ISTFD 2025

THE 6TH INTERNATIONAL SYMPOSIUM ON THERMAL-FLUID DYNAMICS

JULY 24 - 26, 2025 QINGDAO, CHINA

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Welcome

Warmly welcome to Qingdao to attend the 6th International Symposium on Thermal-Fluid Dynamics (ISTFD 2025). It is a follow-up conference to the previous five successful conferences, which were held in Xi'an, China (2019), Beijing, China (2021), Xi'an, China (2022), Nanjing, China (2023) and Xi'an, China(2024). ISTFD 2025 will be held in Qingdao, China on 24-26 July 2025, and is organized by the College of New Energy, China University of Petroleum, East China.

Thermal-Fluid Dynamics play a significant role in energy revolution and achieving carbon neutrality. It is the foundations to a wide range of engineering subjects such as energy, power, environment, energy saving and storage, renewable energy, aerospace and astronautics, nuclear energy, hydrogen energy, mechanical engineering, emerging and interdisciplinary subjects such as zero carbon technologies, micro- and nano-fluidics, advanced thermal processes and others. It plays a key role in the development and breakthrough of scientific theories, innovative technologies and revolution of industry and human society systems.

ISTFD aims to become one of the leading annual international forums and to advance scientific knowledge and technology development of Thermal-Fluid Dynamics and relevant emerging, cutting-edge and interdisciplinary subjects.

ISTFD 2025 will continue the increasingly important mission of fostering international cooperation and the exchange of ideas, including the most recent advances and exciting research outcomes in the field of thermal-fluid dynamics. The conference will include invited presentations and keynotes, contributed oral and poster presentations, as well as formal and informal opportunities to connect with your engineering peers. We sincerely welcome participants from every country and with a wide range of academic and professional backgrounds. Especially, young scientists and students are cordially invited.

The Organizing Committee wishes all participants a pleasant stay in Qingdao. Thank you.

On behalf of the Organizing Committee
Prof. Liang Gong
ISTFD 2025 Chairman
China University of Petroleum (East China)

China University of Petroleum (East China)

China University of Petroleum (UPC) is a national key university directly affiliated to the Ministry of Education and a member of the '211 Project' and '985 project innovation platform for well-established disciplines' universities. In both 2017 and 2022, it has been listed among the national plan of Double First-class Construction. It is co-constructed by Ministry of Education, five leading petroleum and petrochemical companies (CNPC, SINOPEC, CNOOC, CHINA SHENHUA and YANCHANG PETROLEUM) and Shandong Province. Honored as 'the cradle of Petroleum talents', UPC is an important base of high-level talents education for petroleum and petrochemical industry and has already developed into a multi-disciplinary and well-rounded university focusing on petroleum and engineering.

The university now has TANGDAOWAN campus, GUZHENKOU campus and Dongying Park. The two campuses are located in Qingdao city which enjoys a high reputation as 'the sailing city' and 'city by the sea' with its charming scenery. Dongying park is located in Dongying City, the central city on the Yellow River Delta and nationally known as 'the city of oil' , and now well serves as the base for research and practice.

UPC has 16 schools as well as HuiCui College, the College of International Education, the College of Remote Education, and the College of Continuing Education. Focusing on high-level education, the university has established a complete education system, enrolling about over 19,000 undergraduate students, more than 10,000 graduate students, and over 700 international students. It has a highly qualified faculty which ensures the quality of teaching and research. The university currently employs 1,723 faculty members, including 1,221 professors and associate professors, and 492 doctoral supervisors. . Among them are more than 40 distinguished individuals, such as academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering (including dual appointees), Changjiang Scholars Distinguished Professors, recipients of the National Science Fund for Distinguished Young Scholars and other national honors.

The university boasts over 40 national and provincial-level research platforms, including the National Key Laboratory of Deep Petroleum Resources, the National Key Laboratory of Heavy Oil, the National Engineering Research Center for Offshore Exploration and Development Equipment, and the China-Saudi Arabia Joint Laboratory for Petroleum Energy under the Belt and Road Initiative. The university has one National Natural Science Foundation Innovative Research Group, three Ministry of Education Innovative Teams, one Shandong Province Taishan Scholar Talent Team in Superior and Distinctive Disciplines, two National Huang Danian-style Faculty Teams, and three National Teaching Teams.

After more than seventy years of development, UPC has become an engineering-oriented university with the characteristics of petroleum science, and formed a system with various disciplines such as science, management, liberal arts, and the science of law and economics. With more determination and confidence, it is striving for the goal to be a high-level research-oriented university with its petroleum discipline reaching the world-class level and all disciplines developed comprehensively.

College of New Energy

College of New Energy (CNE) was co-founded by China University of Petroleum and Shandong Energy Group based on the principle of ‘school enterprise integration, collaborative innovation, resource sharing, mutual benefit and win-win cooperation’ on July 8th, 2019. CNE is designed to adapt to the trend of national energy structure transition, and build a clean, low-carbon, safe, and efficient energy sector. CNE supports the development of Shandong Energy Group and significant projects of replacing old growth drivers with new ones in Shandong Province. CNE also strengthens and expands the predominant disciplines of the university, focuses on strengthening the cross integration of basic energy disciplines and new energy disciplines, actively cultivates new growth points and breakthrough points in the field of new energy disciplines, promotes the transformation and application of new energy technology achievements, and accelerates the pace of energy technology revolution. in February 2024, it was selected as a model energy institute in Shandong Province.

CNE comprises five academic departments: Chemical Equipment and Control Engineering, Energy and Power Engineering, Electrical Engineering, Energy Storage Science and Engineering, and New Energy Science and Engineering, as well as an experimental teaching center. The college currently has 128 faculty members, including 21 professors, 54 associate professors, 32 doctoral supervisors, and 77 master’s supervisors. It boasts thirteen national-level talents, including leading talents from the National "Ten Thousand Talents Program", Changjiang Scholars Distinguished Professors, and recipients of the National Science Fund for Distinguished Young Scholars, as well as 18 provincial and ministerial-level talents. The college houses 12 provincial and ministerial-level research platforms, including the National Engineering Research Center for Large-Scale Coal Gasification and Coal-Based New Materials (Qingdao).

With the mission of serving the national energy strategy, the college aims to build a high-end talent cultivation and technological innovation base in the new energy field. Adhering to the new development philosophy, the college will foster a cultural identity of "courage, determination, and pursuit of excellence" in the new energy sector, striving to become a domestically leading, high-level research-oriented institute with distinctive features in the new energy field.

Committee

Chairmen

Prof. Bofeng Bai
Xi'an Jiaotong University, CN

Prof. Liang Gong
China University of Petroleum (East China), CN

Co-Chairs

Dr. Lixin Cheng
Sheffield Hallam University, UK

Dr. Qinling Li
Sheffield Hallam University, UK

Dr. Liangyu Zhao
Beijing Institute of Technology, CN

Dr. Yun Wu
Science and Technology on Plasma Dynamics Laboratory, CN

Conference Secretary

Dr. Haibin Zhang
Xi'an Jiaotong University, CN
Dr. Tao Zhang
China University of Petroleum (East China), CN
Dr. Chuanyong Zhu
China University of Petroleum (East China), CN

Conference Contacts

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Outline

Date	Time	Events
Jul. 24 Thursday	14:00-21:00	Registration at the Crowne Plaza Oriental Movie Metropolis
	18:00-19:30	**Dinner at Starlight All Day Dining Restaurant**
Jul. 25 Friday	8:30-8:40	**Opening Ceremony at Banquet Hall**
	8:40-9:20	Plenary Lecture 1 - Banquet Hall
	9:20-10:00	Plenary Lecture 2 - Banquet Hall
	10:00-10:20	**Group Photo & Break**
	10:20-11:00	Plenary Lecture 3 - Banquet Hall
	11:00-11:40	Plenary Lecture 4 - Banquet Hall
	11:40-12:20	Plenary Lecture 5 - Banquet Hall
	12:20-14:00	**Lunch & Break at Starlight All Day Dining Restaurant**
	14:00-14:30	Keynote Presentations
	14:30-14:50	Invited Talks
	14:50-15:50	Oral Lectures
	15:50-16:10	**Break & Poster Session**
	16:10-16:40	Keynote Presentations

	16:40-17:00	Invited Talks
	17:00-18:00	Oral Lectures
	18:30-20:00	**Welcome Dinner at Banquet Hall**
Jul. 26 Saturday	8:30-9:10	Plenary Lecture 6 - Banquet Hall
	9:10-9:50	Plenary Lecture 7 - Banquet Hall
	9:50-10:30	Plenary Lecture 8 - Banquet Hall
	10:30-10:50	**Break & Poster Session**
	10:50-11:20	Keynote Presentations
	11:20-11:40	Invited Talks
	11:40-12:25	Oral Lectures
	12:30-14:00	**Lunch & Break at Starlight All Day Dining Restaurant**
	14:00-14:20	Invited Talks
	14:00-16:00	Panel Discussion at Conference Room 5
	14:20-15:05	Oral Lectures
	15:05-15:25	**Break & Poster Session**
	15:25-15:45	Invited Talks
	15:45-16:55	Oral Lectures
	17:10-17:30	**Closing Ceremony & Award Ceremony at Banquet Hall**
	18:30-20:00	**Dinner at Starlight All Day Dining Restaurant**

Plenary Lecture 1

Prof. Aleksandr N. Pavlenko

Corresponding Member of Russian Academy of Sciences Professor, Head of the Laboratory of Low-Temperature Thermophysics. Kutateladze Institute of Thermophysics, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia

Topic: Heat and mass transfer enhancement in multi-phase systems to improve energy effiency and energy saving in the power, chemical industries and electronics

Introduction

Aleksandr Pavlenko is Corresponding Member of Russian Academy of Sciences, a Professor and Head of the Low-Temperature Thermophysics Laboratory of Kutateladze Institute of Thermophysics (Novosibirsk, Russia). He graduated Department of Physics, Novosibirsk State University (1981). In 1990 he received PhD degree for his work "Crisis of heat transfer at non-stationary heat release and dynamics of boiling regimes change at pool boiling of cryogenic liquid". In 2001 received DSc for his work "Transfer processes at boiling and evaporation". The main scientific results: - developed the theory of boiling crisis in nonstationary heat generation, experimentally and theoretically investigated the mechanisms of the development of self-sustaining evaporation front in metastable liquids and the dynamics of change of boiling regimes; - for the first time the regularities of heat transfer and development of crisis phenomena in the falling wave liquid films at nonstationary heat release was investigated; methods of heat transfer enhancement during evaporation and boiling under different hydrodynamic conditions using micro-/nanostructured surfaces were developed; - developed scientific bases of processes of mass transfer in distillation using structured packings serving as a base for the creation of new modern efficient energy and cryogenic technologies. He is the author and co-author of more than 600 research works, 4 patents and two monographs.

