FFHMT 2024

PROCEEDINGS OF THE 11TH INTERNATIONAL CONFERENCE ON FLUID FLOW, HEAT AND MASS TRANSFER (FFHMT 2024)

June 16, 2024 - June 18, 2024 | Chestnut Conference Centre
University of Toronto, Toronto, Canada

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WELCOME MESSAGE FROM THE CONFERENCE CHAIR

On behalf of the International Academy of Science, Engineering and Technology (International ASET Inc.), the organizing committee would like to welcome you to the 11th International Conference of Fluid Flow, Heat and Mass Transfer (FFHMT 2024).

FFHMT 2024 is aimed to become one of the leading international annual conferences in the fields of heat, momentum, and mass transfer. This conference will provide excellent opportunities to the scientists, researchers, industrial engineers, and university students to present their research achievements and to develop new collaborations and partnerships with experts in the field.

FFHMT is a series of international conferences held yearly. These conferences focus on all aspects of fluid flow, heat and mass transfer. The 11th International Conference of Fluid Flow, Heat and Mass Transfer (FFHMT 2024) is going to be held in a hybrid format, i.e. in person as well as online.

In the tenth meeting of this conference, two Plenary Speakers and two keynote speakers will share their expertise with the aim of exposing participants to a wide spectrum of applications, and to foster crosspollination of ideas and develop new research interests. In addition, approximately 31 papers will be presented from professors, students, and researchers across the world.

We thank you for your participation and contribution to the 11th International Conference of Fluid Flow, Heat and Mass Transfer (FFHMT 2024). We wish you a very successful and enjoyable experience.

Dr. Boguslaw Kruczek
Conference Chair and Proceedings Editor
FFHMT 2024

Dr. Wael H. Ahmed
Conference Co-Chair
FFHMT 2024

Dr. Xianshe Feng
Conference Co-Chair and Proceedings Editor
FFHMT 2024

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ABOUT FFHMT 2024

The International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT) aims to become the leading annual conference in fields related to traditional and modern transport phenomena. The goal of FFHMT 2024 is to gather scholars from all over the world to present advances in the fields of transport phenomena and to foster an environment conducive to exchanging ideas and information. This conference will also provide an ideal environment to develop new collaborations and meet experts on the fundamentals, applications, and products of the mentioned fields.

FFHMT is a series of international conferences held yearly. These conferences focus on all aspects of fluid flow, heat and mass transfer. After successfully holding FFHMT'14 to FFHMT'23 in Canada, FFHMT 2024 is hosted in Chestnut Conference Centre - University of Toronto, Toronto - Canada as well this year. FFHMT 2024 is going to be held in a hybrid format, i.e. in person as well as online.

FFHMT is an acronym for **F**luid, **F**low, **H**eat, and **M**ass **T**ransfer.

- All papers were peer-reviewed
- The conference proceedings are published under an ISSN and ISBN number
- Each paper is assigned a unique DOI number by Crossref
- The conference proceedings are indexed by Scopus and Google Scholar
- The proceedings are permanently archived in Portico (one of the largest community-supported digital archives in the world)

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We would like to thank the following for accepting to act as a member of the Scientific Committee for the FFHMT 2024 Conference:

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University of Ottawa, Canada
Conference Chair

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University of Guelp, Canada
Conference Co-Chair

Dr. Xianshe Feng
University of Waterloo, Canada
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- **Dr. RAJEEV JAIMAN,** University of British Columbia, Canada

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Scientific Committee Members

- **Dr. Konstantinos Kontis,** University of Glasgow, Russia
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- **Dr. Lian Shen,** University of Minnesota, USA
- **Dr. Jules Thibault,** University of Ottawa, Canada
- **Dr. Junfeng Zhang,** Laurentian University, USA

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KEYNOTE SPEAKERS

The keynote information for the 11th International Conference of Fluid Flow, Heat and Mass Transfer (FFHMT 2024) is as follows:

Keynote Speakers

Dr. Javad Mostaghimi
University of Toronto, Canada

Dr. Jules Thibault
University of Ottawa, Canada

Dr. Marilyn Lightstone
Mc Master University, Canada

Dr. Farhad Ein-Mozaffari
Toronto Metropolitan University, Canada

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FFHMT 2024 KEYNOTE SPEAKER

Titles: A Conical Radio-Frequency Inductively Coupled Plasma (RF-ICP) Source with applications in Materials Processing and Elemental Analysis

