ASME 2022 SHTC

Summer Heat Transfer Conference Co-Located with the 16th International Conference on Energy Sustainability

CONFERENCE
July 11-13, 2022

Philadelphia, Pennsylvania

Program

event.asme.org/SHTC

The American Society of Mechanical Engineers®
ASME®

ASME
SETTING THE STANDARD

Welcome

FROM THE CONFERENCE CHAIRS

Dear Colleagues,

On behalf of the ASME Heat Transfer Division, it is our pleasure to welcome you to the ASME 2022 Summer Heat Transfer Conference held during July 11–13, 2022, at the downtown Sheraton Hotel in Philadelphia, PA. We are delighted to note that this year the conference is in person after two years of virtual meetings. The conference is a premier event that offers excellent opportunities to disseminate your research and network with the international heat transfer community. The technical content of the conference is broad in scope and will provide a forum for presentation of state-of-the-art research. It is co-sponsored by the AIChE and is co-located with the ASME 16th International Conference on Energy Sustainability.

The conference offers a vibrant program with several technical sessions, plenary talks, and a panel discussion. The plenary sessions include presentations from John Bischof (University of Minnesota) and the Donald Q. Kern Award winner John Lienhard V (MIT), as well as a talk by Michael Modest (UC-Merced), who is the winner of the Max Jakob Memorial Award. One hundred and seventy papers and presentations are scheduled. A special forum to discuss funding opportunities has been organized with representatives from the National Science Foundation and the U.S. Department of Energy. Special events at the conference are the Welcome Reception, the Awards Lunch, and a technical tour of the Boeing Helicopter Plant in Ridley Park, PA.

The contributions of all the track, topic, and session chairs, authors, reviewers, and ASME staff have been invaluable in organizing this conference. We would like to specifically acknowledge ASME staff Mary Jakubowski, Laraine Lee, and April Tone. We also thank track and session organizers for supporting the conference technical program, overseeing the reviews of the technical papers, and helping maintain high standards. We are grateful to representatives from the AIChE together with the ASME Advanced Energy Systems and the Solar Energy Divisions for the cooperative spirit in bringing together this jointly sponsored co-located event. Most importantly, we thank you, the participants, for giving strength to the conference with your presence and by participating in the important task of the review process and the ongoing technical engagement.

We hope you enjoy this meeting and the opportunity to reconnect with your colleagues once again in person.

Satwindar S. Sadhal, Conference Chair University of Southern California

Milind A. Jog, Conference Co-Chair University of Cincinnati

Mark A. Kedzierski, Technical Program Chair National Institute of Standards and Technology

Contents

Conference Information

REGISTRATION INFORMATION

Liberty Foyer, Ballroom Level

Registration Hours:

Sunday, July 10, 12:00PM–05:00PM

Monday, July 11, 07:00AM–05:30PM

Tuesday, July 12, 07:00AM–05:30PM

Wednesday, July 13, 07:00AM–12:30PM

EXHIBIT INFORMATION

Liberty Foyer, Ballroom Level

Hours

Monday, July 11, 10:00AM–04:00PM

Tuesday, July 12, 10:00AM–04:00PM

Don't forget to stop by and visit with our Exhibitors from Boeing!

AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

All technical sessions are equipped with one LCD projector and one screen. Laptops will NOT be provided in the sessions. Presenters MUST bring their own or make arrangements in advance with the session chairs to share theirs. Please bring your presentation on a thumb drive 15 minutes prior to the session start time. A speaker ready room is available starting on Monday from 7:00AM–5:00PM and Wednesday until 12:00PM in the Franklin Room located on the Mezzanine Level.

BADGE REQUIRED FOR ADMISSION

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

CONFERENCE AWARDS LUNCH

The Awards Luncheon will take place during the conference to recognize and celebrate a select group of individuals for their contributions and achievements in heat transfer engineering. The schedule is as follows:

Heat Transfer Division Awards Luncheon
Tuesday, July 12, 12:15PM–1:45PM in Liberty B, on the Ballroom Level

CONFERENCE LUNCHES

Conference lunches will be held from 12:15PM to 1:45PM on Monday and Tuesday in Liberty B located on the Ballroom Level. On Wednesday you will be on your own. Please join your fellow attendees for a good meal and a great networking opportunity.

CONFERENCE APP

SHTC/ES 2022 is utilizing a mobile event app in place of a printed program to enhance the conference experience for all attendees.
You will be able to:

- Connect with Attendees
- View Speaker Profiles
- Access Session Information
- Watch On-Demand Content
- Download Final Papers
- And More!

*All features may not be available at all events.

CONFERENCE PROCEEDINGS

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

CONFERENCE REFRESHMENT BREAKS

Morning and afternoon breaks will be provided in the Liberty Foyer, Ballroom Level. Come and meet our exhibitors and join your fellow attendees for a few minutes of networking and discussion. The schedule is as follows:

Monday - Tuesday, July 11–12
10:10AM–10:30AM and 03:40PM–04:00PM

Wednesday, July 13
10:10AM – 10:30AM

TECHNICAL TOUR*

Wednesday, July 13
08:00AM–12:00PM
$35.00 for Members and Non-Members
Tickets Required – Maximum of 30 participants
https://www.boeing.com/company/key-orgs/boeing-testing-services/wind-tunnels-and-propulsion.page#/speed

*U.S. Citizens or Green Card Holders only

Proof of Citizenship/Permanent Residence will be required upon arrival at Boeing.

Closed-Toed Shoes Required.

Safety Glasses will be supplied, but if you have your own, please bring them with you.

Please meet at the main lobby by 17th street entrance sign. The buses will load on 17th between Race and Vine.

BOEING TECHNOLOGIES

The low-speed Boeing Vertical/Short Takeoff and Landing Wind Tunnel (BVWT), located in Philadelphia, has a large, versatile test section that is useful for testing fixed- and rotary-wing aircraft and non-aeronautical vehicles and structures. BVWT is a closed-circuit single-return tunnel and has a 20-by-20-foot, variable-configuration test section. The tunnel is capable of speeds of hover to 0.3 Mach, with a dynamic pressure range of 0 to 160 pounds per square foot.

It includes a fully automated test-model positioning system and airspeed controller, state-of-the-art data collection and instrumentation, and stainless steel honeycomb to improve flow quality. Touch-screen function control panels can display 30 monitored parameters. With the data updated every half second, these monitors provide for near-real-time display of multiple parameters.

The wind tunnel staff is experienced in all forms of force, pressure, flight control, vibratory, and dynamic testing of powered and unpowered fixed- and rotary-wing aircraft and other test articles in and out of ground effect.

OPENING RECEPTION

Sunday, July 10
06:30PM–08:00PM
Liberty B, Ballroom Level

EMERGENCY INFORMATION

If you are experiencing a health emergency, please dial 911. If you are able or someone else is able, please dial zero and inform the operator so that the hotel can be on the alert for the emergency response team. The hotel also has 24-hour security and officers trained in first aid, CPR, & AED service.

INTERNET ACCESS

Complimentary basic internet is provided in sleeping rooms if you are staying at the Sheraton and in the hotel's public space. Internet in the meeting space will be limited.

MEMBERSHIP TO ASME (4 MONTHS FREE)

Registrants who paid the non-member conference registration fees will receive a four-month complimentary ASME Membership. ASME will automatically activate this complimentary membership for qualified attendees. Please allow approximately four weeks after the conclusion of the conference for your membership to become active. Visit www.asme.org/membership for more information about the benefits of ASME Membership.

PRESENTER ATTENDANCE POLICY

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

Schedule at a Glance

TIME	EVENT	ROOM
SUNDAY, JULY 10, 2022		
12:00PM–05:00PM	Registration	Liberty Foyer
01:00PM–03:00PM	HTD Executive Committee Meeting (Closed Meeting)	India A
03:30PM–05:30PM	HTD EC & K-Committee Leadership Open Meeting	India A
06:30PM–08:00PM	Opening Reception	Liberty B
MONDAY, JULY 11, 2022		
07:00AM–05:30PM	Registration	Liberty Foyer
07:00AM–05:30PM	Registration	Liberty Foyer
07:00AM–05:00PM	Speaker Ready Room	Franklin
08:30AM–10:10AM	K-09 - Nanoscale Radiative Thermal Devices/Systems	Freedom E
08:30AM–10:10AM	K-08 - Fundamentals of Boiling/Condensation including Micro/Nano-Scale Effects I [Includes Molecular Level Simulation of Phase Change]	India C
08:30AM–10:10AM	K-10 - Heat Transfer Equipment-I	India D
08:30AM–10:10AM	K-16 - Heat Transfer in Electronic Equipment	India A
10:00AM–04:00PM	Boeing Exhibit	Liberty Foyer
10:10AM–10:30AM	AM Coffee Break	Liberty Foyer
10:30AM–12:10PM	D. Q. Kern Award Lecture "Thermal Systems Engineering for Desalination and Ion Separations" John Lienhard	Liberty A
12:15PM–01:45PM	Lunch	Liberty B
02:00PM–04:00PM	HTC Strategic Planning Meeting (Closed Meeting)	Freedom F
02:00PM–03:40PM	K-08 - Fundamentals of Boiling/Condensation including Micro/Nano-Scale Effects II [Includes Molecular Level Simulation of Phase Change]	India C
02:00PM–03:40PM	K-10 - Heat Transfer Equipment II	India D
02:00PM–03:40PM	K-19 - Environmental Heat Transfer	Freedom E
02:00PM–03:40PM	K-20 - Computational Methods for Materials Development and Manufacturing-I	Freedom G
03:40PM–04:00PM	PM Coffee Break	Liberty Foyer
04:00PM–05:40PM	K-06 - Heat and Mass Transfer in Renewable Energy Systems	India C
04:00PM–05:40PM	K-10 - Heat Transfer Equipment-III	India D
04:00PM–05:40PM	K-09 - Characterizations of Nanoscale Thermal Transport	Freedom E
04:00PM–05:40PM	K-13 - Condensation	Freedom F
04:00PM–05:40PM	K-20 - Computational Methods for Materials Development and Manufacturing-II	Freedom G
TUESDAY, JULY 12, 2022		
07:00PM–05:30PM	Registration	Liberty Foyer
07:00AM–05:00PM	Speaker Ready Room	Franklin
08:30AM–10:10AM	K-06 - Thermal Storage in Energy Systems	India C
08:30AM–10:10AM	K-13 - Evaporation/Boiling - I	Freedom F

Schedule at a Glance

TIME	EVENT	ROOM
08:30AM–10:10AM	K-09 - First-Principles Prediction of Phonon and Electron Thermal Transport-I	Freedom E
08:30AM–10:10AM	K-07 - Thermophysical Properties	India D
08:30AM–10:10AM	K-20 - Heat Transfer Enhancement	Freedom G
10:00AM–04:00PM	Boeing Exhibit	Liberty Foyer
10:10AM–10:30AM	AM Coffee Break	Liberty Foyer
10:30AM–12:10PM	Max Jakob Memorial Lecture “Interaction of Turbulence, Chemistry and Radiation In Combustion Systems” - Michael Modest	Liberty A
12:15PM–01:45PM	Awards Luncheon	Liberty B
02:00PM–03:40PM	Keynote: "Nanowarming for Regenerative Medicine" John Bischof	Liberty A
03:40PM–04:00PM	PM Coffee Break	Liberty Foyer
04:00PM–05:40PM	K-20 - Applications of CHT	Freedom G
04:00PM–05:40PM	K-18 - Heat Transfer under Extreme Conditions	India D
04:00PM–05:40PM	K-06 - Heat and Mass Transfer in Heating, Cooling, and Power Systems	India C
04:00PM–05:40PM	K-13 - Evaporation/Boiling-II	Freedom F
04:00PM–06:00PM	K-19 - Environmental Heat Transfer Committee Meeting, Chair: Kashif Nawaz	India A
06:00PM–08:00PM	K-08 - Theory & Fundamental Research Committee Meeting, Chair: Diana Borca-Tascuic	Freedom F
06:00PM–08:00PM	K-10 - Heat Transfer Equipment Committee Meeting, Chair: Kashif Nawaz	India C
06:00PM–08:00PM	K-13 - Heat Transfer in Multiphase Flow Committee Meeting, Chairs: Vinod Srinivasan & Chanwook Park	India D
06:00PM–08:00PM	K-15 - Transport Phenomena in Manufacturing & Materials Processing Committee Meeting, Chair: Stephen Akwaboa	Freedom E
06:00PM–08:00PM	K-20 - Computational Heat Transfer Committee Meeting, Chair: Shima Hajimirza	Freedom G
06:00PM–08:00PM	K-23 - Diversity, Equity, and Inclusiveness Committee Meeting, Chair: Leslie Phinney	Freedom H
WEDNESDAY, JULY 13, 2022		
07:00AM–12:00PM	Speaker Ready Room	Franklin
07:00AM-12:30PM	Registration	Liberty Foyer
08:00AM–12:00PM	Boeing Tour	Bus will board at 8:00AM Sharp!
08:30AM–10:10AM	K-06 - Thermal Management of Battery Systems	India C
08:30AM–10:10AM	K-09 - First-Principles Prediction of Phonon and Electron Thermal Transport-II	Freedom E
08:30AM–10:10AM	K-13 - Multiphase Flow	Freedom F
08:30AM–10:10AM	K-12 - Aerospace Heat Transfer	Freedom G
10:10AM–10:30AM	AM Coffee Break	Liberty Foyer
10:30AM–12:10PM	Panel on Research Funding Opportunities: NSF and DOE	Liberty A
12:15PM	**END OF CONFERENCE/LUNCH ON OWN**	