Abstract

In plenary lecture the analysis of the modern state in the field of development of methods of heat transfer enhancement, control of extreme processes of heat and mass transfer at boiling and evaporation in various hydrodynamic conditions, including regimes at free convection, at jet/spray irrigations, at film flows and in liquid layers, including in the field of mass forces of considerable intensity is carried out.The basic physical mechanisms determining in interconnection significant intensification of heat and mass transfer processes, increase of critical heat flux in the considered regimes at use of various types of modification of the heat-emitting surface are considered. The factors of decrease in efficiency of mixtures separation in large-scale distillation columns with structured packings and means of suppression of their negative influence are considered.

Plenary Lecture 2

Prof. Xinwei Wang

Department of Mechanical Engineering, Iowa State University, Ames, Iowa 50011, United States

Topic: Energy Carrier-wide Thermal Nonequilibrium under Intense Photon Irradiation

Introduction

Xinwei Wang is the Anson Marston Distinguished Professor and Wilkinson Professor in Interdisciplinary Engineering at Iowa State University (http://web.me.iastate.edu/wang). He obtained his Ph.D. from the School of Mechanical Engineering, Purdue University in 2001, M.S. (1996) and B.S. (1994) from the University of Science and Technology of China. Over more than 20 years, he has led his laboratory to conduct extensive research on thermophysical properties of micro/nanoscale materials and interfaces, energy transport physics and control, and laser-assisted material interaction and manufacturing. His lab has developed a number of new techniques for measuring the thermal conductivity/diffusivity and interfacial thermal resistance of micro/nanoscale materials, including the TET, TPET, PLTR, ET-Raman and FET-Raman techniques. His lab reported the first work on distinguishing the optical and acoustic phonon thermal nonequilibrium, and distinguishing the transport of phonons and hot carriers in 2D materials. The thermal reffusivity theory and equivalent interfacial medium theory developed by his lab provide novel ways to correlate phonon scattering and material/interface structures. He received the inaugural Viskanta Fellow Award of Purdue University for his pioneering and independent work in thermal sciences. He is the Fellow of ASME and OPTICA, and Associate Fellow of AIAA. At present, he is the associate/senior editor of five international journals, and on the editorial board of six journals.

Abstract

In 2D materials synthesis, structure modification and tailoring, and thermophysical properties characterization, photon irradiation is widely used to induce chemical reaction, material ablation, and localized temperature gradient and energy transport. The laser absorption process involves excitation of electrons to conduction band, hot carrier diffusion, cascading energy transport from electrons to optical phonons, then to acoustic phonons, and final heat conduction by acoustic phonons. Theoretical prediction based on first-principle modeling has uncovered very strong thermal nonequilibrium among these energy carriers. In-depth physics understanding of this nonequilibrium and the energy exchange among energy carriers is critical to high-level laser-assisted manufacturing probing, design, control, optimization, and new synthesis discovery. This talk will cover our pioneering and systematic work on investigating the thermal nonequilibirum among energy carriers in 2D materials under intense photon irradiation. To tackle this big challenge, an energy transport state-resolved Raman (ET-Raman) technique has been invented in our lab that is capable of thermal probing down to sub-micron scale and picoseconds. For the first time, we distinguished the temperature rises of different modes optical phonons and acoustic phonons, and reported their energy coupling factor. Both supported and free-standing nm-thick 2D materials have been characterized. This breakthrough leads to the first measurement of intrinsic thermal conductivity and interface thermal conductance of 2D materials. For monolayer 2D materials, the electron-hole recombination will re-emit photons. This radiative recombination will also be reported based on our ET-Raman characterization, uncovering some very intriguing energy absorption feature.

Plenary Lecture 3

Prof. Xiaobing Luo

Huazhong University of Science and Technology (HUST), China

Topic: Design and realization of an ultra-thin plate micropump

Introduction

Xiaobing Luo is a Professor at Huazhong University of Science and Technology (HUST), Dean of the School of Energy and Power Engineering, and Dean of the China-EU Institute for Clean and Renewable Energy (ICARE). He is IEEE Fellow and ASME Fellow. His research focuses on thermal management design and devices for electronic systems. Prof. Luo has received numerous awards, including the First Prize of Hubei Provincial Science and Technology Progress Award (2024), the First Prize of Technological Invention Award from the Chinese Society of Engineering Thermophysics (2024), the IEEE CPMT Exceptional Technical Achievement Award (2016), the Second Prize of National Technological Invention Award, and the First Prize of Hubei Provincial Natural Science Award (2015). He has supervised 33 master's and 24 doctoral graduates, published 198 SCI-indexed papers as first or corresponding author, obtained 59 Chinese and 5 U.S. invention patents as first inventor, and authored one Chinese and one English monograph. His innovations include ultra-thin micropump and levitation micropump technologies, commercially transferred to Huawei and others, and an integrated thermal management system (isolation-storage-conduction) in large-scale applications in the South and East China Seas.

Abstract

With the rapid advancement of 5G communications, artificial intelligence, and related technologies, the power density of electronic devices has been growing exponentially. Liquid cooling has emerged as the core solution for breaking through chip thermal limitations due to its high heat capacity and low thermal resistance characteristics. As ··the "power heart" of liquid cooling systems, the performance of micropumps directly determines cooling efficiency, energy consumption levels, and system integration density, thereby influencing adaptability across diverse applications from data centers to mobile terminals. Notably, emerging fields like wearable devices and ultrathin servers demand thermal systems with sub-5mm thickness, posing three critical challenges for micropump design: First, size effects alter the laminar-turbulent transition threshold, invalidating conventional pump design theories. Second, the millimeter-scale form factor requires balancing competing constraints of hydraulic efficiency, electromagnetic drive performance, and mechanical strength to achieve hydro-electromechanical co-design. Third, optimizing critical region clearances (e.g., at the pump tongue) must reconcile performance requirements with manufacturing tolerances. To address these challenges, we developed an ultra-thin plate micropump featuring: 1) Microscale flow field modeling to analyze vortex evolution and pressure gradient distribution for hydraulic optimization; 2) Numerical parameter transfer between hydraulic and electromagnetic domains for co-optimized design; 3) Tolerance thresholds determined through sensitivity analysis to prevent performance degradation from excessive miniaturization while maintaining axial/radial constraint limits. The prototype achieves a remarkable 4.93mm profile (34×34×4.93 mm^3), delivering 120ml/min@10kPa hydraulic performance at just 1W power input with ultra-low 24.8dB noise (measured at 0.3m).

Plenary Lecture 4

Prof. Fei Duan

School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore

Topic: Gas Turbine Power Generation System Fueled with Partially Cracked Ammonia

Introduction

Fei Duan is a tenured faculty in School of Mechanical and Aerospace Engineering at Nanyang Technological University (NTU), Singapore. Dr. Duan obtained his Ph.D. degree in University of Toronto, Canada in 2005. Dr. Duan also worked as a visiting scientist in Institute of Fluid Mechanics at Friedrich-Alexander-University, Erlangen-Nuremberg, Germany. The topics of his research cover droplet wetting and evaporation dynamics, enhanced thermal management, efficient cogeneration system, etc. In NTU, Dr. Duan has secured over 16 million Singapore dollars on research funding from the governmental agencies and industries as a principal investigator. He has advised over 28 postdoctoral fellows or research associates, 20 Ph.D. students, and 14 Master's students. Dr. Duan has published over 190 peer-reviewed journal papers, 4 patents, 5 book chapters, and 130 conference presentations including 20 plenary lectures and keynotes. He serves as Subject Editor for Applied Thermal Engineering (Elsevier, Impact Factor: 6.1), at Editorial Board for Scientific Reports (Nature Portfolio, Impact Factor: 3.8) and Frontiers in Heat and Mass Transfer (Tech Science Press); and Editor at Large in Droplet (Willy).

Abstract

Decarbonization requires applying zero-carbon fuels transferred from hydrocarbon fuels as one potential solution in power generation. Partial ammonia cracking has become an effective solution to address the low reactivity and high ignition energy from the combustion of pure ammonia. The talk covers the application of ammonia utilization in power generation, the principles of partial ammonia cracking, and the design of single-cycle and cogeneration gas turbine systems. The parameter studies on thermodynamics are performed to assess the off-design gas turbine performance under various fuel types and injections. Under the same turbine inlet temperature and compression ratio, the ammonia-fueled gas turbine has a relatively narrow load operating range that can be expanded by increasing compression ratio, enhancing combustion stability and decomposing ammonia fuel. Incorporating considerations of fuel interchangeability, components of cracker and turbine, and system safety, the feasible operating envelopes of 30 MW partially cracking ammonia-fueled gas turbine are evaluated, the thermal efficiency of single-cycle system can vary between 43.1% and 46.0% and the cogeneration efficiency ranges from 81.7% to 82.5%. Additionally, the kinetic modelling and emission characteristics of multi-staged partially cracked ammonia/ammonia-fueled gas turbine combustors are also discussed. The multistage combustion configurations are discussed on both combustion stability and emission control on the parameters of ammonia substitution rate, local equivalence ratio, and ammonia cracking ratio. Further economic assessment of the proposed systems is conducted.