Dr. Javad Mostaghimi, University of Toronto, Canada

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Dr. Javad Mostaghimi is a Professor in the Department of Mechanical & Industrial Engineering at the University of Toronto and the director of the Centre for Advanced Coating Technologies (CACT). Before joining the University of Toronto in 1990, he held positions at Pratt & Whitney Canada, Longueil, Quebec, and the Department of Chemical Engineering, University of Sherbrooke, Sherbrooke, Quebec. His main research interests are the study of thermal spray coatings, including superhydrophobic coatings, thermal barriers, corrosion and wear-resistant coatings. He has performed comprehensive studies on the flow, temperature, and electromagnetic fields within arcs and RF inductively coupled plasmas. Professor Mostaghimi has done extensive simulations of the dynamics of droplet impact and solidification in thermal spray processes, and design of novel DC and RF plasma torches. Professor Mostaghimi is elected into the Canadian Academy of Engineering and the Academy of Science of the Royal Society of Canada. He has the rank of Fellow of the following professional societies: RSC, ASME, ASM, CSME, EIC, AAAS, IUPAC.

FFHMT 2024 KEYNOTE SPEAKER

Titles: Evaluating Membrane Properties: An Insight into the Time-Lag Method and Influencing Factors

Dr. Jules Thibault, University of Ottawa, Canada

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Jules Thibault obtained his bachelor of chemical engineering at the Royal Military College in 1973. He later obtained a PhD in Chemical Engineering from McMaster University in 1978 where he worked on the topic of heat transfer in nuclear reactors. Following his PhD Professor Thibault spent four years in the Canadian Armed Forces, including two six-month postings to Egypt and Cyprus with the United Nations. From 1981 to 1984, he taught in the Department of Chemistry and Chemical Engineering at the Royal military College, after which time he joined the Department of Chemical Engineering of Laval University. In 2000, he moved to the Department of Chemical and Biological Engineering at the University of Ottawa. His research interests are in biochemical engineering, and process simulation, control and optimization.

FFHMT 2024 KEYNOTE SPEAKER

Titles: The Role of Heat Pumps in Achieving Greenhouse Gas Emission Reductions in Canada's Existing Building Stock

Dr. Marilyn Lightstone, Mc Master University, Canada

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Marilyn Lightstone is a Professor and former Chair of Mechanical Engineering at McMaster University. She is a Professional Engineer registered in Ontario. In 2013, Marilyn was appointed as the first female Chair in the history of the Faculty of Engineering at McMaster University and was reappointed for a 2nd five-year term in 2018. She was previously Associate Chair (Undergraduate) in Mechanical Engineering. She is a Fellow of the Canadian Society for Mechanical Engineering and is an award-winning teacher at McMaster University. Marilyn served as the Director and Executive Officer of the Computational Fluid Dynamics Society of Canada and as a conference co-chair. She was Chair of the eSim Conference which is an international conference for building simulation in 2016. She was the National Fluids Examiner for the PEO for 2007-2010 and was Vice-Chair Graduate Attributes for the Canadian Engineering Accreditation Board in 2017. She was a member of the NSERC Grant Selection Committee for 2008-2011 and co-chaired that committee in 2010-11. She also was a member of the Agence Nationale de la Recherche (ANR – French National Research Agency) Grant Selection Committee with review meetings held in Paris in 2012 and 2015. She was also a member of the International Union of Theoretical and Applied Mechanics (IUTAM) as the Canadian Representative to the General Assembly of the IUTAM (2017-2021) and was a member of the IUTAM Diversity Working Group in 2021.

FFHMT 2024 KEYNOTE SPEAKER

Titles: Investigation of Gas Dispersion in Non-Newtonian Fluids with Coaxial Mixers Keynote Abstract

Dr. Farhad Ein-Mozaffari, Toronto Metropolitan University, Canada

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Dr. Farhad Ein-Mozaffari received his Ph.D. in chemical engineering from the University of British Columbia. Currently, he is a professor in the Department of Chemical Engineering at Toronto Metropolitan University. Dr. Ein-Mozaffari is a registered professional engineer in Ontario, Canada. His research interests are mixing, computational fluid dynamics (CFD), flow visualization (e.g., tomography and ultrasonic velocimetry), multiphase flow, non-Newtonian fluid flow, hydrodynamics of bioreactors, Scale-up of chemical processes, discrete element modeling (DEM), CFD-DEM coupling, and powder blending. He has published more than 380 refereed journal papers, book chapters, conference papers, and industry-university technical reports. Dr. Ein-Mozaffari has supervised/co-supervised more than 59 PhD and MASc students, PDF, and research associates. He has been awarded various reputable research grants such as NSERC DG, NSERC RTI, NSERC CRD, NSERC Alliance, New Frontiers in Research Fund – Exploration, NSERC ENGAGE, CFI, Mitacs, Connect Canada, and OCE. Dr. Ein-Mozaffari has collaborated with numerous companies such as Xerox Research Centre of Canada, Apotex, Sanofi Pasteur, Cosmetica Laboratories Inc., Baffinland Iron Mines, CSRplus, Hayward Gordon, Husky Injection Molding Systems Ltd., and Imasco Minerals Incorporation. He is the editor and a member of the editorial board of several journals. Dr. Ein-Mozaffari is the recipient of several awards including Dean's Research Award, Dean's Service Award, and YSGS Outstanding Contribution to the Graduate Education Award.