Keynote Lectures and Committee Meetings

COMMITTEE MEETINGS	DAY	DATE	START TIME	END TIME	ROOM
K-19 - Environmental Heat Transfer Meeting Chair: Kashif Nawaz	Tuesday	12-Jul	06:00PM	08:00PM	India A
K-8 - Theory & Fundamental Research, Chair: Diana Borca-Tascuic	Tuesday	12-Jul	06:00PM	08:00PM	Freedom F
K-10 - Heat Transfer Equipment, Chair: Kashif Nawaz	Tuesday	12-Jul	06:00PM	08:00PM	India C
K-13 - Heat Transfer in Multiphase Flow Committee Meeting - SHTC, Chairs: Vinod Srinivasan/Chanwook Park	Tuesday	12-Jul	06:00PM	08:00PM	India D
K-15 - Transport Phenomena in Manufacturing & Materials Processing, Chair: Stephen Akwaboa	Tuesday	12-Jul	06:00PM	08:00PM	Freedom E
K-20 - Computational Heat Transfer, Chair: Shima Hajimirza	Tuesday	12-Jul	06:00PM	08:00PM	Freedom G
K-23 - Diversity, Equity, and Inclusiveness, Chair: Leslie Phinney	Tuesday	12-Jul	06:00PM	08:00PM	Freedom H

KEYNOTE LECTURES	DAY	DATE	START TIME	END TIME	ROOM
D. Q. Kern Award Lecture "Thermal Systems Engineering for Desalination and Ion Separations" - John Lienhard	Monday	11-Jul	10:30AM	12:10PM	Liberty A
Max Jakob Memorial Lecture “Interaction of Turbulence, Chemistry and Radiation In Combustion Systems” - Michael Modest	Tuesday	12-Jul	10:30AM	12:10PM	Liberty A
Keynote: "Nanowarming for Regenerative Medicine" John Bischof	Tuesday	12-Jul	02:00PM	03:40PM	Liberty A

MONDAY, JULY 11 • 10:30AM–12:10PM
LIBERTY A, BALLROOM LEVEL

D. Q. KERN AWARD LECTURE

Dr. John H. Lienhard V
MIT

Thermal Systems Engineering for Desalination and Ion Separations

ABSTRACT: The world's renewable fresh water supply, from net precipitation, has become much more variable as our climate changes. Further, world population has risen steeply in the last century, and the water demands of growing economies continue to rise. As a result, water scarcity is a growing worldwide problem, with water shortages impacting both human populations and ecosystems. Desalination has been deployed worldwide to expand the supply of freshwater, especially for coastal populations, and its use has increased rapidly, with more than 100 billion L/day of capacity now installed. The cost and lifetime of plants has also improved steadily. Nonetheless, desalination processes need greater sustainability and circularity, including energy efficiency and resource recovery. In this talk, I will discuss our research on energy inefficiency in desalination, selective recovery of chemical and mineral resources from saline water, and the application of concepts from thermal systems engineering to improve the performance of both thermal and membrane desalination systems. Examples will be drawn from reverse osmosis, humidification-dehumidification, membrane distillation, solvent extraction, lithium capture, and brine valorization.

Strong.

BIOGRAPHY: John H. Lienhard V is the Abdul Latif Jameel Professor and the founding Director of the Abdul Latif Jameel Water and Food Systems Lab at MIT (J-WAFS). During more than three decades on the MIT faculty, Lienhard's research and educational efforts have focused on heat and mass transfer, water purification and desalination, and thermodynamics. He has also filled a number of administrative roles at MIT.

Lienhard's research on water purification has spanned a wide range of technologies for desalination and waste brine management, with a focus on energy efficiency and environmental protection. Lienhard has directly supervised 100 graduate theses and postdoctoral associates and is author of more than 300 peer-reviewed publications. He has been issued 38 U.S. patents, most of which have been commercialized through start-up companies.

Lienhard is a Fellow of the American Society of Mechanical Engineers (ASME), a Fellow of the American Association for the Advancement of Science (AAAS), and a Fellow of the American Society of Thermal and Fluid Engineers (ASTFE). He is a recipient of the 1988 National Science Foundation Presidential Young Investigator Award, the 1992 SAE Teetor Award, a 1997 R&D 100 Award, the 2012 ASME Technical Communities Globalization Medal, the 2015 ASME Heat Transfer Memorial Award, the 2019 ASME Edward F. Obert Award, and the 2021 AIChE Donald Q. Kern Award.

TUESDAY, JULY 12 • 10:30AM–12:10PM
LIBERTY A, BALLROOM LEVEL

MAX JAKOB MEMORIAL AWARD LECTURE

Dr. Michael Modest

Radiative Heat Transfer in Combustion Systems

ABSTRACT: In many important combustion applications, heat transfer is dominated by thermal radiation from combustion gases and soot. Thermal radiation from combustion gases is extremely complicated, and accurate and efficient predictions are only now becoming possible with the use of accurate global methods, such as full-spectrum k-distributions, and with state-of-the-art line-by-line accurate Monte Carlo methods. The coupling between turbulence and radiation can more than double the radiative loss from a flame. Radiative properties and computational methods will be briefly discussed, and several examples of turbulent reacting flows, an oxy-fuel furnace, high pressure laminar flames and high-pressure fuel spray in combustion engines will be presented. Thermal radiation can also be used as an optical diagnostic tool to determine temperature and concentration distributions, which will be briefly discussed.

BIOGRAPHY: Dr. Modest received his Dipl.-Ing. degree from the Technical University in Munich (1968), and in 1972 obtained his M.S. and Ph.D. in Mechanical Engineering from the University of California at Berkeley. For several years he taught at Rensselaer Polytechnic Institute and the University of Southern California, followed by 24 years as a Professor of Mechanical Engineering at the Pennsylvania State University, from which he retired in 2009 with the title of Distinguished Professor Emeritus. He then served as Shaffer and George Professor of Engineering at the University of California, Merced, from which he retired in 2018 as Distinguished Professor Emeritus.

During his career Dr. Modest has made many seminal contributions in all areas of radiative heat transfer, as well as in the field of laser processing of materials. He is perhaps best known for his work on thermal radiation in combustion systems and is the author of "Radiative Heat Transfer" (presently in its 4th ed). He has over 370 refereed publications, including 2 books, 10 book chapters. He is an ASME Honorary Member and was recipient of many national and international honors, including the ASME Heat Transfer Memorial Award, the AIAA Thermophysics Award, and the Humboldt Research Award.

Keynote Lectures

TUESDAY, JULY 12 • 02:00PM–03:40PM
LIBERTY A, BALLROOM LEVEL

John Bischof
University of Minnesota

Nanowarming for Regenerative Medicine

ABSTRACT: This talk will introduce a new Gen-4 NSF Engineering Research Center entitled Advanced Technologies for the Preservation of Biological Systems (ATP-Bio). This ERC focuses on cryopreservation of living biological systems to improve human and eco-system health. The talk will also introduce several new technologies which focus on rapid rewarming technologies to improve cryopreservation. In one important example, gold and iron oxide nanoparticles are used to transduce optical or radiofrequency electromagnetic fields to affect heating of biomaterials at multiple scales (1 µL droplets to L systems). This application of "nanowarming" allows both rapid and uniform rewarming of vitrified (i.e., cryopreserved) biomaterials back from the cryogenic state, thereby avoiding crystallization and cracking failures. This and other new techniques allow rewarming at predictable and controllable rates from 10's to 10,000,000's of °C/min, thereby addressing a key technology bottleneck for larger (e.g., tissues and organs) and smaller vitrified systems (e.g., embryos and oocytes). These new rates now allow improved cell, tissue, and organ cryopreservation, including the first robust drosophila and zebrafish embryo cryopreservation methods yielding live and reproducing young. In summary, this talk demonstrates the growing opportunities for cryopreservation in regenerative medicine and biodiversity.

BIOGRAPHY: Bischof works in the area of thermal bioengineering with a focus on biopreservation, thermal therapy, and nanomedicine. His awards include the ASME Van Mow Medal and Fellowships in societies including Cryobiology, JSPS, ASME, IAMBE, and AIMBE. He has served as the President of the Society for Cryobiology and Chair of the Bioengineering Division of the ASME. Bischof obtained a B.S. in Bioengineering from U.C. Berkeley (UCB) in 1987, an M.S. from UCB and U.C. San Francisco in 1989, and a Ph.D. in Mechanical Engineering from UCB in 1992. After a Post-doctoral Fellowship at Harvard in the Center for Engineering in Medicine, he joined the faculty of the University of Minnesota in 1993. Bischof is now a Distinguished McKnight University Professor and Kuhrmeyer Chair in the Departments of Mechanical and Biomedical Engineering, the Medtronic-Bakken Endowed Chair and Director of the Institute for Engineering in Medicine at the University of Minnesota, and Director of the new NSF Engineering Research Center ATP-Bio.

AWARDS AND RECOGNITIONS

ASME Honorary Member
Dr. Pamela M. Norris
University of Virginia

ASME Honorary Member
John B. Kitto, Jr., P.E.

2022 Donald Q Kern Award Winner
Dr. John H. Lienhard V
MIT

2022 Max Jakob Memorial Award Winner
Dr. Michael Modest

Research Funding Opportunities Panel

WEDNESDAY, JULY 13 • 10:30AM TO 12:10PM
LIBERTY A, BALLROOM LEVEL

Dr. Ying Sun
National Science Foundation

BIOGRAPHY: Dr. Ying Sun is Program Director of the Thermal Transport Processes Program in the Directorate for Engineering at the National Science Foundation. The program supports fundamental research in thermodynamics, and heat and mass transfer, including thermal solutions to climate change and quantum-thermal interface. Dr. Sun is also Hess Family Endowed Chair Professor in the Department of Mechanical Engineering and Mechanics at Drexel University. Her research interests include multiphase flows and heat/mass transfer, complex fluids and interfacial phenomena, machine learning and data-driven methods, and multi-scale modeling with applications in energy systems and advanced manufacturing. Dr. Sun is an ASME Fellow and a recipient of the NSF CAREER Award, AFOSR Summer Faculty Fellowship, French CNRS Visiting Professorship, and Drexel College of Engineering Research Achievement Award. She serves as an Associate Editor for Journal of Electrochemical Energy Conversion and Storage and was an ELATE Leadership Fellow and a visiting professor at Princeton University, Ecole Polytechnique, and Tsinghua University.

Dr. Avi Shultz
U.S. Department of Energy's Solar Energy Technologies Office (SETO)

BIOGRAPHY: Dr. Avi Shultz is the program manager for Concentrating Solar-Thermal Power (CSP) for the U.S. Department of Energy's Solar Energy Technologies Office (SETO), which supports research, development, and demonstration of solar-thermal components and systems that can enable wide-spread deployment of low-cost CSP with thermal energy storage. Dr. Shultz has been with SETO since 2013, where he started as a science and technology policy fellow, supporting the CSP program on a wide variety of topics. Before joining SETO, Dr. Shultz was a post-doctoral fellow at the University of Amsterdam, after getting his Bachelor and Doctoral degrees in Chemistry, from Columbia University and Northwestern University, respectively.

MONDAY, JULY 11, 2022

K-08 FUNDAMENTALS OF BOILING/CONDENSATION INCLUDING MICRO/NANO-SCALE EFFECTS I [INCLUDES MOLECULAR LEVEL SIMULATION OF PHASE CHANGE]

8:30AM–10:10AM **INDIA C**

Chair: **Amitabh Narain** - *Michigan Technological University*
Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytech Institute*
Co-Chair: **Van P. Carey** - *University of California, Berkeley*
Co-Chair: **Dong Liu** - *University of Houston*

Parameters of Micro-Nano Structured Surface on Condensation Heat Transfer Performance of Steam With Various Amounts of Non-Condensable Gas: A Theoretical Analysis

Technical Paper Publication: SHTC2022-81679

Benli Peng - *Dalian Maritime University,* **Wenlong Sheng** - *Dalian Maritime University,* **Yong Zhou** - *Dalian Maritime University,* **Meizhuting Qiu** - *Dalian Maritime University,* **Zhengyu He** - *Dalian Maritime University*

Comparison of Micro Fin Array Configurations for Heat Transfer Enhancement in Microchannels

Technical Paper Publication: SHTC2022-85752

Colton Frear - *Florida Polytechnic University,* **Gerardo Carbajal** - *Florida Polytechnic University,* **Edwar Romero-Ramirez** - *Florida Polytechnic University*

Data-Driven Modeling of Liquid-Vapor Interface Dynamics During Pool Boiling

Technical Paper Publication: SHTC2022-85582

Christy Dunlap - *University of Arkansas,* **Hari Pandey** - *University of Arkansas,* **Han Hu** - *University of Arkansas*

Heat Transfer Rate Predictions of the Air-Cooled Condenser With Machine Learning Algorithm Based on the Operating Big Data of the Power Plant

Technical Paper Publication: SHTC2022-83767

Kai Chen - *Baidu Inc.,* **Xin Xie** - *Baidu Inc.,* **Yan Chu** - *China Huadian Corporation Ltd.,* **Meng Leng** - *China Huadian Corporation Ltd.,* **Jinyi Zhang** - *Baidu Inc.,* **Zhenwei Xu** - *China Huadian Corporation Ltd.,* **Feng Huang** - *Baidu Inc.,* **Heming Zhang** - *Tsinghua University*