Plenary Lecture 5

Prof. Jun Yao

China University of Petroleum (East China), China

Topic: Theory and Methods for Multi-Scale, Multi-Modal, and Multi-Field Coupling Numerical Simulation of Unconventional and Fracture-Vug Carbonate Oil-Gas Reservoirs

Introduction

Yao Jun, is mainly engaged in scientific research and teaching in the field of Flow mechanics in Porous Media. He serves as the Director of Research Center of the Oil-Gas Flow in Reservoirs at China University of Petroleum (East China), the Leader of the "Changjiang Scholar" Innovation Team for Oil-Gas Field Development Engineering of the Ministry of Education, the Leader of the Excellent Innovation Team for Oil-Gas Field Development in Shandong Province, and the Leader of the Innovation and Intelligence Introduction Base for Oil-Gas Field Development Engineering of the Ministry of Education. In 2025, he was awarded the Lifetime Achievement Medal by the International Society for Porous Media; in 2024, he received the Meritorious Service Award from the International Society for Porous Media; in 2023, he was named the first Fellow of the China Petroleum Society; and in 2020, he obtained the highest individual awards from the Society of Petroleum Engineers (SPE), namely the Honorary Member and Distinguished Member.

Abstract

The oil-gas flow mechanics in unconventional and fracture-vug carbonate reservoirs is characterized by multi-scale, multi-modal, and multi-field coupling features, making its flow behavior and numerical simulation exceptionally complex. From a deep mechanical theoretical perspective, this study proposes an overall research framework involving multi-scale characterization of flow mechanisms, cross-scale correlation, multi-physical-field coupling modeling, and unified description of continuous-discrete media, forming a new research paradigm for modern oil-gas flow and numerical simulation.

Key Achievements:

1. Pioneering Digital Rock Technology: Based on artificial intelligence methods, we have developed innovative techniques for constructing multi-scale, multi-mineral shale digital rock cores and pore network models, and flow simulation methods, enabling precise acquisition of pore structure, permeability, relative permeability curves, and capillary pressure curves.
2. Advanced Numerical Simulation Methods: We created multi-modal, multi-field coupling numerical simulation methods and technologies for complex hydrocarbon reservoirs that account for micro-scale flow mechanisms. This includes the development of large-scale parallel numerical simulation software, with key performance indicators—such as simulation grids (10 billion), computation speed, and discrete fracture-vug processing capacity (100, 000 fractures)—significantly surpassing current commercial software.
3. Machine Learning-Driven Optimization: We established methods for 3D development production optimization and fracture parameter inversion in complex hydrocarbon reservoirs using machine learning, enhancing the engineering application efficiency, reliability, and practicality of numerical simulation.

Plenary Lecture 6

Prof. Christos N. Markides

Clean Energy Processes (CEP) Laboratory, Department of Chemical Engineering, Imperial College London, U.K

Topic: Advanced optical measurements for detailed insight into interfacial reacting flows

Introduction

Christos N. Markides is Professor of Clean Energy Technologies, Head of the Clean Energy Processes Laboratory, and leads the Experimental Multiphase Flow Laboratory, which is the largest experimental space of its kind at Imperial College London. He is also, amongst other, Editor-in-Chief of journal Applied Thermal Engineering and founding Editor-in-Chief of new journal AI/Thermal-Fluids. He specialises in applied thermodynamics, fluid flow and heat/mass transfer processes in high-performance devices, technologies and systems for thermal-energy recovery, utilisation, conversion or storage. He has authored >400 journal and >350 conference articles on topics related to this talk. He has won multiple awards, including IMechE's 'Donald J. Groen' outstanding paper prize in 2016, IChemE's 'Global Award for Best Research Project' in 2018, IChemE's 'Clean Energy Medal' in 2025, and received Imperial College's President Award for Research Excellence in 2017. He has an interest in technology transfer, innovation and commercialisation, most recently as a founding Director of Solar Flow.

Abstract

Multiphase flows are commonly encountered in diverse applications, both in industrial and also natural environments. Of interest to us in this talk are two-phase, interfacial reacting flow systems where the production and accumulation of a solid phase can lead to severe operational challenges, and even complete flow blockage. To study such flows, we focus specifically on hydrate formation over sessile drops, where hydrates are inclusion compounds that form initially as thin solid films at the interface between two immiscible liquids, one of which is water.

Of importance in flows of interest are the thermodynamic conditions that create favourable drivers for hydrate formation at certain temperatures and pressures. However, beyond this, the hydrate formation process is accompanied by heat release due to its exothermic nature, and in cases where the flow transport processes have timescales of the order of the chemical kinetics, these processes can become coupled, leading to rich and complex phenomena.

In this talk, we will discuss recent efforts to develop and apply a range of advanced experimental techniques based on optical measurement principles in order to obtain high spatiotemporal resolution information on important scalar and vector fields in a target interfacial, reacting flow. We will discuss the challenges faced when attempting to perform such measurements, and proceed to present first-of-a-kind data on hydrates forming on the interfaces of sessile drops. We will close with an outlook on remaining opportunities and open questions that motivate further research in this field.

Plenary Lecture 7

Prof. A.A. Mohamad

Dept. of Mechanical and Manufacturing Engineering, Schulich School of Engineering, The University of Calgary, Calgary, Alberta, T2N 1N4, Canada

Topic: Fluid Dynamics of a Liquid Metal Droplet

Introduction

Dr. Majeed Mohamad is a Mechanical and Manufacturing Engineering professor at the University of Calgary, Canada. He was the Interim Director of the Centre for Environmental Engineering for Research and Education (CEERE). Dr. Mohamad is an ASME fellow and Executive Scientific member of the International Center for Heat and Mass Transfer (ICHMT). Dr. Mohamad's research area spans different aspects of thermal sciences and engineering. He has extensively contributed to heat and mass transfer fundamentals in natural convection, combustion in porous media, flow and heat transfer in liquid metals, solar energy, adsorption/desorption, thermal radiation, etc. His work on solar energy resulted in developing a high-efficiency solar air heater. Also, his work on combustion in the porous medium resulted in an ultra-low NOx burner. Dr. Mohamad published over 350 papers, mainly in peer-reviewed journals.

Abstract

High-power electronics and laser systems often require heat dissipation exceeding 200 W/cm². Phase change processes like boiling and condensation can manage high heat fluxes but may introduce reliability issues due to volume and pressure fluctuations. Liquid metals, with their superior thermal conductivity, offer a promising alternative.

Gallium-based liquid metals stand out due to their unique combination of high electrical conductivity, low melting point, and high surface tension. These properties make them attractive for emerging technologies such as flexible electronics, soft robotics, and adaptive materials. This body of research investigates the dynamic behavior of gallium-based liquid metals, focusing on their impact and response under controlled, non-oxidizing conditions that preserve their native fluidic characteristics.

The talk presented here explores the isothermal fluid dynamics of liquid metal droplets impacting solid surfaces. Understanding these dynamics lays the foundation for studying non-isothermal systems. In particular, we examine droplet impact and splashing behavior on superhydrophobic surfaces in viscous environments. The deformation patterns observed reveal distinct dynamics compared to conventional fluids, driven by the metal's high surface tension and density.

Critical parameters influencing the transition from deposition to splashing are identified, emphasizing the roles of the Weber and Reynolds numbers, adapted to account for the high density and viscosity of liquid metals. These findings highlight the unique fluid mechanics of gallium-based alloys and underscore their potential in advanced thermal management and reconfigurable systems requiring precise, responsive control.

Plenary Lecture 8

Prof. John C. Chai

Mechanical and Aerospace Engineering at the United Arab Emirates University, UAE

Topic: Recent Developments in Bounding Unbounded Spatial Differencing Schemes and False Diffusion

Introduction

John Chai is currently professor and chairman of MAE at UAEU. He is an elected Fellow of ASME, Fellow of HEA, an Associate Editor of ASME Journal of Solar Energy Engineering (2023 – present), an Associate Editor for Heat Transfer Research (2023 – present), an ex-Editorial Board member of Computational Thermal Sciences, an ex-Associate Editor of the ASME Journal of Thermal Science and Engineering Applications and an ex-Associate Editor of Heat Transfer Engineering.

He was the chief scientist of the Innovative Technology Research Center at Shenzhen Envicool Technology. In the UK, he was a Professor and the Subject Area Leader (Head) of ME at the University of Huddersfield. He was a professor and chairman of ME at the Petroleum Institute. He also held faculty positions in Singapore and Tennessee, USA, and industrial positions in USA.

He has published over 100 journal articles, over 100 conference articles, and contributed a chapter to the second edition of the Handbook of Numerical Heat Transfer. He has over 40 patents (US, EU, UK, and China) in various stages of awards and filings. His works have been cited over 5000 times and his H-index is 37 (Google Scholars).

Abstract

It is well known that first-order schemes such as the upwind scheme, and power-law scheme are not accurate and require fine computational grids to produce accurate mesh independent solutions. Higher-order schemes such as the second-order upwind scheme, and the QUICK scheme were formulated with the idea of producing more accurate solutions using the same computational mesh than the first-order schemes, and achieving mesh independent solutions with fewer number of control volumes. However, this is not the case as these two higher-order schemes (and the central scheme) are unbounded. These schemes may lead to physically unrealistic overshoots and undershoots solutions. This talk presents the reasons behind these undershoots and overshoots, and propose MUST (Monotonic Unbounded Scheme Transformer) that ensures boundness for unbounded schemes.