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The following papers were presented at the 11th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT 2024).

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Dynamics of Droplets under Shear Flow on Surfaces Containing Areas of Different Wettability
Authors: Zejia Xu, Yakang Xia, Jianxun Huang, Ri Li

CFD of the Conditioned Air Distribution in a Hospital Operating Room
Authors: Omer E. Mohamed, Amr Ahmed, Musa Abubker

Optimizing Biowaste Material Mixing for Efficient Biogas Production via Airlift Pump-Equipped Digesters
Authors: Tariq Malhis, Ihab H. Alsurakji, Amjad El-Qanni, Wael H. Ahmed

Classification Tree Analysis and Manifold Alignment of Manifold Learning-Based Turbulent Flow Abundances for Flow Characterization
Authors: Nicholas V. Scott, Antoine Mathieu, and Tian-Jian Hsu

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Authors: William Gordon, O. Remus Tutunea-Fatan, Evgueni Bordatchev

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Numerical Modeling Of Water-Air Multiphase Flow Within A Pipeline In The Presence Of Double Leaks
Authors: Hicham Ferroudji, Muhammad Saad Khan, Abinash Barooah, Mohammad Azizur Rahman, Ibrahim Hassan, Rashid Hassan, Ahmad K. Sleiti, Sina Rezaei Gomari, Matthew Hamilton

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Induced Flow Field by an Array of Four Synthetic Jet Actuators Issued in a Quiescent Surrounding
Authors: Hossein Khanjari, Ronald Hanson

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Authors: Hamid Reza Zandi Pour, Michele Iovieno

Metal Powder Handling In Additive Manufacturing Application
Authors: Shu-San Hsiau, Li-Tsung Sheng , Yi-Lun Xiao

Visualization of Flow in Control Valve with Cylindrical Perforated Cage via Computational Fluid Dynamics
Authors: Yuki Kurosawa, Chongho Youn

Experimental Study of Heat Transfer Mechanisms and Energy Consumption in a Heated Truck Weigh Station during Winter
Authors: Mohammadreza Tohidi, Jean Rouleau, Louis Gosselin

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Authors: Odelma Teixeira, José Páscoa

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SPONSORS

International ASET Inc. would like to thank the following sponsors for their support of FFHMT 2024:

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JOURNAL PUBLICATION

Selected articles from the coference will be published in the Journal of Fluid Flow, Heat and Mass Transfer (JFFHMT) after a secondary review process.

This journal has adopted to the open-access model, meaning all free access to the journal's articles and content with no need for subscription. This ensures larger audience and therefore higher citations.

All published papers of JFFHMT will be submitted to Google Scholar. Additionally, they will be permanently archived in Portico (one of the largest community-supported digital archives in the world) and will be assigned unique DOIs.

Please visit the following website for the respected journal: **JFFHMT:** https://jffhmt.avestia.com

