhaoyan Zhang** University of California	
TFEC-2020-37090	**Wind Turbines Icing Physics and Innovative Strategies for Wind Turbine Icing Mitigation**	Multiphase Flow - PO	**Hui Hu** Iowa State University	
TFEC-2020-37111	**Wave reflection and transmission line algorithms for time-domain speech simulation**	Fluid Mechanics of Speech	**Anil Kumar Palaparthi** University of Utah	Ingo Titze
TFEC-2020-37130	**Multi-physics computational modeling of speech - from neuromuscular muscle activation to flow-structure-acoustic interaction of voice production**	Fluid Mechanics of Speech	**Xudong Zheng** University of Maine	
TFEC-2020-37252	**Sintering Strategies for Creating 3D TiO2 Nanomaterials for Photovoltaic Applications**	Solar energy equipment and processes - I	**Saeid Vafaei** Bradley University	Dalton Thomas, Alexander Wolosz, Kazuhiro Manseki, Takashi Sugiura
TFEC-2020-37505	**Recent advances in synthetic vocal fold modeling**	Fluid Mechanics of Speech	**Scott Thomson** Brigham Young University	
TFEC-2020-37771	**Experimental study of heat transfer of ice slurry based on Monopropylen glycol**	Multiphase Flow - PO	**Souheila Mellari** Université Frères Mentouri	
TFEC-2020-38187	**The assumption of atmospheric pressure downstream of the flow separation point is likely only valid for lower subglottal pressures (soft phonation)**	Fluid Mechanics of Speech	**Sid Khosla** University of Cincinnati	
TFEC-2020-38471	**An Experimental and Numerical Study of a Counter-Current Flow Solar Reactor With Heat Recuperation**	Solar energy equipment and processes - PO	**Nesrin Ozalp** University of Minnesota Duluth	Assaad Alsahlani, James Klausner, Kelvin Randhir, Michael Hayes, Philipp Schimmels
TFEC-2020-38503	**INFLUENCE OF SURFACE WETTABILITY ON BUBBLE BEHAVIORS IN POOL BOILING**	Multiphase Flow - I	**Yakang Xia** University of British Columbia	Ri Li
TFEC-2020-38551	**Effects of velopharyngeal openings on flow characteristics and aeroacoustics sound mechanisms during sibilant sound with audible nasal emission**	Fluid Mechanics of Speech	**Liran Oren** University of Cincinnati	Elias Sundström
TFEC-2020-38560	**Experimental test facility for turbulent flow measurements in a rib-roughened channel at Reynolds numbers above 50 000**		**Sebastian Ruck** Karlsruhe Institute of Technology	Frederik Arbeiter, Georg Schlindwein
TFEC-2020-38563	**Kelvin Wakes in a Free Surface Water Flow Regarding the Liquid Lithium Target in DONES**	Flow Instability - I	**Björn Brenneis** Karlsruhe Institute of Technology (KIT)	Sebastian Ruck

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August 15–19, 2021

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