The talk also describes an approach to generate accurate false diffusion free solutions for a classical benchmark problem. This is a significant development as until now, there were no false diffusion free solutions for all Peclet numbers to facilitate the false diffusion studies.

Keynote Lecture 1

Prof. Anton Surtaev

Kutateladze Institute of Thermophysics of Russian Academy of Sciences, Russia

Topic: Precision Characterization of Phase Change Processes: Integrating Direct Experimental Methods with AI Analysis

Introduction

Dr. Anton Surtaev is a Senior Researcher at the Kutateladze Institute of Thermophysics and Novosibirsk State University (Russia). He received his Ph.D. from Kutateladze Institute of Thermophysics in 2011. Dr. Anton Surtaev has published over 70 peer-reviewed journal articles. He is an RSF expert and supervisor of projects supported by Russian Science Foundation (RSF) and Russian Foundation for Basic Research (RFBR), including those carried out with foreign partners. He has been awarded the Novosibirsk City Scholarship for Ph.D. Students (2009); the V.E. Alemasov Memorial Award (2012); the S.S. Kutateladze Memorial Award (2012); the Russian President's Scholarship (2015-2017); the Novosibirsk City Award in the Field of Science and Innovation (2017). His current research interests include two-phase flows and heat transfer, phase change phenomena (boiling, condensation and evaporation), development of new techniques for enhancement of heat-mass transfer and for experimental diagnostics, energy efficiency and micro/nanotechnology, various applications of multiphase flows, including biomedicine.

Abstract

Understanding phase change processes with high precision is critical for advancing thermal management systems, energy conversion technologies, and industrial cooling applications. This keynote explores the integration of cutting-edge experimental techniques with artificial intelligence (AI) analysis to achieve unprecedented accuracy in characterizing local boiling characteristics, heat transfer dynamics, and crisis phenomena development. Key experimental approaches include infrared (IR) thermography for temperature field mapping, total reflection techniques for interfacial behavior analysis, and high-speed visualization for capturing transient boiling events in real time. By leveraging AI-driven data processing and pattern recognition, we enhance the interpretation of complex experimental datasets, enabling deeper insights into phase transition mechanisms. This fusion of direct measurement methods with AI-based analytics paves the way for improved predictive models, optimization of heat transfer performance, and the development of next-generation thermal systems.

Keynote Lecture 2

Dr. Hao Chen

Beijing Key Laboratory of Heat Transfer and Energy Conversion, College of Mechanical and Energy Engineering, Beijing University of Technology, Beijing 100124, China

Topic: Mass transfer and gas-liquid two-phase flow inside proton exchange membrane fuel cell under vibration and low-pressure conditions

Introduction

Dr. Hao CHEN is an Associate Professor of Beijing University of Technology. His primary research focuses on the thermo-fluidic issues of proton exchange membrane fuel cells under unconventional operating conditions. He has led a National Natural Science Foundation Youth Project. He has published over 50 academic papers, including more than 30 SCI-indexed articles. He also serves as early career editorial board member of Energy Reviews, review editor of Frontiers in Energy Research, member of editorial board of Solar Energy (in Chinese).

Abstract

Proton exchange membrane fuel cells constructed in zero-carbon vehicles, such as automobile and unmanned aerial vehicle, experience vibration and low-pressure conditions, when they operate at unconventional working situations like high-altitude environment. Understanding the two-phase mass transportation, gas-liquid flowing, as well as the heat transferring, which couple with electrochemical reactions, facilitate improving water/heat management strategy. Aiming at enhancing power output of zero-carbon vehicles, investigating characteristics of reactant and product transportations inside the deployed proton change membrane fuel cells can better facilitate make contribution on enhancing the power system operating procedures at harsh operating conditions is an important issue. Thus, the present work implements a numerical model coupling with vibration effect, and conducts a serious of researches on reactants and products transportation behaviors inside proton exchange membrane fuel cells under the effect of vibration and low-pressure situation, where the real-road operating conditions having bumpy and high-altitude effects are simulated. Moreover, experimental work is also implemented to investigate gas-water distribution and flowing principles by a utilizing self-constructed vibration and low-pressure experimental set-up, where the real-road vibration condition and low-pressure having pressure situation lower than a standard atmospheric pressure situation are provided. The results of present work facilitate understanding mass transportation procedures coupling with electrochemical reaction characteristics in side fuel cell based zero-carbon vehicles under unconventional conditions.

Keynote Lecture 3

Dr. Jianheng Chen

School of Pipeline and Civil Engineering, China University of Petroleum (East China), Qingdao, China

Topic: Radiative Sky Cooling: Advances, Applications, and Multiscale Impact Assessment

Introduction

Dr. Jianheng Chen is a Special-Term Professor at China University of Petroleum (East China). He earned his Ph.D. from The Hong Kong Polytechnic University in 2021, followed by postdoctoral research at both The Hong Kong Polytechnic University and City University of Hong Kong. In 2025, Dr. Chen joined the faculty of China University of Petroleum (East China). Dr. Chen's research primarily centers on radiative sky cooling technologies, aiming to enable ultra-low-energy buildings and facilities in support of carbon neutrality. He has published over 40 SCI-indexed journal papers and received several prestigious honors, including the ASET International Best Paper Award and the Clarivate Analytics ESI Highly Cited Paper Award. In addition to his research achievements, Dr. Chen serves on the editorial board of the SCI journal Sustainability and acts as guest editor for several journals, including Advances in Applied Energy, Buildings, and Energies.

Abstract

Radiative sky cooling is a passive thermal management process in which terrestrial surfaces dissipate heat to outer space via thermal infrared radiation. By designing materials with high solar reflectance and strong thermal emittance, especially within the atmospheric transparency window, radiative cooling effectiveness can be significantly enhanced. Unlike conventional, energy-intensive cooling systems, radiative sky cooling operates without electricity, enabling sustainable temperature reduction. Recent breakthroughs in the scalable manufacturing of cost-effective radiative cooling materials have paved the way for their widespread application. This keynote will present the principles and advancements in radiative sky cooling, covering building-integrated cooling solutions, eco-friendly high-performance materials, and comprehensive multiscale evaluations of their deployment. At the building scale, the radiative sky cooling-based super-cool roof strategy will be introduced and the holistic strategies that combine advanced roofing strategies, colored cooling walls, and thermally responsive windows will be discussed to optimize overall envelope performance. To drive industry-wide adoption, our research also addresses policy integration, advocating for the incorporation of radiative sky cooling into building energy codes and standards to promote innovation and energy efficiency at the regulatory level. At the national scale, we have developed a spatiotemporal assessment framework for radiative cooling resources, supporting strategic implementation across China. Collectively, these efforts demonstrate the transformative potential of radiative sky cooling, from materials innovation to policy and large-scale deployment.

Keynote Lecture 4

Dr. Yujie Chen

Beijing Institute of Petrochemical Technology, Beijing, China

Topic: Curve interface reconstruction algorithms for capturing the interface of two-phase flow

Introduction

Yujie Chen is a full professor at Beijing Institute of Petrochemical Technology. His research focuses on numerical simulation methods for gas-liquid two-phase flow and their applications in boiling heat transfer. He was selected for the 2024 Youth Talent Support Program of the Beijing Association for Science and Technology and three Best Paper Awards. Over the past five years, he has published more than 70 SCI-indexed papers, including over 30 as first or corresponding author. He serves as a special issue editor for SCI journals and is a member of the Scientific Advisory Board of the SDEWES Conference. He has served as session chair at five international conferences and delivered five invited talks at domestic and international academic events.

Abstract

The curve interface reconstruction algorithm has received significant attention in the context of two-dimensional two-phase flow. However, it remains absent in the three-dimensional scenario. In our study, a three-dimensional curve interface reconstruction (CIR) algorithm is proposed to address this challenge within structured meshes. Specifically, a portion of the spherical surface is employed to reconstruct the three-dimensional curve interface segment, with the radius and center coordinates determined by curvature and mass conservation constraints, respectively. To enhance curvature accuracy, a sphere-based iterative reconstruction (SIR) algorithm is proposed to calculate the reconstructed distance function (RDF) for the three-dimensional curve interface. Various tests involving the interface reconstruction of spherical, ellipsoidal, and cubic objects demonstrate that the coupled SIR and CIR (SIR-CIR, simplified by SCIR) method achieves higher accuracy than many popular methods, particularly with coarse mesh resolutions. Additionally, the SCIR method offers the advantages of straightforward implementation and coding for interface reconstruction in two-phase flow research. This advantage results in reduced computational costs compared to the coupled volume-of-fluid and level set (VOSET) method, which also utilizes an iterative method to solve RDF.

Keynote Lecture 5

Dr. Yi Huang

Research Institute of Aero-engine, Beihang University, China

Topic: AC Electric Field-Induced Interfacial Regulation of Microdroplets

Introduction

Yi Huang is an Associate Professor (Excellence 100 Talents Program) and Ph.D. Supervisor at the Research Institute of Aero-engine, Beihang University. He received his Ph.D. from Nanyang Technological University (NTU), Singapore in 2016 and continued his postdoctoral research at NTU. His research focuses on advanced cooling technologies, including novel cooling configurations, microscale enhanced heat transfer, and thermal design of ceramic matrix composite (CMC) turbine blades. He has published over 40 SCI papers in top-tier journals such as Advanced Materials, Small, International Journal of Heat and Mass Transfer, and Applied Thermal Engineering, with over 900 citations. He has led projects funded by the National Natural Science Foundation of China, the National Key R&D Program, the Horizon Europe Program, and the Advanced Aero Power Innovation Workstation. Dr. Huang is a core member of the GF Science and Technology Innovation Team.