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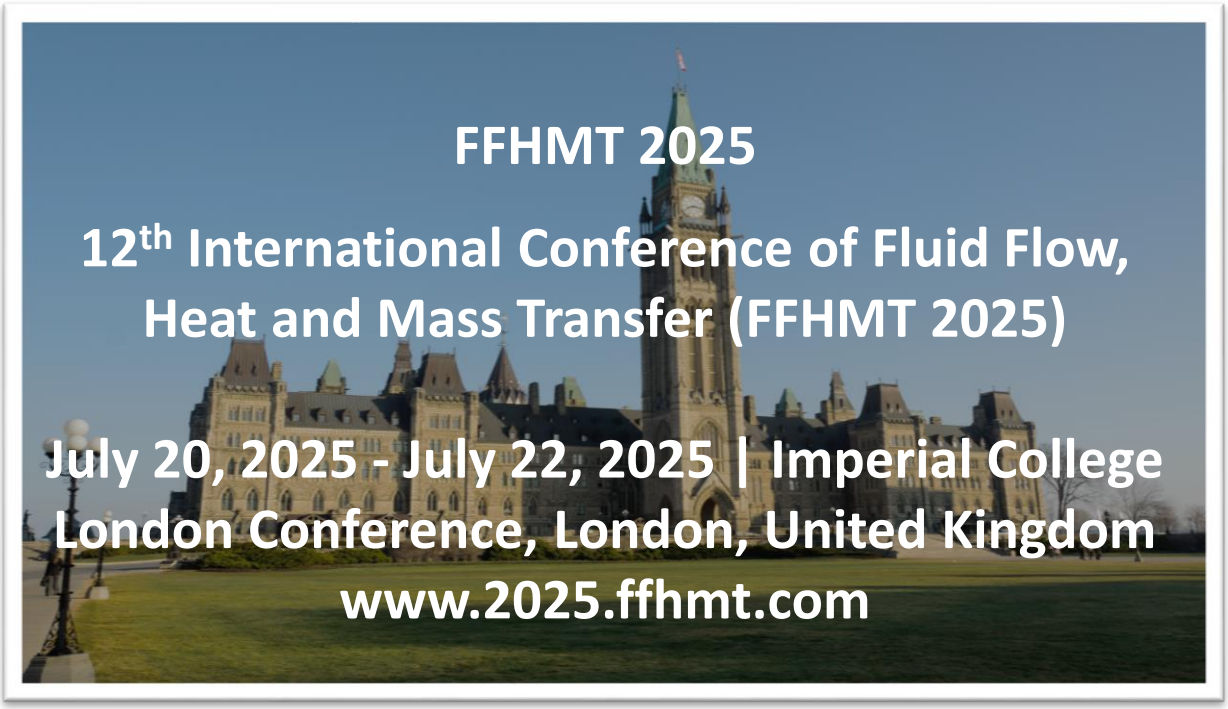
FFHMT 2025

The 12th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT 2025) will be held on July 20, 2025 - July 22, 2025 in Imperial College London Conference, London, United Kingdom .



For inquiries and to obtain further information on the congress, please visit the website

You can also email info@ffhmt.com or call us at: +1-613-834-9999

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ETHICS & MALPRACTICE

At International ASET Inc., we take matters that relate to ethics in publishing very seriously. We believe that the peer-review publication process is a vital building block of academia, and its integrity must be maintained at all costs, which is why every article will be peer-reviewed by several experts in the field. Under peer-review, experts in the related fields are required to provide opinions and comments on the improvements of the submissions.

We are proud of our efforts towards abiding by the guidelines of ethics, integrity, and high standards in publishing.

Following are the ethics guidelines set by the organizers for the authors and the reviewers of the conference:

Scientific Committees

Scientific committees consisting of experts in the fields are established. The committees oversee the peer-review and publication process. To see the scientific committee members, please follow the link: Scientific Committee

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One or more reviewer, scientific committee member, or chair, (internal or external), are responsible for evaluating the relevance of the submitted manuscripts to the proceedings, technical and scientific merit, originally, and impact. These evaluations are to be carried out regardless of ethnicity, religion, gender, sexual orientation, political beliefs, and institutions. Successive to peer-review, the Chair has full authority and is solely responsible for the published content and the process thereof.

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Scientific committee member(s) and publishing staff may not disclose manuscripts or their content, directly or indirectly, to anyone other than individuals invited to review the manuscript (whether they accept or not), other reviewers of the same publications, and publishing staff.

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ETHICS & MALPRACTICE

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In order for final decisions to be made regarding acceptance or rejection of papers, we rely on peer-review. Peer-review is the process of experts in the field reading, understanding, and objectively commenting on submitted papers. Through peer-review, scholars give back to the academic and scientific community by helping the chair(s) make decisions regarding manuscripts.

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Reviewers should promptly notify the chair(s) if they are unable or unqualified to carry out their reviewing duties. Reviewers should do their best to provide the reviews to the chair(s) as promptly as possible, and within the designated time-frame.

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Invited reviewers should immediately inform the chair(s) in case of a conflict of interest based on competitive, collaborative, personal, family, and other relationships with the authors or people involved in the work.

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The paper being submitted for the proceedings should be based on clear objective, discussion, and references. The findings, data, and the arguments being used in the paper should be accurate. It is author's responsibility to guarantee the authenticity of the data in the paper.

Authorship

Only persons who have significantly contributed to the work and the manuscript can be named authors on a paper. These contributions include the idea/concept, design, experiments, evaluation, analysis, drafting or revision of the manuscript, and others. Authors must all have agreed to be named as such and for the manuscript to be submitted. Anyone who has contributed based on the above, but the level of contribution is not significant, may appear in the acknowledgement section of the manuscript.

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Authors are encouraged to share their data, software, or other sharable material online, provided copyright and ownership laws surrounding that particular project permit. Authors may also be asked to share such material with the chair(s), and/or reviewers, and must be willing to do so if asked.

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ETHICS & MALPRACTICE

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Errata and Retractions

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Schedule:

This conference proceeding accompanies the conference, meaning a new proceedings will be published every year for the corresponding annual conference of this series.

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