Water Thermodynamic Behavior Under Influence of Electric Field: A Molecular Dynamics Study

Technical Paper Publication: SHTC2022-83813

Malcolm Porterfield - *Rensselaer Polytechnic Institute,* **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

K-09 NANOSCALE RADIATIVE THERMAL DEVICES/SYSTEMS

8:30AM–10:10AM **FREEDOM E**

Chair: **Richard Zhang** - *University of North Texas*

Self-Thermal Regulating VO2-Fabry-Perot Cavity Coating for Passive Radiative Cooling Device

Technical Presentation Only: SHTC2022-80428

Ken Araki - *University of North Texas,* **Richard Zhang** - *University of North Texas*

Dynamic Emissivity Control Mediated by Breaking of Inversion Symmetry: Dark Mode to Bright Mode Conversion

Technical Presentation Only: SHTC2022-83960

Alok Ghanekar - *University of Southern California,* **Michelle Povinelli** - *University of Southern California*

Active Directional Control of Emissivity With Quasi-Localized Guided Modes

Technical Presentation Only: SHTC2022-84370

Alok Ghanekar - *University of Southern California,* **Michelle Povinelli** - *University of Southern California*

Magnetic Resonance Imaging for 3D Thermometry

Technical Presentation Only: SHTC2022-97599

Darshan Darshan- *University of Illinois at Urbana-Champaign,* **David Cahill** - *University of Illinois at Urbana-Champaign*

Development of a Numerical Model to Assess Sensitivity for Fiber-Based Frequency-Domain Thermoreflectance Measurements

Technical Paper Publication: SHTC2022-80540

Ronald Warzoha - *United States Naval Academy*

K-16 HEAT TRANSFER IN ELECTRONIC EQUIPMENT

8:30AM–10:10AM **INDEPENDENCE A**

Chair: **Ronald Warzoha** - *United States Naval Academy*
Co-Chair: **Raffaele Luca Amalfi** - *Seguente, LLC*
Co-Chair: **Solomon Adera** - *University of Michigan*
Co-Chair: **Filippo Cataldo** - *Wieland Provides Srl*

A Loop Heat Pipe for Vehicle CPU Cooling: Peak Performance and Partial Flooding and Dryout Regimes

Technical Paper Publication: SHTC2022-83836

Julio Ferreira - *University of Michigan,* **Massoud Kaviany** - *University of Michigan,* **Vincent Dupont** - *Calyos AS,* **Olivier De Laet** - *Calyos AS,* **Thomas Nicolle** - *Calyos AS,* **Erik Yen** - *GM R&D Center*

Optimal Design of Additively Manufactured Metal Lattice Heat Sinks for Electronics Cooling

Technical Paper Publication: SHTC2022-85400

Bharath Bharadwaj - *Virginia Tech,* **Prashant Singh** - *Mississippi State University,* **Roop Mahajan** - *Virginia Tech*

Hybrid Thermal Management System Combining Vapor Chamber and Composite Phase Change Heat Sink for High Heat Flux Electronic Devices

Technical Presentation Only: SHTC2022-88232

Junjie He - *Xi'an Jiaotong University,* **Shihong Ma** - *Xi'an Jiaotong University,* **Qiuwang Wang** - *Xi'an Jiaotong University,* **Wenxiao Chu** - *Xi'an Jiaotong University*

Heat Transfer Enhancement in Microchannel Heat Sink With Transverse Tesla Valve-Shaped Ribs for Cooling of High-Power Density Electronics

Technical Presentation Only: SHTC2022-88245

Jian-Fei Zhang - *Xi'an Jiaotong University,* **Xing Xu** - *Xi'an Jiaotong University,* **Wei Gao** - *Xi'an Jiatong University,* **Zhiguo Qu** - *Xi'an Jiaotong University,* **Zhiyuan Jiang** - *Xi'an Jiaotong University*

Improved Femtosecond 3D Light Field Lithography With a Phase-Controlled Spatial Light Modulator

Technical Paper Publication: SHTC2022-85681

Aravind Jakkinapalli - *Texas A&M University,* **Sy-Bor Wen** - *TAMU*

Design and Development of a Hybrid Thermal Management System for Electromechanical Actuator for Aircraft

Technical Presentation Only: SHTC2022-89150

Jiajun Xu - *University of the District of Columbia,* **Andoniaina M Randriambololona** - *University of the District of Columbia,* **Kymani Brown** - *University of the District of Columbia,* **Kuuku Botchway** - *University of the District of Columbia*

K-10 HEAT TRANSFER EQUIPMENT I

8:30AM–10:10AM **INDIA D**

Chair: **Kashif Nawaz** - *Oak Ridge National Laboratory*
Co-Chair: **Prashant Singh** - *North Carolina State University*

Effect of Hydraulic Diameter and Surface Roughness on Additively Manufactured Offset Strip Fin Heat Exchanger Performance

Technical Paper Publication: SHTC2022-80416

Teri Baker - *The Pennsylvania State University,* **Michael Manahan** - *The Pennsylvania State University,* **Stephen Lynch** - *The Pennsylvania State University,* **Edward Reutzel** - *The Pennsylvania State University*

Heat Transfer Enhancement in Spirally Corrugated Tube and V-Spirally Corrugated Tube: Computational and Numerical Study

Technical Paper Publication: SHTC2022-81790

Xin-Ji Chen - *Institute of Process Equipment,* **Feng-Lei Wang** - *Qingdao Changlong Power Equipment Co., Ltd.,* **Chen Yang** - *Institute of Process Equipment,* **Zhi-Jiang Jin** - *Institute of Process Equipment,* **Jin-Yuan Qian** - *Institute of Process Equipment*

Diffusion Bonded Compact Heat Exchanger in 740H for High Temperature and High Pressure Applications

Technical Paper Publication: SHTC2022-81837

Zhijun Jia - *CompRex LLC,* **Tom Parlow** - *CompRex, LLC,* **Dane Kuhr** - *University of Wisconsin-Madison,* **Mark Anderson** - *University of Wisconsin-Madison,* **Brian Baker** - *Special Metals*

Numerical Study on the Influence of Fin Parameters on the Flow and Heat Transfer Characteristics for 3-D Finned Flat Tube

Technical Presentation Only: SHTC2022-88238

Yudong Ding - *Chongqing University,* **Yuheng Gu** - *Chongqing University,* **Xiang Yang** - *Chongqing University,* **Zhehao Zhang** - *Chongqing University,* **Xun Zhu** - *Chongqing University,* **Hong Wang** - *Chongqing University,* **Min Cheng** - *Chongqing University,* **Qiang Liao** - *Chongqing University*

Flow and Heat Transfer Characteristics of Supercritical Rp-3 Kerosene in an Inclined Rectangular Channel Heated on One Side

Technical Presentation Only: SHTC2022-86203

Lie-Bin Jiang - *Chongqing University,* **Gu-Yuan Li** - *Chongqing University,* **Jin Yu** - *Chongqing Jiaotong University,* **Bin-Bin Yu** - *Army Logistical Academy,* **Jia Jia Yu** - *Chong Qing University*

Enhancing Data Center Efficiency by a Novel Phase-Change Heat Sink Architecture

Technical Presentation Only: SHTC2022-80216

Suhas Tamvada - *University of Florida,* **Saeed Moghaddam** - *University of Florida*

K-08 FUNDAMENTALS OF BOILING/CONDENSATION INCLUDING MICRO/NANO-SCALE EFFECTS II [INCLUDES MOLECULAR LEVEL SIMULATION OF PHASE CHANGE]

2:00PM–3:40PM **INDIA C**

Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytech Institute*
Chair: **Amitabh Narain**, *Michigan Technological University*
Co-Chair: **An Zou**, *Syracuse University*
Co-Chair: **Navdeep Dhillon**, *California State University – Long Beach*
Co-Chair: **Ming-chang Lu**, National Taiwan University

A Combined Active and Passive Enhanced Nucleation Rate Flow- and Pool-Boiling Approach for Enabling New Science and Applications

Technical Presentation Only: SHTC2022-81625

Amitabh Narain - *Michigan Technological University,* **Divya Pandya** - *Michigan Technological University,* **Noah Agata** - *Michigan Technological University,* **Logan Canull** - *Michigan Technological University,* **Vibhu Vivek** - *Vivek Technologies LLC,* **Soroush Sepahyar** - *Michigan Technological University,* **Atharva Rahane** - *Michigan Technological University*

Determining Micro Droplet Profiles Using Reflection Interference Fringe (RIF) Technique

Technical Presentation Only: SHTC2022-90374

Iltai (Isaac) Kim - *Texas A&M University-Corpus Christi,* **Yang Lie** - *Texas A&M University-Corpus Christi,* **Jasesung Park** - *Texas A&M University,* **Hyun-Joong Kim** - *CEKO,* **Hong-Chul Kim** - *CEKO*

CaCO3 Crystallization in Droplet Evaporation on Surfaces With Microstructure

Technical Presentation Only: SHTC2022-84351

Hong-Qing Jin - *University of Illinois at Urbana-Champaign,* **Sophie Wang** - *University of Illinois at Urbana-Champaign*

The Effect of Real Gas Radiation on Laminar Natural Convection on a Vertical Plate

Technical Presentation Only: SHTC2022-88078

Nathan Hale - *Brigham Young University,* **Brent Webb** - *Brigham Young University*

Adiabatic Section Flow Resistance of Axial-Groove Heat Pipes for Slowly-Varying Meniscus Curvature

Technical Presentation Only: SHTC2022-94816

Marc Hodes - *Tufts University,* **Andrew Daetz** - *Tufts University,* **Toby Kirk** - *Oxford University*

K-20 COMPUTATIONAL METHODS FOR MATERIALS DEVELOPMENT AND MANUFACTURING I

2:00PM–3:40PM **FREEDOM G**

Chair: **Aaron Wemhoff** - *Villanova University*
Chair: **Mohamed Abdelhady** - *National Research Council Canada*
Chair: **Aaron Wemhoff** - *Villanova University*
Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Chair: **Shima Hajimirza** - *Stevens Institute of Technology*
Chair: **Cheng-xian Lin** - *Florida International University*
Co-Chair: **Like Li** - *Mississippi State University*
Co-Chair: **Leitao Chen** - *Tennessee State University*

Heat Transfer Enhancement in V-Spirally Corrugated Tube: Computational and Numerical Study

Technical Presentation Only: SHTC2022-88041

Jin-Yuan Qian - *Zhejiang University,* **Xin-Ji Chen** - *Zhejiang University,* **Feng-Lei Wang** - *Zhejiang University,* **Chen Yang** - *Zhejiang University*

Adjoint-Based Shape Optimization of Mini-Channel Radiator Tubes Using a CAD-Based Parametrization

Technical Presentation Only: SHTC2022-90554

Praharsh Pai Raikar - *VITO,* **Nitish Anand** - *VITO,* **Carlo De Servi** - *VITO,* **Matteo Pini** - *Technische Universität Delft*

Heat Pipe-Based Enhanced Dehumidification System Modeling and Comparison

Technical Presentation Only: SHTC2022-96488

Tara Housen - *Villanova University,* **Aaron Wemhoff** - *Villanova University*

Calculating Radiation View Factors Using Hybrid GRU-LSTM Recurrent Neural Networks

Technical Presentation Only: SHTC2022-97760

Alireza Kianimoqadam - *University of Maine,* **Justin Lapp** - *University of Maine*

Forward and Inverse Design of Spectral Emissivity Using Common Machine-Learning Models

Technical Presentation Only: SHTC2022-97667

Sean Lubner - *Massachusetts Institute of Technology,* **Mahmoud Elzouka** - *Lawrence Berkeley National Lab,* **Charles Yang** - *Lawrence Berkeley National Lab,* **Alok Singh** - *Lawrence Berkeley National Lab,* **Minok Park** - *Lawrence Berkeley National Lab,* **Collin Guo** - *Lawrence Berkeley National Lab,* **Adrian Albert** - *Lawrence Berkeley National Lab,* **Vassilia Zorba** - *Lawrence Berkeley National Lab,* **Ravi Prasher** - *Lawrence Berkeley National Lab*

K-19 ENVIRONMENTAL HEAT TRANSFER

2:00PM–3:40PM **FREEDOM E**

Chair: **S.A. Sherif** - *University of Florida*
Co-Chair: **Kashif Nawaz** - *Oak Ridge National Laboratory*
Co-Chair: **Michael Pate** - *Texas A&M University*

A Numerical Study on the Effect of Physical Changes of Air Distribution Setup on the Heating Performance of a Forced Air Circulation System

Technical Paper Publication SHTC2022-84389

Vincent Akula - *Idaho State University,* **Anish Sebastian** - *Idaho State University*

Effects of Air Flow and Micro-Dust Layer on the Onset of Condensation for Solar Glass Applications

Technical Presentation Only: SHTC2022-97554

Mayameen Naser Reda - *Chair of Thermodynamics,* **H.H. Al-Kayiem** - *Universiti Teknologi PETRONAS*

Use of Genetic Algorithms to Extract Fundamental Heat Transfer Performance Parameters From Evaporative Cooler Test Data

Technical Paper Publication: SHTC2022-86172

Samuel Cabrera - *University of California, Berkeley,* **Van P. Carey** - *University of California, Berkeley*

Application of Particle Image Velocimetry to Molten Chloride Salts

Technical Presentation Only: SHTC2022-81525

Noah LeFrancois - *McGill University,* **Valerie Lamenta** - *McGill University,* **Jovan Nedic** - *McGill University,* **Melanie Tetreault-Friend** - *McGill University*