Abstract

Droplet-based microfluidics, as a key component in lab-on-a-chip technology, primarily manipulates microdroplets through the fluid shear effect and additional control over individual droplet behaviors using external actuation. Recent advancements in interfacial regulation technology for microdroplets like electro-coalescence have enabled high programmability, exceptional monodispersity, and versatility. These features enable its use as a versatile tool for widespread applications including energy engineering, aeronautics and astronautics, biological and material science.

This study investigates the electro-coalescence of single- and multi-component aqueous droplets, as well as the controllable behaviors of organic droplet in AC electric field. The results show that droplet coalescence in different flow parameters can be achieved in milliseconds by adjusting the electrical conditions. The influence of flow conditions, electrical parameters, electric designs, and fluid properties are given our attention. Two primary mechanisms—dipole-dipole interactions and interfacial polarization—are identified. Conductivity is identified as the primary factor governing the balance between these two mechanisms. For non-aqueous emulsions, typical behaviors of organic droplets surrounded by organic medium (o/o emulsions) with different functional groups like alkyl, hydrocarbon, hydroxyl, and ester, are controlled by the AC electric field. We innovatively identify the key dimensionless number Wee·Ca, combined with the Maxwell-Warnger relaxation and channel geometry. A comprehensive analysis of flow regime transitions is conducted to elucidate electrohydrodynamic behavior and support the design of a multi-parameter control model for o/o emulsions. MPCH, a hydrated salt/hydrogel composite phase change material, is proposed based on the above findings. The versatile configuration of the dispersed and continuous phases allows for on-demand control over phase transition temperatures and mechanical properties in realistic scenarios. This approach offers a new concept to broaden the application ranges of inorganic phase change materials.

Keynote Lecture 6

Prof. Dong Li

School of Civil Engineering and Architecture, Northeast Petroleum University, China

Topic: Fundamental Research on Solar Photothermal Utilization in Insulated Glazing Envelopes Embedded with Phase Change Materials

Introduction

Li Dong, born in 1979, Ph.D., doctoral supervisor, third-level professor, Longjiang Scholar, Young Scholar, recipient of Heilongjiang Province Outstanding Youth Fund, provincial government special allowance expert. At present, he is the dean of the School of Civil Engineering of Northeast Petroleum University, the leader of the leading professional and technical talents (clean energy technology) in Heilongjiang Province, the director of the key laboratory of new energy thermal utilisation and disaster prevention and mitigation in the cold areas of Heilongjiang Province, and the research and development of low-carbon and new energy relations between Northeast Petroleum University-Kojaelli University in Turkey. Chinese Director of the Joint Laboratory. He is also a member of the Clean Heating Industry Committee (CHIC), a member of the Youth Work Committee of the China Renewable Energy Society, a member of the Thermal Utilisation Professional Committee of the Chinese Renewable Energy Society, a standing member of the Solar Energy Utilisation Professional Committee of the China Engineering Construction Standardisation Association, and a director of the Heilongjiang Energy and Environment Society. He served as the editorial committee of the international SCI journal Energy Sources Part A, and the editorial committee of the domestic journals Energy Saving Technology, Journal of Northeast Petroleum University, Applied Optics and Oil and Gas Field Ground Engineering.

Abstract

The building sector accounts for approximately 37% of global carbon emissions. Developing low-carbon technologies for building envelopes by harnessing renewable energy represents an effective approach to reducing conventional energy consumption and mitigating global environmental challenges. Glass envelopes are closely linked to internal energy demands such as heating, air conditioning, ventilation, and lighting. As the primary components responsible for thermal losses and gains, optimizing glass envelope systems to enable coordinated solar photothermal utilization is a critical step toward advancing low-carbon building envelopes. Glazing envelopes embedded with phase change materials enhance the thermal storage capacity of glass systems, enabling spatial and temporal regulation of intermittent and uneven solar energy. This offers a promising solution to reduce building energy consumption and increase the thermal inertia of glazing systems. This presentation will review the current state of research on glazing envelopes embedded with phase change materials, including advances in thermal storage and insulation materials, photothermal transmission control mechanisms, and the impact on indoor light-thermal environments. A summary and future outlook of glazing energy saving technologies will also be provided.

Keynote Lecture 7

Prof. Jingfa Li

Department of Oil & Gas Storage and Transportation Engineering, Yangtze University, China

Topic: Research Progress on Key Technologies of Hydrogen-Blended Natural Gas Pipeline Transportation

Introduction

Jingfa Li is a full professor and Doctoral Supervisor in the Department of Oil & Gas Storage and Transportation Engineering at Yangtze University. His research interests focus on hydrogen pipeline transportation technology. He served as a member of the Second Youth Committee of the Heat and Mass Transfer Branch of the Chinese Society of Engineering Thermophysics and as a youth editorial board member/guest editor for 9 academic journals, and he also served as session chairs for 12 international conferences. Prof. Li chaired over 6 national and provincial-level projects, published over 60 SCI-indexed papers. He published the China's first textbook on hydrogen pipeline transportation, co-authored 3 Chinese/English textbooks or monographs. Prof. Li has been awarded two provincial/ministerial-level Science and Technology Progress Awards, and three Best Paper Awards and Top Influential Paper Awards. He received the honors including the Outstanding Young Scholar Award at the 30th International Conference on Computational & Experimental Engineering and Sciences and the CMES 2023 Young Researcher Award, etc.

Abstract

Using natural gas pipelines for hydrogen-blended transportation is an important approach to achieving efficient hydrogen delivery and advancing China's "Hydrogen into Ten Thousand Homes" initiative. To ensure the safety and stability of hydrogen-blended transportation, it is essential to thoroughly study the differences between hydrogen-blended natural gas and conventional natural gas in terms of pipeline processes and operation & maintenance. This report introduces hydrogen blending in natural gas pipelines from three perspectives: "blending-transportation-operation & maintenance." It covers topics such as hydrogen-blending processes and equipment, compatibility of hydrogen with non-metallic pipelines, hydrogen-blended pipeline transportation processes, simulation software platforms, as well as leakage-induced combustion/explosion risks and mitigation measures for hydrogen-blended pipelines.

Keynote Lecture 8

Prof. Ting Ma

School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, China

Topic: Study on an ultra-power-dense mini-channel heat exchanger fabricated using SLM-based additive manufacturing for supercritical CO2 applications

Introduction

Dr. Ting Ma is a professor at the School of Energy and Power Engineering, Xi'an Jiaotong University. He received his Ph.D. in Engineering Thermophysics from Xi'an Jiaotong University in 2012. He was a visiting scholar in the Mechanical Engineering Department at University of Nevada-Las Vegas from Aug. 2011 to Jan. 2012, and a visiting scholar in the Mechanical Engineering Department at Virginia Tech from Mar. 2014 to Feb. 2015. His research interests mainly include heat transfer enhancement under high-temperature and high-pressure conditions, mini-channel heat exchangers, electronic cooling, and thermoelectric power generator and cooler. He has published over 100 international journal papers and contributed two book chapters, obtained more than 30 invention patents, and given over 30 plenary/keynote/invited speeches at academic conferences. He is the winner of Outstanding Youth Foundation of National Natural Science Foundation of China, First Prize of Technological Invention of Shaanxi Province, and First Prize of Technological Invention of MOE. He has been an Associate Editor of Journal of Enhanced Heat Transfer.

Abstract

Mini-channel heat exchangers (MCHEs), owing to their high thermal efficiency, compact configuration, and capability to withstand high temperatures and pressures, hold significant promise for deployment in advanced energy systems such as supercritical CO_2 (SCO_2) Brayton cycle power generation. To address the inherent limitations of conventional chemical etching and diffusion bonding techniques in terms of compactness and heat transfer performance, this study employs selective laser melting (SLM)-based additive manufacturing, combined with optical metrology, to fabricate and characterize prototype MCHEs with hydraulic diameters below 0.41 mm for flow and heat transfer testing. Leveraging SLM technology and thermal resistance analysis, a hybrid MCHE design strategy is proposed to simultaneously enhance heat transfer capability and structural compactness. Systematic thermohydraulic experiments using SCO_2 are conducted to obtain corrected flow resistance coefficients and heat transfer coefficients for the fabricated mini-channels. Experimental results indicate that a hybrid MCHE design with differentiated channel geometries on the hot and cold sides can concurrently achieve high volumetric power density and enhanced thermal performance. This strategy holds great potential for engineering applications.

Keynote Lecture 9

Dr. Chao Wang

Guangdong Provincial Key Laboratory on Functional Soft Condensed Matter, School of Materials and Energy, Guangdong University of Technology, Guangzhou, China

Topic: High-entropy Catalyst for Efficient and Stable Steam Reforming towards Low-Carbon Hydrogen Production

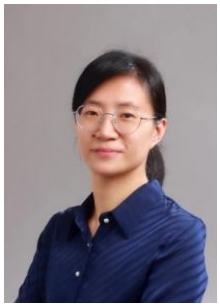
Introduction

Dr. Chao Wang is a Professor from Guangdong University of Technology, serving as an assistant to the Dean and deputy director of the "Guangdong Provincial Key Laboratory on Functional Soft Condensed Matter"; engaged in research related to high entropy catalyst development and hydrogen energy development and utilization, presided over various scientific research projects including the National Natural Science Foundation of China, published over 150 peer reviewed academic papers.

Abstract

The heterophase interface between the catalyst and the high-temperature CxHyOz/H2O mixture heat flow constitutes the heat exchange boundary in steam reforming. Consequently, catalysts inevitably experience significant temperature gradients, leading to degradation via active metal nanoparticle agglomeration and reduced energy utilization. High-entropy oxides (HEOs), known for their unique core effects, are promising candidates for novel high-temperature catalysts. However, leveraging their unique features for efficient hydrogen production via steam reforming remains unexplored. This work reports a high-entropy perovskite catalyst synthesized via a wet-chemical process, demonstrating outstanding stability under the redox conditions of high-temperature reforming. Intriguingly, self-reconstruction of the HEO was observed during the initial reaction stage, proving crucial for efficient H_2 production. Driven by lattice distortion, active surface oxygen species reacted with hydrogen carrier molecules via redox processes, inducing surface reconstruction. DFT calculations and HAADF-STEM revealed that, facilitated by polymetallic synergy, dynamic redistribution of active components formed a supported-like NiCo/HEO structure. This structural evolution correlated with an increasing H_2 production rate. Exsolved NiCo nanoparticles (~20 nm) stably embedded into the HEO surface, forming a "semi-embedded-exposed" heterointerface that effectively prevented agglomeration. This ensured long-term stability (>1200 min) under severe thermal stress and redox cycling at 800 °C. Furthermore, the sluggish diffusion effect at the metal-support interface delayed heat release at active sites, providing energy input that facilitated rapid C-H/O-H bond cleavage and efficient hydrogen production under photothermal drive. This work elucidates the catalytic mechanism of HEOs and provides valuable insights for developing stable high-temperature catalysts for H_2 production.

Keynote Lecture 10



Prof. Yuan Wang

College of Aerospace Science and Engineering, National University of Defense Technology, Changsha, Hunan, China

Topic: Experimental observation of thermal pattern transition across an evaporating meniscus

Introduction

Yuan Wang, Ph.D., Associate Professor. College of Aerospace Science and Engineering, National University of Defense Technology. She obtained her Ph.D. in Chemical Engineering from the University of Edinburgh in 2011 and joint NUDT ever since. Her research interests include aero-engine thermal protection, icing and anti-icing, and heat and mass transfer in phase-change processes. She has published over 90 academic papers and has been authorized 16 national patents. She is selected for the High-level Innovative Talent Training Program of Hunan Province and National University of Defense Technology.

Abstract

Evaporation of curved liquid surfaces or sessile droplets is a complex thermo-fluidic phenomenon that has been extensively studied due to its wide range of applications in fields such as material processing, cooling systems, and microfluidics. The thermal behaviors of an evaporating meniscus significantly impact the performance of high-heat-flux components in fields such as data centers, supercomputers, etc. We investigate the thermal patterns and convection mechanisms in an evaporating ethanol meniscus. Infrared thermography is employed to capture the temperature evolution of the meniscus formed in quartz cuvettes with different inner diameters. High-resolution spatiotemporal thermal images are obtained. Four distinct convection stages are identified. Analysis reveals that larger cuvettes with thinner films suppress fractal “croissant-shaped” thermal cells while enhancing the Marangoni stress-dominated radial migration of small-scale cells. The Marangoni-to-Rayleigh numbers ratio exhibits weak temperature dependence but can be used to calculate the liquid layer thickness threshold below which Marangoni effects govern interfacial transport.

Keynote Lecture 11

Dr. Zengli Wang

College of New Energy, China University of Petroleum (East China), China

Topic: Bidirectional Phase Change Supercharging Flow Theory of Single-Screw Steam Compressor and Key Technologies for Cold/Hot State Cooperative Design

Introduction

Prof. Zengli Wang Hailing from Rizhao, Shandong Province, has been honored with prestigious titles including the Ministry of Education's Young Changjiang Scholar, Young Talent in the Equipment Pre-research Program, Taishan Young Expert (Shandong Province), and Qingdao City's March 8th Red Flag Bearer. Her primary research focuses on compressor technologies and systems, refrigeration and heat pump technology, and energy conversion/utilization. She has led 26 scientific research projects comprising 3 national-level initiatives (e.g., the National Natural Science Foundation), 2 national defense-related projects (e.g., the JKW Project), and 6 provincial/ministerial-level programs (e.g., the Shandong Outstanding Youth Fund). Recognitions include a Second Prize in the National Teaching Achievement Award and 6 provincial/ministerial teaching and research awards. Academic contributions encompass 56 first/corresponding-author publications (26 SCI-indexed, 14 EI-indexed) and 24 invention patents.

Abstract

The single-screw compressor (SSC), distinguished by its high volumetric efficiency, exceptional dynamic balance, superior reliability, and strong adaptability, represents an optimal configuration for high-temperature steam heat pump cycles. Notably, however, during its actual operation, the moving components within the compressor exhibit high susceptibility to thermal deformation under high temperature and pressure conditions, consequently accelerating tribological degradation. The injection of cooling water into the compression chamber enables compressor cooling while concurrently facilitating lubrication and sealing between moving components, thereby resolving this critical operational challenge. Consequently, based on the structural characteristics of the CP-type SSC and the spatial meshing principle of the with the multicolumn envelope meshing pair, the three-dimensional multi-channel geometric model was established. Furthermore, the numerical calculation model incorporating phase change, flow, and heat transfer mechanisms was developed. The compatibility between liquid injection parameters (i.e. the nozzle diameter, the water-injected speed, and the injection deflection angle) and the kinematic characteristics of screw rotors was investigated. Specifically, comprehensive analyses were conducted to examine the influence of water injection parameters on the dynamic film formation and spreading mechanism of injected liquid within the chamber, as well as the bidirectional phase-change heat and mass transfer characteristics during vapor-liquid phase transitions. Through this systematic investigation, an optimal combination of liquid injection parameters was determined. The relevant research provides the theoretical basis for the design of the water-injected compressor.

Keynote Lecture 12

Prof. Qi Xiao

Wuhan Second Ship Design and Research Institute, National Key Laboratory of Marine Thermal Power Engineering, Wuhan, China

Topic: Simulation of High-Viscosity Oil-Gas Two-Phase Flow and Gas Removal Process

Introduction

Xiao Qi, professor in State Key Laboratory of Marine Thermal Energy and Power, Wuhan Second Ship Design and Research Institute. He has long been engaged in fundamental research on thermos-hydraulics of marine propulsion systems, focusing on multiscalel dynamic simulation power cycle and multiphase flow. He has led over 10 major projects, such as National Natural Science Foundation of China grants. He has published over 60 academic papers (40+ SCI/EI-indexed), holds over 60 authorized invention patents (28 as first inventor), and has registered 5 software copyrights.

Abstract

The lubrication system of conventional ship power systems is prone to entraining a large number of bubbles during operation. The collapse and rupture of these bubbles can damage the lubricating film at critical oil-lubricated components, such as main engine bearings, thereby compromising the operational reliability of the power system. This study establishes a predictive model for high-viscosity oil-gas two-phase flow by enhancing the traditional Eulerian multiphase flow model with considerations of bubble size distribution and force characteristics within the oil. By optimizing the flow channel design, filter screen material, dimensions, and coordinated arrangement angles in the circulating oil tank, the gas removal efficiency from oil-bubble mixtures is significantly improved. Furthermore, a pressure oscillation wave-induced self-excited pulsed jet combined with a hydrocyclone separator enables efficient separation and online degassing of dissolved gases in lubricating oil. The findings of this research provide guidance for substantially reducing bubble content in high-viscosity oil systems and enhancing the operational safety and reliability of power systems.

Keynote Lecture 13

Dr. Lin Zeng

Department of Mechanical and Energy Engineering, Southern University of Science and Technology, China

Topic: Water management and pore-scale modeling in anion exchange membrane fuel cells to achieve high performance and durability

Introduction

Prof. Lin Zeng is a tenured associate professor at the Department of Mechanical and Energy Engineering of Southern University of Science and Technology(SUSTech). Prof. Zeng received his bachelor's degree and master's degree from Harbin Institute of Technology. He received his Ph.D. on mechanical engineering from Hong Kong University of Science and Technology (HKUST) in 2014. Prof. Zeng was a postdoctoral research fellow at HKUST from 2015 to 2018 before he joined the SUSTech. Prof. Zeng's research interests mainly include fuel cells, water splitting, electrochemical energy storage materials and devices. Prof. Zeng led ten research projects and joined as the core member in other research projects. Prof. Zeng has published more than 150 research papers in journals such as Nature Catalysis, Energy & Environmental Science, Nano Energy, Journal of Materials Chemistry A and Applied Energy. His Google Scholar Citation is over 10,000 times and H-index is 53.

Abstract

Anion exchange membrane fuel cells (AEMFCs) have gained considerable attention due to their merits, such as rapid oxygen reduction reaction (ORR) kinetics and high energy conversion efficiency. However, thermal and water management in AEMFCs is very complicated, due to that the water is generated at the anode, while water is consumed at the cathode. The anode flooding and the cathode drying will occur simultaneously. In this presentation, I will introduce several research achievements from our group in the field of water and thermal management in AEMFCs. These include hydrophobic treatment of the anode, construction of anode models, and micro/nano-scale reconstruction of the catalyst layer. In particular, we employed the relaxation time analysis to analyze the impedance distribution across different components of the membrane electrode assembly, thereby directly revealing the water distribution within the catalyst layer.

Keynote Lecture 14

Dr. Tao Zhang

College of New Energy, China University of Petroleum (East China), China

Topic: Research on Key Integrated Technologies for CO2 Enhanced Oil Recovery and Storage

Introduction

Dr. Tao Zhang is working at the School of New Energy, China University of Petroleum (East China), has been dedicated to research on CO2 displacement technology for unconventional oil and gas development since 2014. His related findings have been published in 58 SCI-indexed papers, along with 5 EI and Chinese core journal articles, including 47 as first/corresponding author, among which 25 appear in CAS Zone 1/TOP journals. He has authored one English monograph and holds four domestic and international patents.