Growth of Zeolite Crystals on Surface

Technical Presentation Only: SHTC2022-93659

Ashok Thapa - *Syracuse University,* **Shalabh C. Maroo** - *Syracuse University*

Non-Equilibrium Energy Transport During Ultrafast Laser Sintering of Nanoparticles for Nanoscale Metal Printing

Technical Presentation Only: SHTC2022-81490

Chinmoy Podder - *Texas A&M University,* **Heng Pan** - *Texas A&M University*

K-10 HEAT TRANSFER EQUIPMENT II
2:00PM–3:40PM INDIA D

Chair: **Kashif Nawaz**- *Oak Ridge National Laboratory*
Co-Chair: **Prashant Sing h**- *North Carolina State University*
Co-Chair: **Sandra Boetcher** - *Embry Riddle Aeronautical University*
Co-Chair: **Ravi Annapradagga** - *Carrier Corporation*

Pool Boiling Heat Transfer Enhancement of Dielectric Fluids on Round Tubes Using Open-Cell Metal Foams

Technical Presentation Only: SHTC2022-87805

Cheng-Min Yang - *Oak Ridge National Laboratory,* **Kashif Nawaz** - *Oak Ridge National Laboratory*

HVAC Systems Improvement for Environment Control to Minimize the Covid 19 Infection Spreads

Technical Presentation Only: SHTC2022-88524

Nazia Afrin - *St. Mary's University*

Thermal Stability of Cryogenic Fluid Flow in Microgravity

Technical Presentation Only: SHTC2022-97391

Qian Lei - *New Jersey Institute of Technology,* **Boris Khusid** - *New Jersey Institute of Technology,* **Joel L. Plawsky** - *Rensselaer Polytechnic Institute,* **Corey Woodcock** - *Rensselaer Polytechnic Institute,* **David Money** - *Princeton CryoTech, Inc,* **Christopher Smith** - *Princeton CryoTech, Inc,* **Tom M. Conboy** - *Creare LLC,* **Mohammad Kassemi** - *Case Western Reserve University*

Numerical Investigation on Shell and Tube Latent Thermal Energy Storage Partially Filled With Metal Foam and Corrugated Internal Tube

Technical Paper Publication: SHTC2022-81806

Bernardo Buonomo - *Università degli studi della Campania "Luigi Vanvitelli",* **Oronzio Manca** - *Università degli studi della Campania "Luigi Vanvitelli",* **Sergio Nardini** - *Università degli studi della Campania "Luigi Vanvitelli",* **Renato Elpidio Plomitallo** - *Università degli studi della Campania "Luigi Vanvitelli"*

Evaluation of Printed Circuit Heat Exchanger Perfromance Using Expermental and Numerical Approaches

Technical Paper Publication: SHTC2022-91451

Kyle Zada - *Vacuum Process Engineering, Inc.,* **Dereje Amogne** - *Vacuum Process Engineering, Inc.*

K-06 HEAT AND MASS TRANSFER IN RENEWABLE ENERGY SYSTEMS
4:00PM–5:40PM INDIA C

Chair: **Leitao Chen** - *Tennessee State University*
Co-Chair: **Hohyun Lee** - *Santa Clara University*

Implementation of a Model Predictive Control Strategy to Regulate Temperature Inside a Plug-Flow Solar Reactor With Counter-Current Flow

Technical Paper Publication: SHTC2022-85609

Assaad Alsahlani - *Purdue University Northwest,* **Kelvin Randhir** - *Michigan State University,* **Michael Hayes** - *Michigan State University,* **Philipp Schimmels** - *Michigan State University,* **Nesrin Ozalp** - *Purdue University Northwest,* **James Klausner** - *Michigan State University*

Analysis of the Heat Transfer and Criterion of Freezing of Molten Salt Startup Flow in Relatively Cold Pipes

Technical Paper Publication: SHTC2022-81902

Ye Zhang - *University of Arizona,* **Peiwen Li** - *University of Arizona*

A Numerical Study of the Dominant Condensation Mechanism in Cross-Flow Transport

Technical Paper Publication: SHTC2022-81884

Saja Al-Rifai - *Florida International University,* **Cheng-xian Lin** - *Florida International University*

Convective Heat Transfer Potential of Particles/Airflow Through Single Cell Thick Additively Manufactured Octet-Shaped Lattice Frame Material

Technical Paper Publication: SHTC2022-81856

Youssef Aider - *Mississippi State University,* Heejin Cho - *Mississippi State University,* Prashant Singh - *Mississippi State University*

Design and Analysis of a Modular High-Temperature Recuperator for Multi-Method Additive Manufacturing

Technical Presentation Only: SHTC2022-81886

Jacob Bryan - *Utah State University,* Aiden Meek - *Utah State University,* Hailei Wang - *Utah State University*

Designing Porous Polymers for Passive Daytime Radiative Cooling

Technical Presentation Only: SHTC2022-96695

Yuan Yang - *Columbia University*

K-09 CHARACTERIZATIONS OF NANOSCALE THERMAL TRANSPORT

4:00PM–5:40PM **FREEDOM E**

Chair: Jun Liu - *North Carolina State University*

A Revisit to the First-Principles Prediction of Interfacial Thermal Conductance of Layered Materials Using Diffuse Mismatch Model

Technical Paper Publication: SHTC2022-78001

Jixiong He - *North Carolina State University,* Jun Liu - *North Carolina State University*

Heat Diffusion Process in the Nonlinear Dynamics in Quasi One-Dimensional Molecules

Technical Paper Publication: SHTC2022-83352

Heeyuen Koh - *Seoul National University,* Maruyama Shigeo - *University of Tokyo*

Non-Intrusive Cooling System Fault Detection and Diagnostics Using Deep Learning of Acoustic Emission

Technical Paper Publication: SHTC2022-85429

Hari Pandey - *University of Arkansas,* Weston Waldo - *University of Arkansas,* Han Hu - *University of Arkansas*

Time-Dependent Solution of Unsteady Flow Equations for Nanoscale Heat and Mass Transfer, Advanced Fluidics, and High Energy Blast Propagations

Technical Paper Publication: SHTC2022-78044

Ramlala Sinha - *Applied Engineering Consultants*

Contact Thermal Resistance Between Boron Nitride Nanotubes With and Without a Polymer Interlayer

Technical Presentation Only: SHTC2022-81528

Zhiliang Pan - *Vanderbilt University,* Yi Tao - *Southeast University,* Matthew Fitzgerald - *Vanderbilt University,* Deyu Li - *Vanderbilt University*

Thermal Transport via Gas Conduction Within Nanoconfinement

Technical Presentation Only: SHTC2022-81599

Greg Acosta - *University of Nebraska-Lincoln,* Mohammad Ghashami - *University of Nebraska-Lincoln*

K-13 CONDENSATION

4:00PM–5:40PM **FREEDOM F**

Chair: Vinod Srinivasan - *University of Minnesota*
Co-Chair: Jovica Riznic - *Canadian Nuclear Safety Commission*

Experimental and Modelling Analysis of a Large-Scale Two-Phase Loop Thermosyphon

Technical Paper Publication: SHTC2022-78822

Debraliz Isaac Aragones - *Purdue University,* Chien-Hua Chen - *Advanced Cooling Technologies,* Justin Weibel - *Purdue University,* David Warsinger - *Purdue University,* Richard Bonner - *Advanced Cooling Technologies*

Numerical Simulation on the Flow and Heat Transfer Characteristics of the Condenser Shell Side in a 3rd Generation Nuclear Power Plant

Technical Paper Publication: SHTC2022-85131

Dong Yan - *Shandong Nuclear Power Company,* Lin Chen - *Shandong Nuclear Power Company,* Yingpei Xia - *Shandong Nuclear Power Company,* Yueheng Sun - *Shandong Nuclear Power Company*

Condensation Heat Transfer Characteristics of Binary Vapor Mixtures of Immiscible Liquids

Technical Presentation Only: SHTC2022-88091

Qiang Liao - *Chongqing University,* **Yuheng Gu** - *Chongqing University,* **Jinkui Jia** - *Chongqing University,* **Yudong Ding** - *Chongqing University,* **Hong Wang** - *Chongqing University,* **Min Cheng** - *Chongqing University,* **Xun Zhu** - *Chongqing University*

Condensation Heat Transfer Characteristics of Binary Vapor Mixtures of Immiscible Liquids

Technical Presentation Only: SHTC2022-87444

Qiang Liao - *Chongqing University,* **Yuheng Gu** - *Chongqing University,* **Jinkui Jia** - *Chongqing University.* **Yudong Ding** - *Chongqing University,* **Hong Wang** - *Chongqing University,* **Min Cheng** - *Chongqing University,* **Xun Zhu** - *Chongqing University*

Prediction of Condensation Freezing Droplet Size on Nano-Textured Superhydrophobic Surfaces

Technical Presentation Only: SHTC2022-84381

Yuchen Shen - *University of Illinois at Urbana-Champaign,* **Sophie Wang** - *University of Illinois at Urbana-Champaign*

K-10 HEAT TRANSFER EQUIPMENT III

4:00PM–5:40PM **INDIA D**

Chair: **Prashant Singh**- *North Carolina State University*
Co-Chair: **Kashif Nawaz**- *Oak Ridge National Laboratory*
Co-Chair: **Sandra Boetcher** - *Embry Riddle Aeronautical University*
Co-Chair: **Arun Muley** - *Boeing*

Polymer Composite Heat Transfer Surfaces in Highly Corrosive Application

Technical Presentation Only: *SHTC2022-83809*

Abisolom Goitom - *Technoform Tailored Solutions Holding GmbH,* **Nicolas Schiffer** - *Technoform Tailored Solutions Holding GmbH*

Thermal Transport in Partially Porous Channel Flow

Technical Presentation Only: SHTC2022-83883

Shilpa Vijay - *University of Southern California,* **Mitul Luhar** - *University of Southern California*

A Computational Model to Predict the Transient Performance of a Thermal Energy Storage Unit Coupled With an Air Pre-Cooler for a Novel Dry-Cooling System for Power Plants

Technical Presentation Only: SHTC2022-84247

Rituja Kulkarni - *University of Cincinnati,* **Milind Jog** - *University of Cincinnati,* **Raj Manglik** - *University of Cincinnati*

Modeling of Local Heating in Thick Fiber Reinforced Thermoplastic Composites

Technical Presentation Only: SHTC2022-97756

James Gayton - *University of Maine,* **Justin Lapp** - *University of Maine*

Thermal Performance Tests for Foam-Based Microevaporator Cold Plates

Technical Presentation Only: SHTC2022-81813

Lucas Arrivo - *Villanova University,* **Steven Schon** - *QuantaCool Corporation,* **Aaron Wemhoff** - *Villanova University*

K-20 COMPUTATIONAL METHODS FOR MATERIALS DEVELOPMENT AND MANUFACTURING II

4:00PM–5:40PM **FREEDOM G**

Chair: **Mohamed Abdelhady** - *National Research Council Canada*
Chair: **Aaron Wemhoff** - *Villanova University*
Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Chair: **Shima Hajimirza** - *Stevens Institute of Technology*
Chair: **Cheng-xian Lin** - *Florida International University*
Co-Chair: **Like Li** - *Mississippi State University*
Co-Chair: **Leitao Chen** - *Tennessee State University*

Analysis of the Thermal-Moisture Induced Stresses in a Drying of a Cylindrical Log

Technical Presentation Only: SHTC2022-78119

Enayat Mahajerin - *Saginaw Valley State University*

Extension of Cylindrical Inclusion Percolation Theory Towards Non-Uniform Distributions

Technical Presentation Only: SHTC2022-81811

Anh Trinh - *Villanova University,* **Aaron Wemhoff** - *Villanova University*

Exploring the Effects of Minichannel Wall Distance on Falling Film Condensation: A Numerical Study

Technical Presentation Only: SHTC2022-85717

Shitiz Sehgal - *Texas A&M University,* Jorge Alvarado - *Texas A&M University,* Ibrahim Hassan - *Texas A&M University-Qatar*

Modeling Heat Transfer Including Radiation in Gravity-Driven Granular Flows Using Discrete Element Method

Technical Presentation Only: SHTC2022-87817

Bingjia Li - *University of Michigan,* Zijie Chen - *University of Michigan,* Rohini Bala Chandran - *University of Michigan*

Data-Driven Techniques to Obtain Radiative View Factor Correlations in Particulate Media

Technical Presentation Only: SHTC2022-87818

Zijie Chen - *University of Michigan-Ann Arbor,* Rohini Bala Chandran - *University of Michigan-Ann Arbor*

TUESDAY, JULY 12, 2022

K-09 FIRST-PRINCIPLES PREDICTION OF PHONON AND ELECTRON THERMAL TRANSPORT I

8:30AM–10:10AM **FREEDOM E**

Chair: Jun Liu - *North Carolina State University*

Interface Thermal Resistance Between Monolayer WSe2 and SiO2: Raman Probing With Consideration of Optical-Acoustic Phonon Nonequilibrium

Technical Presentation Only: SHTC2022-85268

Nick Hunter - *Iowa State University*

Computational Discovery of Ultralow Thermal Conductivity Ternary Semiconductors

Technical Presentation Only: SHTC2022-86070

Ankit Jain – *Indian Institute of Technology Bombay*

Interfacial Thermal Resistance Between Nm-Thick MoS2 and Quartz Substrate: A Critical Revisit Under Phonon Mode-Wide Thermal Non-Equilibrium