He has delivered eight invited presentations at prestigious academic conferences, including the Chinese Conference on Engineering Thermophysics (Heat and Mass Transfer) and the International Society for Porous Media (InterPore) Conference, receiving eight Best Presentation/Paper/Poster awards. Serving as editor/guest editor for seven academic journals, he was recognized as an Outstanding Young Editorial Board Member for the CAS Zone 1 TOP journal AGER and has organized 12 international/domestic academic conferences or specialized sessions.

Ranked consecutively in Stanford University's World's Top 2% Scientists list (2022-2024), he was awarded the Shandong Provincial Excellent Young Scientist Fund (Overseas) in 2024. The same year, he was selected for the China University of Petroleum (East China) "Guanghua Scholar" program and honored with the "Jingwei Scholar" title.

Abstract

This report focuses on the core scientific and technological challenges in the field of CO2-enhanced oil recovery (EOR) and storage, systematically elaborating on multiscale coupling mechanisms: microscopic molecular-scale surface modification and dynamic displacement, pore-scale multicomponent phase equilibrium and interfacial evolution, and Darcy-scale seepage behavior.

Centered on engineering applications, the study analyzes optimization and control technologies for CO2 pressurization and pipeline transportation, covering safety research on dense-phase gasification and strategies for energy efficiency improvement. It explores gas channeling prevention techniques in formations, ensuring storage safety through the identification and sealing of channeling pathways. Finally, the report introduces formation anti-clogging and pipeline anti-corrosion technologies, providing theoretical and technical support for the efficient and secure application of CO2-EOR and storage.

Keynote Lecture 15

Dr. Zongbo Zhang

College of Mechanical and Electronic Engineering, China University of Petroleum (East China), Qingdao, China

Topic: Investigation of Ultrasound Enhanced Mass and Heat Transfer in Microchannels

Introduction

Dr. Zongbo Zhang is a professor and doctoral supervisor at China University of Petroleum (East China), and one of the first teaching masters of Chinese Graphics Society. Majoring in micro and nano manufacturing, microfluidic technology, mass and heat transfer and other aspects of research, presided over the National Natural Science Foundation of China 2 projects, participated in more than 20 national and provincial scientific research projects, published 126 academic papers, including 22 papers in SCI I TOP journals, and was authorized to 14 invention patents.

Abstract

Ultrasound-enhanced microchannel mass and heat transfer technology is an advanced technology that utilizes ultrasonic mechanical effects to enhance the microscale transport process. Through the acoustic flow effect and cavitation, efficient transport process regulation is realized in the restricted space of microscale. This technology breaks through the limitation of traditional microfluidic systems relying on passive mixing or pressure-driven, and demonstrates the unique advantage of non-contact dynamic regulation. The following two points will be introduced in this keynote speech: in terms of mass transfer, the investigation reveals in-depth the mechanism of ultrasonic field regulating the behavior of droplets in microchannels. By systematically analyzing the dynamics of droplet oscillation, deformation and splitting induced by acoustic cavitation, the physical nature of ultrasound-enhanced mass transfer inside and outside the droplet has been elucidated. This discovery was successfully applied to the field of precise synthesis of quantum dots, and further realized the optimized preparation of WLED devices. In terms of heat transfer, the investigation proposed an innovative scheme of ultrasound-enhanced microchannel flow boiling to address the heat dissipation challenges of high heat flow density electronic devices. Focusing on analyzing the enhanced mechanism of bubble nucleation, growth and detachment in the ultrasonic field, the acoustic-driven mechanical model of bubble galloping vibration was established. These results lay an important foundation for the development of a new generation of efficient microscale thermal management technologies. This investigation not only expands the application scope of acoustical fluid dynamics in the field of microscale transport, but also provides a new technical path for the optimized design of microfluidic systems and electronic cooling devices with its theoretical findings and experimental results.

Keynote Lecture 16

Dr. Kunpeng Zhao

State Key Laboratory of Multiphase Flow in Power Engineering

Xi'an Jiaotong University, China

Topic: Dynamics of cohesive particles in turbulence

Introduction

Dr. Kunpeng Zhao is an associate professor in the State Key Laboratory of Multiphase Flow in Power Engineering at Xi'an Jiaotong University. He obtained the doctor's degree in 2021 and was selected by National Postdoctoral Program for Innovative Talent in the same year. His research interests lie in the general area of fluid dynamics and transport phenomena, including particle-laden flows, gas-liquid flows and turbulence. Dr. Zhao has authored more than 40 peer-reviewed papers in international journals including J Fluid Mech. (4), Phys. Fluids (4), Phys. Rev. Fluids (2), Chem. Eng. Sci. (4), etc. He has been hosted over 20 scientific research projects, including national natural science foundation projects, sub-project of the key research projects of the state, and State-owned enterprise entrusted projects. He was the recipient of several important awards, including First Prize for Scientific and Technological Progress awarded by the Ministry of Education, and Second Prize of the Shaanxi Province Innovation and Entrepreneurship Competition, etc.

Abstract

Cohesive particles suspended in liquid or gaseous fluid flows tend to form larger aggregates, due to attractive inter-particle forces that cause the primary particles to flocculate. This mechanism plays a dominant role in environmental processes such as sediment erosion and transport in rivers and oceans, and it is also highly relevant in the context of a wide range of industrial processes, such as the wastewater treatment and particle fluidization. We propose a new numerical approach that tracks the dynamics of individual cohesive particles in turbulence, based on a particle-particle interaction model which reflects the combined influence of the lubrication force, the direct contact force, the attractive van der Waals force and the repulsive electrostatic force. It allows for a systematic simulation campaign that yields the temporal evolution of floc size and shape due to aggregation, breakage, deformation, translation and rotation.

Keynote Lecture 17

Dr. Qingyao Luo

Specially Appointed Researcher at the School of Engineering, The University of Tokyo, China

Topic: Surface Heterogeneity Effects on Thermal Transport across Solid--Liquid Polymer Interfaces: A Molecular Dynamics Study

Introduction

Dr. Qing-Yao Luo is a Specially Appointed Researcher at the School of Engineering, The University of Tokyo. He received his Master's degree in Engineering Thermophysics from Xi'an Jiaotong University, and his Ph.D. in the same field from Tohoku University. His current research focuses on nanoscale interfacial heat transfer, thermal management in electronic devices, and electro-osmotic flow at the nanoscale, using molecular dynamics simulations as a primary tool.

Abstract

Efficient heat dissipation at solid–liquid interfaces is a pressing challenge in modern electronic devices, especially as device dimensions approach the phonon mean free path scale. At this nanoscale, interfacial thermal resistance (ITR) becomes a dominant bottleneck, limiting thermal management and device reliability. This keynote presents a systematic investigation into how various forms of surface heterogeneity influence ITR at solid–polymer liquid interfaces, using non-equilibrium molecular dynamics (NEMD) simulations. Three representative types of surface heterogeneities were explored:hard morphological heterogeneity (surface grooves), chemical heterogeneity (patchy wettability patterns), and soft morphological heterogeneity (mixed-length self-assembled monolayers). Our research reveals that surface roughness, when properly scaled relative to the liquid molecule size, can enhance heat transfer by increasing interfacial contact and enabling favorable molecular orientations. Conversely, large-scale chemical patterns lead to temperature non-uniformity across the interface and increased ITR, while smaller patterns yield more homogeneous thermal profiles and reduced resistance. For SAM-based surfaces, stiff and patterned SAMs improve liquid contact and reduce ITR, whereas soft and overlapping SAMs can hinder hydrogen bonding and raise thermal resistance. We conclude with practical design guidelines for ITR control, such as tuning surface topography and chemical patterning to match polymer chain characteristics, and engineering SAM stiffness and composition for optimal liquid interaction. These insights pave the way for more efficient thermal interface engineering in next-generation nanoscale electronic and optoelectronic devices.

Instructions for Presenters

- **Plenary lectures**

40 minutes in total (35 minutes for presentation, 5 minutes for questions).

- **Keynote lectures**

30 minutes in total (25 minutes for presentation, 5 minutes for discussion).

- **Invited talks**

20 minutes in total (15 minutes for presentation, 5 minutes for discussion).

- **Oral lectures**

15 minutes in total (12 minutes for presentation, 3 minutes for discussion).

Conference Room Name	PPT Size
Banquet Hall	16:9
7.25 - Banquet Hall 1	4:3
7.25 - Banquet Hall 2	4:3
7.26 - Banquet Hall 2	16:9
Conference Room 1	4:3
Conference Room 2	4:3
Conference Room 3	4:3
Conference Room 5	4:3
VIP Lounge	4:3

- **Poster**

A poster with size of 1.2m×0.6m in the section of break and poster.

- **Online reports**

We use Voov Meeting for online reports, please scan the QR code below to enter the live broadcast room.

* Presenters are required to meet the session chair 10 minutes before the session starts and upload the PPT file to the computer.