Technical Presentation Only: SHTC2022-87733

Hamidreza Zobeiri - *Iowa State University*

Experimental Mapping of Electron Thermal Transport in Metals

Technical Presentation Only: SHTC2022-91032

Mauricio Segovia - *Purdue University,* Xianfan Xu - *Purdue University*

Temperature-Dependent Excited State Lifetimes of Nitrogen Vacancy Centers in Individual Nanodiamonds

Technical Presentation Only: SHTC2022-97680

Andrea Pickel - *University of Rochester,* Dinesh Bommidi - *University of Rochester*

New Experimental Method for Determination of Energy Accommodation Coefficient

Technical Presentation Only: SHTC2022-97664

Greg Acosta - *University of Nebraska-Lincoln,* Mohammad Ghashami - *University of Nebraska-Lincoln*

K-13 EVAPORATION/BOILING I

8:30AM–10:10AM **FREEDOM F**

Chair: Vinod Srinivasan - *University of Minnesota*
Co-Chair: Jovica Riznic - *Canadian Nuclear Safety Commission*

Experimental Results of Simulation of a Combined Flash Evaporation and Phase Separation System for Desalination of Sea Water

Technical Paper Publication: SHTC2022-81203

Vasudevan Chandramouli - *University of California, Los Angeles,* Jin Jen - *University of California, Los Angeles,* Vijay Dhir - *University of California, Los Angeles*

Heat Transfer Measurements in Neutrally Buoyant Suspensions in the Inertial Regime

Technical Paper Publication: SHTC2022-85241

Merin A P - *University of Minnesota,* Vinod Srinivasan - *University of Minnesota*

Nucleate Pool Boiling of Water on a Heater of the Size of a Capillary Length

Technical Paper Publication: SHTC2022-84337

Julia Reed - *University of California, Los Angeles,* **Vijay Dhir** - *University of California, Los Angeles*

The Effect of Bubble Nucleation on the Performance of a Wickless Heat Pipe in Microgravity

Technical Presentation Only: SHTC2022-81765

Joel Plawsky - *Rensselaer Polytechnic Institute,* **Jiaheng Yu** - *Rensselaer Polytechnic Institute,* **Anisha Pawar** - *Rensselaer Polytechnic Institute*

K-20 HEAT TRANSFER ENHANCEMENT
8:30AM–10:10AM **FREEDOM G**

Chair: **Mohamed Abdelhady** - *National Research Council Canada*
Chair: **Aaron Wemhoff** - *Villanova University*
Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Chair: **Shima Hajimirza** - *Stevens Institute of Technology*
Chair: **Cheng-xian Lin** - *Florida International University*
Co-Chair: **Like Li** - *Mississippi State University*
Co-Chair: **Leitao Chen** - *Tennessee State University*

Investigations on Improving the Performance of Solid Desiccant Cooling Systems With Passive Radiative Sky Cooling Modules

Technical Paper Publication: SHTC2022-81659

Aiqiang Pan - *City University of Hong Kong,* **Siru Chen** - *City University of Hong Kong,* **Tsz Chung Ho** - *City University of Hong Kong,* **Hau Him Lee** - *City University of Hong Kong,* **Chi Yan Tso** - *City University of Hong Kong*

A New Battery Thermal Management System With Integrated Phase Change Materials and Cold Plate: A Numerical Study

Technical Paper Publication: SHTC2022-81860

Xinrui Xiang - *Northeastern University,* **Ruibo Yang** - *Northeastern University,* **Ramaswamy Nagarajan** - *University of Massachusetts Lowell,* **Hongwei Sun** - *Northeastern University*

Topology Optimization Design and Heat Transfer Performance of Cooling Channel Based on Fluid-Solid Coupling

Technical Paper Publication: SHTC2022-85175

Zhijian Duan - *Northwestern Polytechnical University,* **Gongnan Xie** -*Northwestern Polytechnical University,* **Xinrong Ma** - *Xianyang Normal University*

Effects of FIV on Forced Convection Heat Transfer From Two Tandem Cylinders of Unequal Diameters

Technical Paper Publication: SHTC2022-85589

Hamid Khan - *Khalifa University of Science and Technology,* **Md. Islam** - *Khalifa University of Science & Technology,* **Yap Fatt** - *Khalifa University of Science and Technology,* **Isam Janajreh** - *Khalifa University of Science and Technology*

Effects of Flow-Induced Vibration on Heat Transfer From a Circular and Square Cylinder With Different Attack Angle

Technical Paper Publication: SHTC2022-85599

Yuvraj Sarout - *Khalifa University of Science & Technology,* **Md. Islam** - *Khalifa University of Science & Technology,* **Yap Fatt** - *Khalifa University of Science & Technology,* **Isam Janajreh** - *Khalifa University of Science & Technology*

K-07 THERMOPHYSICAL PROPERTIES
8:30AM–10:10AM **INDIA D**

Chair: **Xinwei Wang** - *Iowa State University*
Co-Chair: **Troy Munro** - *Brigham Young University*

Tunable Hydraulic and Thermal Properties via 3-D Printing

Technical Presentation Only: SHTC2022-84363

Shilpa Vijay - *University of Southern California,* **Taylor Mclaughlin** - *University of Southern California,* **Bryce Heitner** - *University of Southern California,* **Stara Shinsato** - *University of California, Berkeley,* **Mitul Luhar** - *University of Southern California*

Thermo-Physical Properties of Drying Process of Dioscorea Alata

Technical Presentation Only: SHTC2022-97334

Emmanuel Nwadike - *Nnamdi Azikiwe University,* **Andrew Azaka** - *Nnamdi Azikiwe University,* **Mathew Abonyi** - *Nnamdi Azikiwe University*

The Effect of Real Gas Radiation on Laminar Developing Flow in a Channel

Technical Presentation Only: SHTC2022-88060

Kyle Pulsipher - *Brigham Young University,* **Brent Webb** - *Brigham Young University*

Natural Convection in a Square Enclosure With Radiatively Participating Real Gases

Technical Presentation Only: SHTC2022-87822

Brennen Clark - *Brigham Young University,* Brent Webb - *Brigham Young University,* Vladimir Solovjov - *Brigham Young University*

K-06 THERMAL STORAGE IN ENERGY SYSTEMS
8:30AM–10:10AM **INDIA C**

Chair: Leitao Chen - *Tennessee State University*

Design of a Thermal Energy Storage System for Heating a Sumaq Wasi House in Ayaviri, Puno (Peru) Using Combustion Gases From a Domestic Stove

Technical Presentation Only: SHTC2022-81883

Luz Estrada Torvisco - *Universidad de Ingeniería y Tecnología,* Carlos Rios Perez - *Universidad de Ingeniería y Tecnología*

Machine Learning Based Control of Multi-Temperature PCM Thermal Storage Assemblies – A Comparison of On/Off Versus Fully Modulating Valve Control

Technical Paper Publication: SHTC2022-86174

Alanna Cooney - *University of California, Berkeley,* Van Carey - *University of California, Berkeley*

Parametric Modelling Study of a High-Temperature Thermal Energy Storage System for Application in Solar Fuel Redox Cycles

Technical Presentation Only: SHTC2022-89249

Alon Lidor - *ETH Zürich,* Ewald Kleefstra - *ETH Zürich,* Aldo Steinfeld - *ETH Zürich*

Experimental Investigation of PCM Melting in a Vertical Capsule

Technical Presentation Only: SHTC2022-90460

Tomer Shockner - *Ben-Gurion University,* Gennady Ziskind - *Ben-Gurion University*

Effect of Phase Change Material Container Design on Hybrid Thermal Management System for a Battery Module

Technical Presentation Only: SHTC2022-90463

İsmail Gurkan Demirkiran - *Izmir Institute of Technology,* Erdal Cetkin - *Izmir Institute of Technology*

PCM Based Heat Sinks for Transient Passive Cooling of an Electronic Device With Localized Power Generation – Numerical and Parametric Study

Technical Presentation Only: SHTC2022-89849

Elad Koronio - *Ben-Gurion University,* Gennady Ziskind - *Ben-Gurion University*

K-06 HEAT AND MASS TRANSFER IN HEATING, COOLING, AND POWER SYSTEMS
4:00PM–5:40PM **INDIA C**

Chair: Leitao Chen - *Tennessee State University*

A Novel Dynamic Spacecraft Radiator Design With Annular Geometry and Varied Thickness Profiles for CubeSat Applications

Technical Paper Publication: SHTC2022-84329

Nicholas Debortolli - *University of Dayton,* Natalie Douglass - *University of Dayton,* David Warburton - *University of Dayton,* Jeremy Price - *University of Dayton,* Josh Cannon - *Brigham Young University,* Brian Iverson - *Brigham Young University,* Rydge Mulford - *University of Dayton*

Experimental Investigation and Heat Transfer Analysis of Innovative Thermal Mechanical Refrigeration System Compared to Electric Compressor

Technical Paper Publication: SHTC2022-85194

Ahmad Sleiti - *Qatar University,* Wahib Al-Ammari - *Qatar University,* Mohammed Al-Khawaja - *Qatar University*

Buoyancy-Driven Convection in Additively Manufactured Cubic Lattice: Effect of Lattice Aspect Ratio and Heating Orientation

Technical Paper Publication: SHTC2022-85740

Prashant Singh - *Mississippi State University,* Mantha S. Phanikumar - *Michigan State University,* Roop Mahajan - *Virginia Tech*

Uncertainty Analysis of Vapor Transport Measurement in a Hollow Fiber Membrane Module for Membrane Humidifier

Technical Paper Publication: SHTC2022-81761

Xuan Linh Nguyen - *Chungnam National University,* **Sangseok Yu** - *Chungnam National University*

Modeling and Simulation of Whole Air Supply System for Proton Exchange Membrane Fuel Cell Under Dynamic Operating Conditions

Technical Paper Publication: SHTC2022-81691

Hoang Nghia Vu - *Chungnam National University,* **Sangseok Yu** - *Chungnam National University*

Investigation of Passive Radiative Cooling Using Bio-Polymers

Technical Presentation Only: SHTC2022-97683

Zahra Kamali Khanghah - *University of Nebraska-Lincoln,* **Mohammad Ghashami** - *University of Nebraska-Lincoln*

K-20 APPLICATIONS OF CHT

4:00PM–5:40PM **FREEDOM G**

Chair: **Mohamed Abdelhady** - *National Research Council Canada*
Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Chair: **Shima Hajimirza** - *Stevens Institute of Technology*
Chair: **Cheng-xian Lin** - *Florida International University*
Co-Chair: **Like Li** - *Mississippi State University*
Co-Chair: **Leitao Chen** - *Tennessee State University*

Physics Assisted Long-Short-Term-Memory Network for Forecasting Fouling in Regenerative Air Preheater

Technical Paper Publication: SHTC2022-80475

Ashit Gupta - *Tata Consultancy Services,* **Vishal Jadhav** - *Tata Consultancy Services,* **Anirudh Deodhar** - *Tata Consultancy Services,* **Venkataramana Runkana** - *Tata Consultancy Services*

Anisotropy of Flow and Heat Transfer of Gaseous MHD Flows in a Circular Tube Under the Control of Transverse Magnetic Field: A Preliminary Study

Technical Paper Publication: SHTC2022-83763

Qijin Zhao - *Army Academy of Armored Forces,* **Baoquan Mao** - *Army Academy of Armored Forces,* **Xianghua Bai** - *Army Academy of Armored Forces,* **Jintao Guo** - *Troop No. 96901 of PLA,* **Chunlin Chen** - *Army Academy of Armored Forces*

Finite Element Conjugate Heat Transfer Strategy for Self and Applied Magnetoplasmadynamic (MPD) Thrusters

Technical Paper Publication: SHTC2022-85788

K. Joel Berry - *Kettering University*

Large Eddy Simulation of Random Pebble Bed Using the Spectral Element Method

Technical Paper Publication: SHTC2022-87117

Tri Nguyen - *Penn State University,* **Elia Merzari** - *Penn State University,* **Haomin Yuan** - *Argonne National Laboratory,* **Dezhi Dai** - *Argonne National Laboratory,* **Brian Jackson** - *Kairos Power*

Prediction and Validation of Fluid Flow Properties in Additively Manufactured Porous Lattice Structures

Technical Presentation Only : SHTC2022-78222

Ashreet Mishra - *Mississippi State University***, David Korba -** *Mississippi State University,* **Inderjot Kaur -** *Mississippi State University,* **Youssef Aider** - *Mississippi State University,* **Prashant Singh** - *Mississippi State University,* **Like Li** - *Mississippi State University*

K-18 HEAT TRANSFER UNDER EXTREME CONDITIONS

4:00PM–5:40PM **INDIA D**

Chair: **Qiang Liao** - *Chongqing University*
Co-Chair: **Calvin Li** - *Villanova University*
Co-Chair: **Zhiguo Qu** - *Xi'an Jiaotong University*
Co-Chair: **Junjun Wu** - *Chongqing University*

Structural Design of Thermoelectric Power Generation System Based on Phase Transfer Materials

Technical Presentation Only: SHTC2022-87597

Ning Zhuang - *Xi'an Jiaotong University,* **Peiqin Wu** - *Xi'an Jiaotong University.* **Qiuwang Wang** - *Xi'an Jiaotong University,* **Ting Ma** - *Xi`An Jiaotong University*

Cold Model Experiments of Ash Deposition Characteristics of Flue Gas Across 3-D Finned Tubes

Technical Presentation Only: SHTC2022-88125

Yudong Ding - *Chongqing University,* **Changshen Lu** - *Chongqing University,* **Junnan Zhang** - *Chongqing University,* **Xun Zhu** - *Chongqing, ,* **Hong Wang** - *Chongqing University,* **Min Cheng** - *Chongqing University,* **Qiang Liao** - *Chongqing University*

Temperature Discretized Design Method for Heat Exchangers With Trans- and Super-Critical Hydrogen

Technical Presentation Only: SHTC2022-88244

Chenglong Yang - *Xi'an Jiaotong University,* **Zetian Tang** - *Xi'an Jiatong University,* **Zhiguo Qu** - *Xi'an Jiatong University,* **Jianfei Zhang** - *Xi'an Jiatong University,* **Zhiyuan Jiang** - *Xi'an Jiaotong University*

Modeling the Influence of Heat Transfer on Gas Hydrate Formation

Technical Paper Publication: SHTC2022-79744

Aritra Kar - *The University of Texas Austin,* **Palash Acharya** - *The University of Texas at Austin,* **Awan Bhati** - *The University of Texas at Austin,* **Arjang Shahriari** - *The University of Texas at Austin,* **Ashish Mhahdeshwar** - *ExxonMobil,* **Timothy A. Barckholtz** - *ExxonMobil,* **Vaibhav Bahadur** - *The University of Texas at Austin*

Boundary Conditions for Modeling of a Lead Reverberatory Furnace

Technical Paper Publication: SHTC2022-81206

Nicholas Walla - *Purdue University Northwest,* **Vitalis Anisiuba** - *Purdue University Northwest,* **Armin Silaen** - *Purdue University Northwest,* **Alexandra Anderson** - *Gopher Resource,* **Joseph Grogan** - *Gopher Resource,* **Chenn Zhou** - *Purdue University Northwest*

High Phonon Scattering Rates Suppress Thermal Conductivity in Hyperstoichiometric Uranium Dioxide

Technical Presentation Only: SHTC2022-94546

Hao Ma - *Oak Ridge National Laboratory,* **Matt Bryan** - *Oak Ridge National Laboratory,* **Judy Pang** - *Oak Ridge National Laboratory,* **Douglas Abernathy** - *Oak Ridge National Laboratory,* **Daniel Antonio** - *Idaho National Laboratory,* **Krzysztof Gofryk** - *Idaho National Laboratory,* **Michael Manley** - *Oak Ridge National Laboratory*

K-13 EVAPORATION/BOILING II

4:00PM–5:40PM **FREEDOM F**

Chair: **Vinod Srinivasan** - *University of Minnesota*
Co-Chair: **Jovica Riznic** - *Canadian Nuclear Safety Commission*

Effects of Tube Geometry and Wettability on Liquid Flow and Evaporation Heat Transfer in Falling Film Flow

Technical Presentation Only: SHTC2022-83830

Hong-Qing Jin - *University of Illinois at Urbana-Champaign,* **Sophie Wang** - *University of Illinois at Urbana Champaign*

Porous Nanochannel Wicks Based Solar Vapor Generation Device

Technical Presentation Only: SHTC2022-96668

Durgesh Ranjan - *Syracuse University,* **Shalabh Maroo** - *Syracuse University,* **An Zou** - *Syracuse University*

Structural-Material-Operational-Performance Relationship for Enhanced Pool Boiling Surfaces Using Neural Network Model

Technical Presentation Only: SHTC2022-91012

Sadaf Mehdi - *Wichita State University,* **Gisuk Hwang** - *Wichita State University*

WEDNESDAY, JULY 13, 2022

K-06 THERMAL MANAGEMENT OF BATTERY SYSTEMS

8:30AM–10:10AM **INDIA C**

Chair: **Leitao Chen** - *Tennessee State University*

Validation of Vented Gas Characteristics From Thermal Runaway of Lithium-Ion Batteries Using LIM1TR

Technical Paper Publication: SHTC2022-79560

Ala' Qatramez - *The University of Memphis,* **Andrew Kurzawski** - *Sandia National Laboratories,* **John Hewson** - *Sandia National Laboratories,* **Michael Parker** - *The University of Memphis,* **Adam Porter** - *The University of Memphis,* **Daniel Foti** - *The University of Memphis,* **Alexander Headley** - *The University of Memphis*

Experimental Validation of Condensation Modeling for H2 Drying in Space-Based Electrolysis

Technical Presentation Only: SHTC2022-87908

Nasim Emadi - *Colorado School of Mines,* **David Dickson** - *Colorado School of Mines,* **John Schmit** - *Colorado School of Mines,* **Christopher Dreyer** - *Colorado School of Mines,* **Michele Hollist** - *OxEon Energy, LLC,* **Joseph Hartvigsen** - *OxEon Energy, LLC,* **Gregory Jackson** - *Colorado School of Mines*

Non-Uniform Heat Generation Model for a Li-Ion Battery Cell to Decrease Numerical Cost

Technical Presentation Only: SHTC2022-89088

Sinan Gocmen - *Izmir Institute of Technology,* **Erdal Cetkin** - *Izmir Institute of Technology*

Thermal Metrology for Measuring Lithium Concentration Gradients in Lithium-Ion Batteries (LIBs)

Technical Presentation Only: SHTC2022-97653

Yuqiang Zeng - *Lawrence Berkeley National Laboratory,* **Divya Chalise** - *Lawrence Berkeley National Laboratory,* **Yanbao Fu** - *Lawrence Berkeley National Laboratory,* **Joseph Schaadt** - *Lawrence Berkeley National Laboratory,* **Sumanjeet Kaur** - *Lawrence Berkeley National Laboratory,* **Vince Battaglia** - *Lawrence Berkeley National Laboratory,* **Sean Lubner** - *Lawrence Berkeley National Laboratory,* **Ravi Prasher** - *Lawrence Berkeley National Laboratory*

Thermal Wave Sensing of Electrochemical Information

Technical Presentation Only: SHTC2022-97590

Divya Challise - *Lawrence Berkeley National Laboratory and University of California, Berkeley,* **Sean Lubner** - *Lawrence Berkeley National Laboratory and Massachusetts Institute of Technology,* **Yuqiang Zeng** - *Lawrence Berkeley National Laboratory,* **Sumanjeet Kaur** - *Lawrence Berkeley National Laboratory,* **Venkat Srinivasan** - *Argonne National Laboratory,* **Rob Jonson** - *Lawrence Berkeley National Laboratory,* **Joseph Schaadt** - *Stanford University and University of California, Berkeley,* **Akshey Dhar** - *Lawrence Berkeley National Laboratory and University of California, Berkeley,* **Mike Tucker** - *Lawrence Berkeley National Laboratory,* **Ravi Prasher** - *Lawrence Berkeley National Laboratory and University of California, Berkeley*

K-13 MULTIPHASE FLOW

8:30AM–10:10AM **FREEDOM F**

Chair: **Vinod Srinivasan** - *University of Minnesota*
Co-Chair: **Jovica Riznic** - *Canadian Nuclear Safety Commission*

An Experimental Investigation of Flow Boiling Characteristics in Interconnected Microchannels With Different Slot Arrangement

Technical Paper Publication: SHTC2022-81624

Yun Li - *Shanghai Jiao Tong University,* **Huiying Wu** - *Shanghai Jiao Tong University*

Numerical Simulation of Multiple Bubble Interaction During Flow Boiling in Micro-Channels

Technical Paper Publication: SHTC2022-81866

Dewan Rahman - *California State University, Northridge,* **Abhijit Mukherjee** - *California State University, Northridge*

Anomalous Adverse Effect of Mass Velocity on Convective Flow Boiling in Microfin Tubes: Literature Review and Mechanistic Analysis

Technical Paper Publication: SHTC2022-82761

Lingnan Lin - *National Institute of Standards and Technology,* **Mark Kedzierski** - *National Institute of Standards and Technology*

Review of Datasets and Correlations for Two-Phase Flow Boiling Heat Transfer of Pure Ethanol and Ethanol/Water Binary Mixtures

Technical Paper Publication: SHTC2022-84340

Mohamed Elfaham - *University of North Dakota,* **Clement Tang** - *University of North Dakota*

A Two-Dimensional Numerical Study on Air/Mist Sweeping Jet Impingement Cooling

Technical Paper Publication: SHTC2022-81664

Ting Wang - *University of New Orleans,* **Ramy Abdelmaksoud** - *University of New Orleans*

Effects of Wettability, Porosity, and Subsequent Hydraulic Linkage on Convective Drying of Water From Porous Media

Technical Presentation Only: SHTC2022-81810

Partha P. Chakraborty - *Kansas State University,* **Melanie Derby** - *Kansas State University*

K-12 AEROSPACE HEAT TRANSFER

8:30AM–10:10AM **FREEDOM G**

Chair: **Ashwani Gupta** - *University of Maryland*
Co-Chair: **Ryo Amano** – *University of Wisconsin-Milwaukee*

Europa Lander Terminal Sterilization Subsystem (TSS) Thermal Model Verification, Validation, and Uncertainty Quantification (VVUQ) Processes

Technical Paper Publication: SHTC2022-81162

Kevin Irick - *Sandia National Laboratories,* **Tyler Voskuilen** - *Sandia National Laboratories*, **Philip Sakievich** - *Sandia National Laboratories*

Heat Transfer on Fuel Injector Surface With Backward Facing Stepped Scramjet Flame Holder

Technical Paper Publication: SHTC2022-83853

Hyung Mo Bae - *Yonsei University,* **Jihyuk Kim** - *Yonsei University,* **Juyeong Nam** - *Yonsei University,* **Injoong Chang** - *Yonsei University,* **Hee Koo Moon** - *Yonsei University,* **Hyung Hee Cho** - *Yonsei University*

Thermal Fluid Assessment of Bluff Versus Streamlined Bodies With a Slot for Aligned Flow

Technical Paper Publication: SHTC2022-80024

Sultan Alshareef - *University of Utah ,* **Todd Harman** - *University of Utah,* **Timothy Ameel** - *University of Utah*

An Experimental Study on Heat Transfer Performance of Jet Impingement Arrays

Technical Paper Publication: SHTC2022-81617

Jiahong Fu - *Zhejiang University City College,* **Bengt Sundén** - *Lund University,* **Zhen Cao** - *Lund University*

A Review on Film Cooling Research: Historical Developments in Hole Shapes, Measurement Techniques, Effects of Operating Conditions and Impact of Additive Manufacturing

Technical Paper Publication: SHTC2022-81803

Inderjot Kaur - *Mississippi State University,* **Sandip Dutta** - *Clemson University,* **Prashant Singh** - *Mississippi State University*

K-09 FIRST-PRINCIPLES PREDICTION OF PHONON AND ELECTRON THERMAL TRANSPORT II

8:30AM–10:10AM **FREEDOM E**

Chair: **Richard Zhang** - *University of North Texas*

Modeling Phonon Backscattering in Axially Modulated Nanowires

Technical Presentation Only: SHTC2022-84231

Yingru Song - *Rice University,* **Geoff Wehmeyer** - *Rice University*

Analytical Development of Phononic Energy Propagation Between Thermal and Acoustic Waves

Technical Presentation Only: SHTC2022-84360

Rajib Mahamud - *Texas A&M University,* **Hossain Ahmed** - *Georgia Southern University*

Modeling the High-Frequency Periodic Heating of a Line-Heater-on-Substrate Structure: Towards a Ballistic 3ω Method

Technical Presentation Only: SHTC2022-85125

Tao Li - *Southeast University,* **Zhen Chen** - *Southeast University*

Modeling Frequency-Dependent Rectification in Heterojunction Thermal Diodes, {SHTC2022-84234}

Technical Presentation Only

Trevor Shimokusu - *Rice University,* **Qing Zhu** - *Rice University,* **Natan Rivera** - *Rice University,* **Geoff Wehmeyer** - *Rice University*

RESEARCH FUNDING OPPORTUNITIES PANEL: NSF AND DOE

10:30AM – 12:10PM **LIBERTY A**

Chair: **Satwindar S. Sadhal**, *University of Southern California*
Co-Chair: **Milind A. Jog**, *University of Cincinnati*
Co-Chair: **Mark Kedzierski**, *National Institute of Standards and Technology*

Panelists:

Dr. Ying Sun, *Program Director, Thermal Transport Processes Program National Science Foundation*

Dr. Avi Shultz, *Program Manager, Concentrating Solar-Thermal Power (CSP) Program, U.S. Department of Energy's Solar Energy Technologies Office (SETO)*

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Abrecht	Kevin	91451	Evaluation of Printed Circuit Heat Exchanger Performance Using Experimental and Numerical Approaches	Track K-10 Heat Transfer Equipment II
Acosta	Greg	97664	New Experimental Method for Determination of Energy Accommodation Coefficient	K-09 First-principles Prediction of Phonon and Electron Thermal Transport I
Acosta	Greg	81599	Thermal Transport via Gas Conduction Within Nanoconfinement	K-09 Characterizations of Nanoscale Thermal Transport
Afrin	Nazia	88524	HVAC Systems Improvement for Environment Control to Minimize the Covid 19 Infection Spreads	K-10 Heat Transfer Equipment II
Ahmed	Hossain	84360	Analytical Development of Phononic Energy Propagation Between Thermal and Acoustic Waves	K-09 First-principles Prediction of Phonon and Electron Thermal Transport II
Aider	Youssef	81856	Convective Heat Transfer Potential of Particles/ airflow Through Single Cell Thick Additively Manufactured Octet-Shaped Lattice Frame Material	K-06 Heat and Mass Transfer in Renewable Energy Systems
Akula	Vincent	84389	A Numerical Study on the Effect of Physical Changes of Air Distribution Setup on the Heating Performance of a Forced Air Circulation System	K-19 Environmental Heat Transfer
Al-Rifai	Saja	81884	A Numerical Study of the Dominant Condensation Mechanism in Crossflow Transport	K-06 Heat and Mass Transfer in Renewable Energy Systems
Alsahlani	Assaad	85609	Implementation of a Model Predictive Control Strategy to Regulate Temperature Inside a Plug-Flow Solar Reactor With Counter-Current Flow	K-06 Heat and Mass Transfer in Renewable Energy Systems
Alshareef	Sultan	80024	Thermal Fluid Assessment of Bluff Versus Streamlined Bodies With a Slot for Aligned Flow	K-12 Aerospace Heat Transfer
Alvarado	Jorge	85717	Exploring the Effects of Minichannel Wall Distance on Falling Film Condensation: A Numerical Study	K-20 Computational Methods for Materials Development and Manufacturing II
Araki	Ken	80428	Self-Thermal Regulating Vo2-Fabry-Perot Cavity Coating for Passive Radiative Cooling Device	K-09 Nanoscale Radiative Thermal Devices/Systems
Bae	Hyung Mo	83853	Heat Transfer on Fuel Injector Surface With Backward Facing Stepped Scramjet Flame Holder	K-12 Aerospace Heat Transfer
Bahadur	Vaibhav	79744	Modeling the Influence of Heat Transfer on Gas Hydrate Formation	K-18 Heat Transfer under Extreme Conditions
Berry	K. Joel	85788	Finite Element Conjugate Heat Transfer Strategy for Self and Applied Magnetoplasmadynamic (MPD) Thrusters	K-20 Applications of CHT
Bharadwaj	Bharath	85400	Optimal Design of Additively Manufactured Metal Lattice Heat Sinks for Electronics Cooling	K-16 Heat Transfer in Electronic Equipment

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Bryan	Jacob	81886	Design and Analysis of a Modular High-Temperature Recuperator for Multi-Method Additive Manufacturing	K-06 Heat and Mass Transfer in Renewable Energy Systems
Cabrera	Samuel	86172	Use of Genetic Algorithms to Extract Fundamental Heat Transfer Performance Parameters From Evaporative Cooler Test Data	K-19 Environmental Heat Transfer
Chakraborty	Partha P.	81810	Effects of Wettability, Porosity, and Subsequent Hydraulic Linkage on Convective Drying of Water From Porous Media	K-13 Multiphase Flow
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Chandramouli	Vasudevan	81203	Experimental Results of Simulation of a Combined Flash Evaporation and Phase Separation System for Desalination of Sea Water	K-13 Evaporation/Boiling I
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Clark	Brennen	87822	Natural Convection in a Square Enclosure With Radiatively Participating Real Gases	K-07 Thermophysical Properties
Cooney	Alanna	86174	Machine Learning Based Control of Multi-Temperature PCM Thermal Storage Assemblies – a Comparison of On/off Versus Fully Modulating Valve Control	K-06 Thermal Storage in Energy Systems
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Duan	Zhijian	85175	Topology Optimization Design and Heat Transfer Performance of Cooling Channel Based on Fluid-Solid Coupling	K-20 Heat Transfer Enhancement
Dunlap	Christy	85582	Data-Driven Modeling of Liquid-Vapor Interface Dynamics During Pool Boiling	K-08 Fundamentals of Boiling/ Condensation including Micro/ Nano-scale Effects I [Includes Molecular Level Simulation of Phase Change]
Elfaham	Mohamed	84340	Review of Datasets and Correlations for Two-Phase Flow Boiling Heat Transfer of Pure Ethanol and Ethanol/water Binary Mixtures	K-13 Multiphase Flow
Emadi	Nasim	87908	Experimental Validation of Condensation Modeling for H2 Drying in Space-Based Electrolysis	K-06 Thermal Management of Battery Systems
Estrada Torvisco	Luz	81883	Design of a Thermal Energy Storage System for Heating a Sumaq Wasi House in Ayaviri, Puno (Peru) Using Combustion Gases From a Domestic Stove	K-06 Thermal Storage in Energy Systems
Ferreira	Julio	83836	A Loop Heat Pipe for Vehicle CPU Cooling: Peak Performance and Partial Flooding and Dryout Regimes	K-16 Heat Transfer in Electronic Equipment
Frear	Colton	85752	Comparison of Micro Fin Array Configurations for Heat Transfer Enhancement in Microchannels	K-08 Fundamentals of Boiling/ Condensation including Micro/ Nano-scale Effects I [Includes Molecular Level Simulation of Phase Change]
Ghanekar	Alok	83960	Dynamic Emissivity Control Mediated by Breaking of Inversion Symmetry: Dark Mode to Bright Mode Conversion	K-09 Nanoscale Radiative Thermal Devices/Systems
Ghanekar	Alok	84370	Active Directional Control of Emissivity With Quasi-Localized Guided Modes-	K-09 Nanoscale Radiative Thermal Devices/Systems
Gocmen	Sinan	89088	Non-Uniform Heat Generation Model for a Li-Ion Battery Cell to Decrease Numerical Cost	K-06 Thermal Management of Battery Systems
Goitom	Abisolom	83809	Polymer Composite Heat Transfer Surfaces in Highly Corrosive Application	K-10 Heat Transfer Equipment III
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He	Junjie	88232	Hybrid Thermal Management System Combining Vapor Chamber and Composite Phase Change Heat Sink for High Heat Flux Electronic Devices	K-16 Heat Transfer in Electronic Equipment
Hodes	Marc	94816	Adiabatic Section Flow Resistance of Axial-Groove Heat Pipes for Slowly Varying Meniscus Curvature	K-08 Fundamentals of Boiling/ Condensation including Micro/ Nano-scale Effects II [Includes Molecular Level Simulation of Phase Change]
Housen	Tara	96488	Heat Pipe-Based Enhanced Dehumidification System Modeling and Comparison	K-20 Computational Methods for Materials Development and Manufacturing I
Hunter	Nick	85268	Interface Thermal Resistance Between Monolayer Wse2 and Sio2: Raman Probing With Consideration of Optical-Acoustic Phonon Nonequilibrium	K-09 First-principles Prediction of Phonon and Electron Thermal Transport I
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Jiang	Lie-Bin	86203	Flow and Heat Transfer Characteristics of Supercritical Rp-3 Kerosene in an Inclined Rectangular Channel Heated on One Side	K-10 Heat Transfer Equipment I

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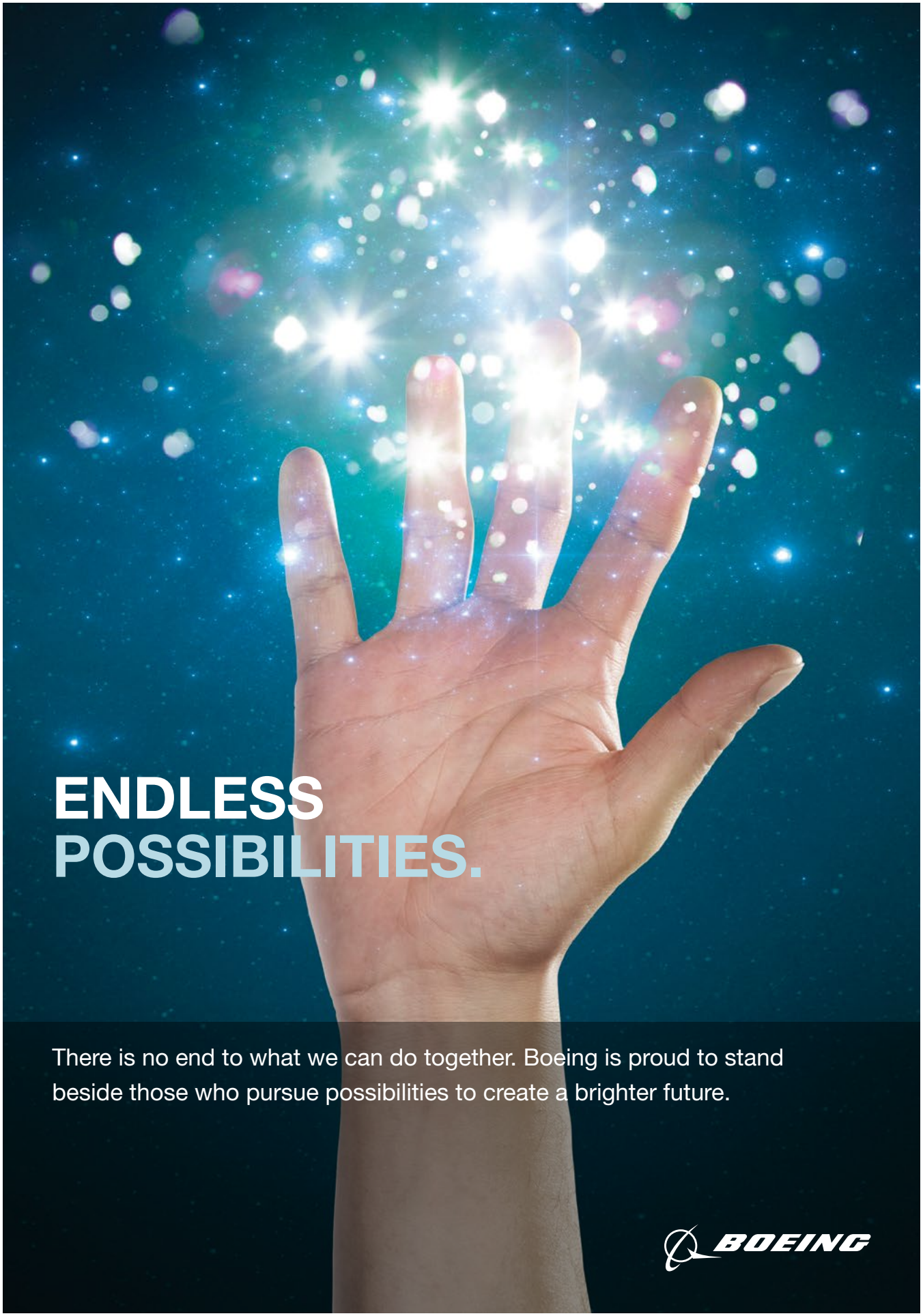
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ACKNOWLEDGMENTS

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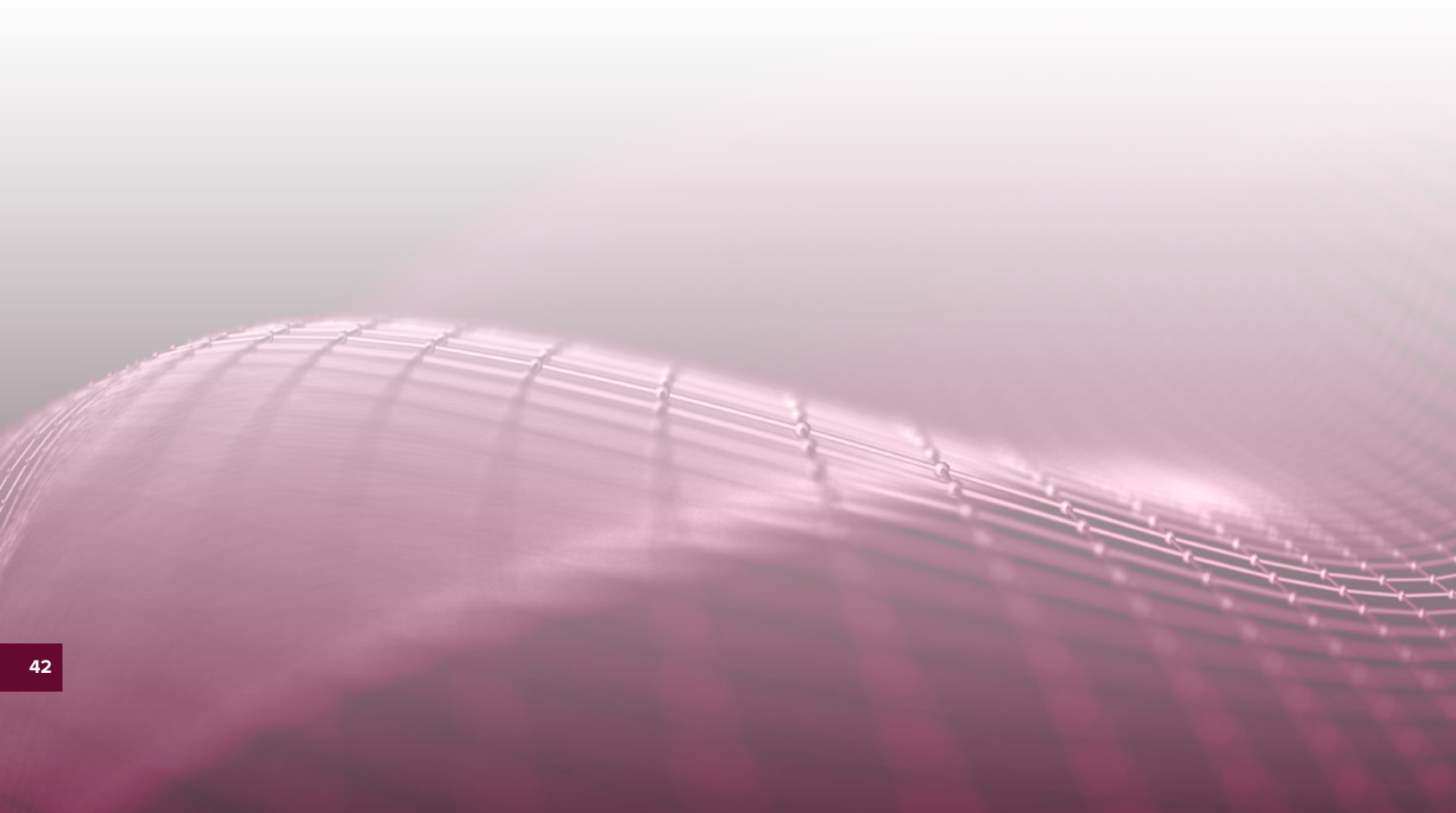

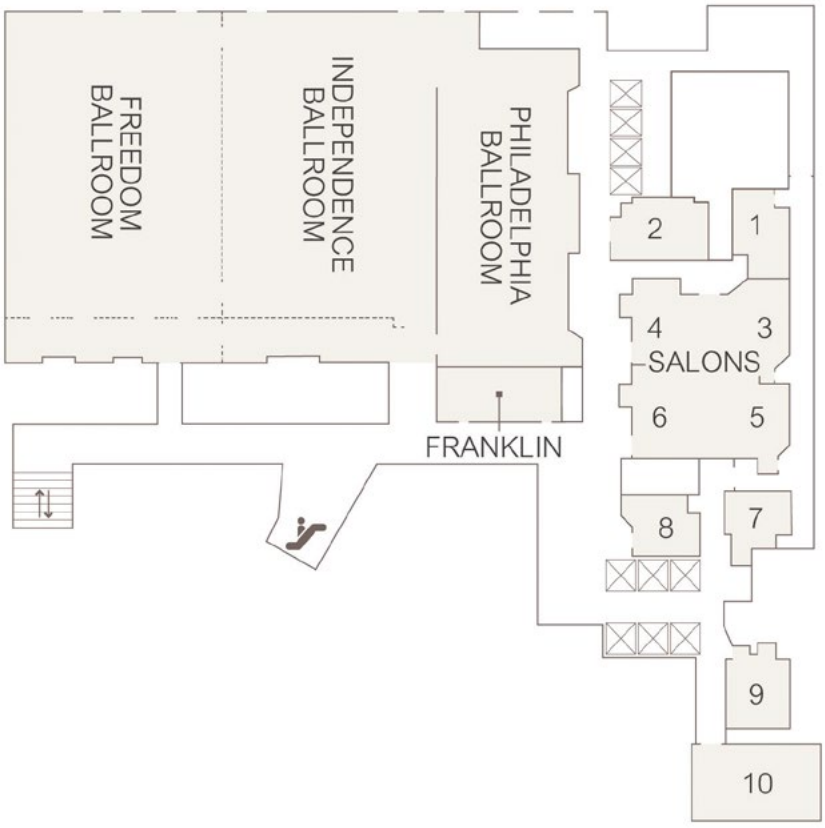
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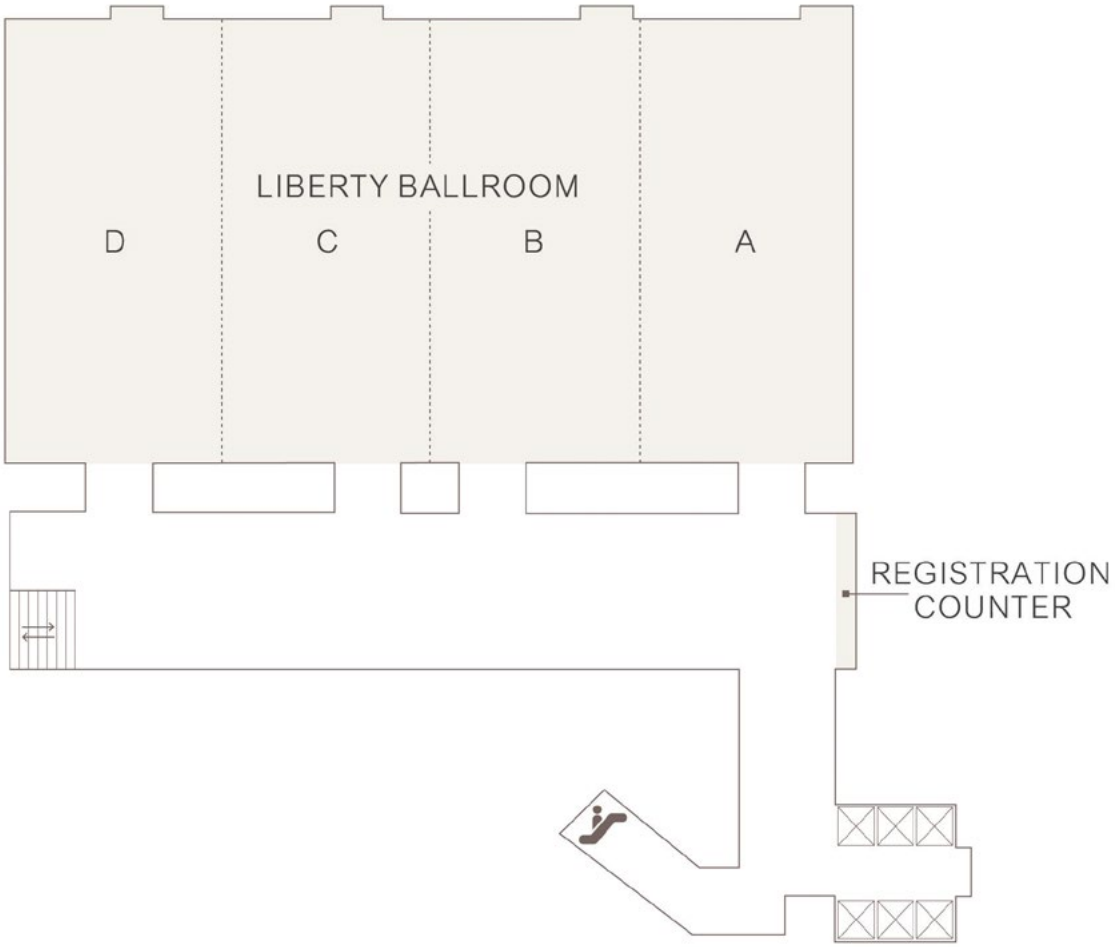

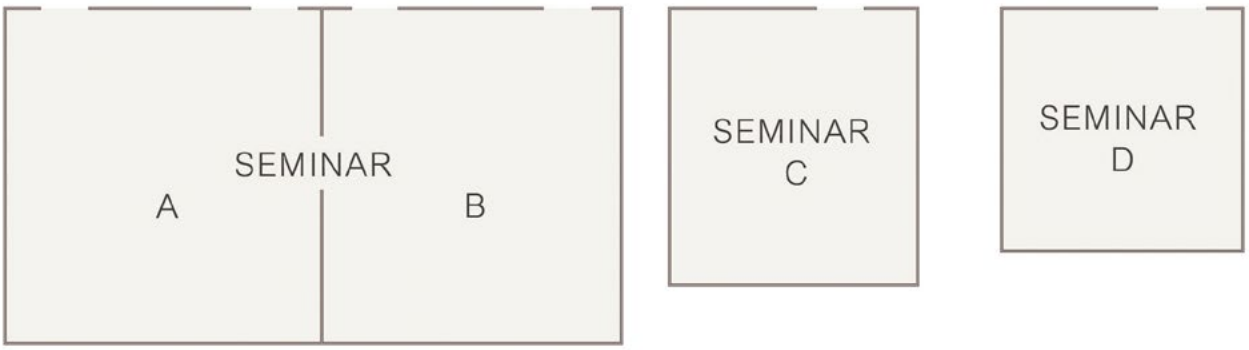
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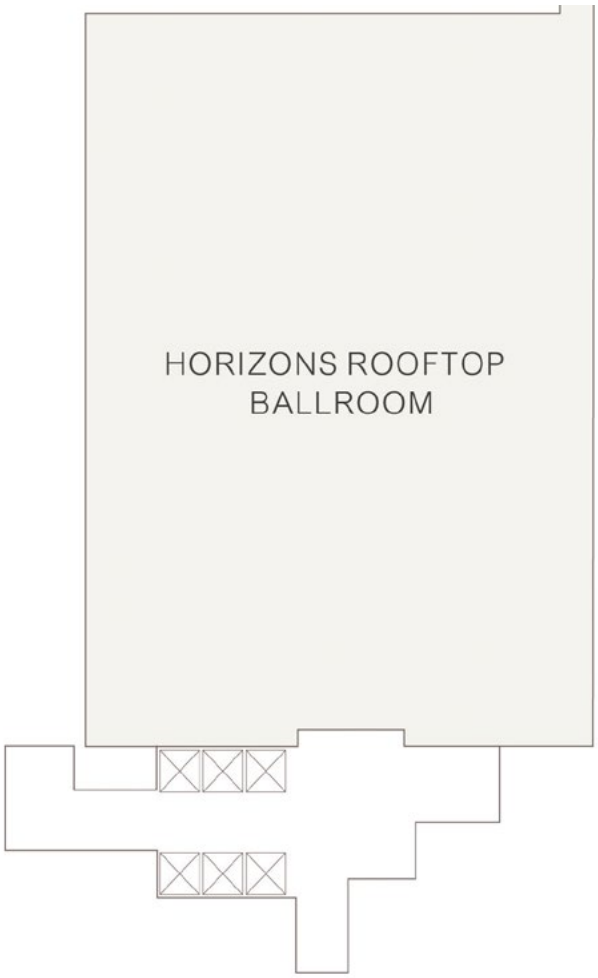
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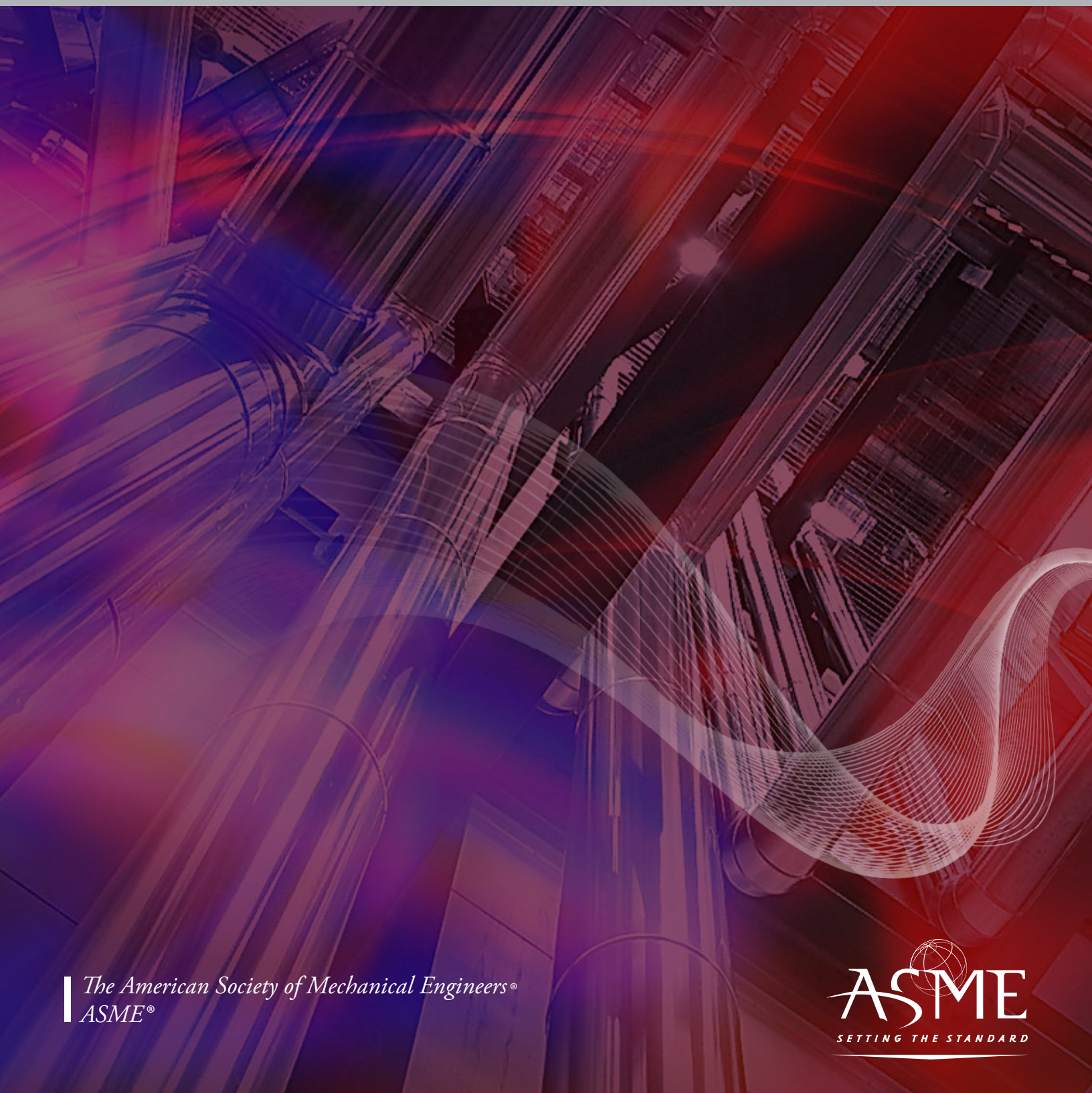

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