Conference Program

25/7/2025 - Friday - Plenary Lecture			
Address: Banquet Hall			
Time (Beijing)	Activity	Attending expert	Title and Affiliation
8:40-9:20	Plenary Lecture 1	Prof. Aleksandr N. Pavlenko	**Heat and mass transfer enhancement in multi-phase systems to improve energy effiency and energy saving in the power, chemical industries and electronics** Kutateladze Institute of Thermophysics
9:20-10:00	Plenary Lecture 2	Prof. Xinwei Wang	**Energy Carrier-wide Thermal Nonequilibrium under Intense Photon Irradiation** Iowa State University
10:00-10:20	***Group Photo & Break***		
10:20-11:00	Plenary Lecture 3	Prof. Xiaobing Luo	**Design and realization of an ultra-thin plate micropump** Huazhong University of Science and Technology
11:00-11:40	Plenary Lecture 4	Prof. Fei Duan	**Gas Turbine Power Generation System Fueled with Partially Cracked Ammonia** Nanyang Technological University
11:40-12:20	Plenary Lecture 5	Prof. Jun Yao	**Theory and Methods for Multi-Scale, Multi-Modal, and Multi-Field Coupling Numerical Simulation of Unconventional and Fracture-Vug Carbonate Oil-Gas Reservoirs** China University of Petroleum (East China)
26/7/2025 - Saturday - Plenary Lecture			
Address: Banquet Hall			
8:30-9:10	Plenary Lecture 6	Prof. Christos N. Markides	**Advanced optical measurements for detailed insight into interfacial reacting flows** Imperial College London
9:10-9:50	Plenary Lecture 7	Prof. A.A. Mohamad	**Fluid Dynamics of a Liquid Metal Droplet** University of Calgary
9:50-10:30	Plenary Lecture 8	John C. Chai	**Recent Developments in Bounding Unbounded Spatial Differencing Schemes and False Diffusion** United Arab Emirates University

25/7/2025 - Friday - Afternoon Address: Banquet Hall 1		
Session:1 **Chair: Kunpeng Zhao, Ting Ma**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 8	**Study on an ultra-power-dense mini-channel heat exchanger fabricated using SLM-based additive manufacturing for supercritical CO2 applications** Ting Ma Xi'an Jiaotong University
14:30-14:50	Invited Talk 153	**Smart Envelope Design with Integrated Thermal Storage and Insulation for Low-Carbon Buildings** Ruitong Yang Northeast Petroleum University
14:50-15:05	Oral lecture 136	**An Experimental Study on Wind-Driven Droplet Impact Using Digital Image Projection Technique** Chen Hu, Linchuan Tian*, Zichen Zhang, Wei Tian Shanghai Jiao Tong University
15:05-15:20	Oral lecture 25	**Forced motion deep sea mining mixed transport pipe hydraulic lift two-phase flow** Zhuo Cheng, Bo Yin , Ke Wang* China University of Petroleum (Beijing)
15:20-15:35	Oral lecture 26	**Multimodal Conductivity Sensing for Oil-in-Water Emulsions in Surfactant-Polymer Flooding Systems** Landi Bai, Yunfeng Han, Ningde Jin* Tianjin University
15:35-15:50	Oral lecture 93	**Analysis of Pitch Influence and Flow Uniformity in Parallel Regenerative Cooling Channels for Supercritical Hydrogen** Yu Zeng, Pingjian Ming* Sun Yat-Sen University
15:50-16:10	***Break & Poster Session***	
16:10-16:40	Keynote Lecture 16	**Dynamics of cohesive particles in turbulence** Kunpeng Zhao Xi'an Jiaotong University
16:40-17:00	Invited Talk 88	**Transient Modeling and Simulation of Water-Oil-Gas Three-Fluid Flow in Pipeline Networks** Wang Duo, Xie Wenfeng, Zhao Honggang, Huang Zehao, Zhai Xinjia Haifang (Shanghai) Technology Co., Ltd.
17:00-17:15	Oral lecture 101	**Dynamic characteristics of two-phase flow and heat transfer in helical coil steam generator for metal fuel boiler** Xu'ai Luo, Zhengyuan Luo*, Xuebo Zheng1, Liang Zhao, Bofeng Bai Xi'an Jiaotong University
17:15-17:30	Oral lecture 82	**Numerical study of dense gas-solid choke phenomenon in powder fuel conveying systems** Shifan Yang, Haibin Zhang*, Bofeng Bai Xi'an Jiaotong University
17:30-17:45	Oral lecture 150	**Pool boiling experimental study on the impact of deposition on the critical heat flux of horizontally-placed tubes** Xiaowen Wang, Maolong Liu*, Tenglong Cong, Hanyang Gu Nanjing University of Science and Technology
17:45-18:00	Oral lecture 85	**Rapid prediction of internal particle deposition characteristics of double-walled blades based on reduced order modeling** Zhu Shuihua, Wang Feilong*, Yang Chao Nanjing University of Aeronautics and Astronautics

25/7/2025 - Friday - Afternoon **Address: Banquet Hall 2**		
Session:2 **Chair: Hao Chen, Lin Chen**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 1	**Precision Characterization of Phase Change Processes: Integrating Direct Experimental Methods with AI Analysis** Anton Surtaev Kutateladze Institute of Thermophysics of Russian Academy of Sciences
14:30-14:50	Invited Talk 122	**Study on Rapid Algorithms for Oil Spill Diffusion under Complex Environmental Conditions** PengXu Chen, Zhan Zhang, Ke Wang* China University of Petroleum (Beijing)
14:50-15:05	Oral lecture 108	**Characterization of hydrogen microjet-assisted flame stabilization in RBCC engines with different equivalence ratios** Decong Zhang, Taiyu Wang*, Mingbo Sun, Peibo Li, Bin An, Changhai Liang, Jikai Chen, Menglei Li, Jiaoru Wang, Yu Xie, Kai Yang, Zechuan Yi, Qi Liu National University of Defense Technology
15:05-15:20	Oral lecture 36	**Topic1: Multiphase Flow and Heat Transfer Title HereResearch on the Structural Design of Submerged Combustion Vaporizers Coupled with External Heat Sources** Rui Wang., Ke Wang.*, Zhenlin Li China University of Petroleum (Beijing)
15:20-15:35	Oral lecture 79	**Effects of Geometrical Parameters on the Dynamic Characteristics of a Dual Throat Nozzle During Thrust Vectoring Starting Process** Jingqing Chen, Jinglei Xu, Yuqi Zhang, Shuai Huang* Nanjing University of Aeronautics and Astronautics
15:35-15:50	Oral lecture 48	**Enhancement of Methane Hydrate Synthesis Using GN-Cu as a Surfactant** Weilong Wang, Shuangshuang Meng, Zhaoliang Wang* China University of Petroleum (East China)
15:50-16:10	***Break & Poster Session***	
16:10-16:40	Keynote Lecture 2	**Mass transfer and gas-liquid two-phase flow inside proton exchange membrane fuel cell under vibration and low-pressure conditions** Hao Chen Beijing University of Technology
16:40-17:00	Invited Talk 139	**Numerical study on effects of hydrodynamic characteristics on reaction behaviors in a circulating fluidized bed riser reactor** Z. Deng, J. Zhuand C. Zhang University of Western Ontario
17:00-17:15	Oral lecture 24	**Numerical Simulation on Heat-Induced Phase Transition Processes of Near-Critical CO2 under Different Initial Density Levels** Quanyu Gong, Lin Chen* University of Chinese Academy of Sciences
17:15-17:30	Oral lecture 73	**Research on Oscillating Nozzle Thrust Vectoring Technology of Scramjet over a Wide Mach Number Range** Wenzhong Jin, Leichao Yang*, Zijun Zhang National University of Defense Technology
17:30-17:45	Oral lecture 86	**Cohesion of coal particles inhibits lignite gasification in supercritical water** Huajie Zhang, Rui Zhang, Kunpeng Zhao, Bofeng Bai* Xi'an Jiaotong University
17:45-18:00	Oral lecture 120	**Experimental and Numerical Study on Resistance Coefficient of Multi-Stage Eccentric Orifice Plate Throttling Device** Hongpeng Li, Yin Fang, Xianliang Lei* Xi'an Jiaotong University

25/7/2025 - Friday - Afternoon Address: Conference Room 1		
Session:3 **Chair: Jianheng Chen**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 3	**Radiative Sky Cooling: Advances, Applications, and Multiscale Impact Assessment** Jianheng Chen China University of Petroleum (East China)
14:30-14:50	Invited Talk 117	**Experimental Study on Transport and Clogging Characteristics of Droplets in Microfluidic Porous Media** Yushuang Li, Weiyi Wang, Boyao Wen, Zhengyuan Luo*, Bofeng Bai Xi'an Jiaotong University
14:50-15:05	Oral lecture 43	**Modeling Taylor Dispersion of Gas-Driving-Oil Flow in Nanochannels** Yiheng Su, Chengzhen Sun* Xi'an Jiaotong University
15:05-15:20	Oral lecture 59	**Interfacial Dynamics and Sealing Behavior in Annulus During Plunger Motion in Inclined Pipelines** Zhang Yuhao, Wan Huaxu, Dong Weiyi, Zhao Kunpeng, Bai Bofeng* Xi'an Jiaotong University
15:20-15:35	Oral lecture 107	**Flame Stabilization Mechanisms in Dual- and Single-Combustion Zones of an RBCC Combustor at Mach 3 Inlet** Kai Yang, Bin An, Taiyu Wang, Peibo Li, Changhai Liang, Mingbo Sun, Decong Zhang National University of Defense Technology
15:35-15:50	Oral lecture 95	**Desorption behavior of asphaltene molecule from the oil-water interfaces: Insights from molecular simulation** Faxue Zhang, Boyao Wen*, Zhenyuan Luo*, Bofeng Bai Xi'an Jiaotong University
15:50-16:10	***Break & Poster Session***	
16:10-16:30	Invited Talk 124	**A Thermodynamically Consistent Model for Compressible Fluid Flow in Fractured Porous Elastic Media** Dongchun Tang, Shuyu Sun, Minfu Feng Sichuan University
16:40-17:00	Oral lecture 104	**Skin friction and heat transfer calculation in channel flow with unstable stratification for low Prandtl number fluids** Xingguang Zhou, Dalin Zhang*, Xinyu Li, Hongxing Yu, Wenxi Tian, Suizheng Qiu, Guanghui Su Xi'an Jiaotong University
17:00-17:15	Oral lecture 39	**An Observational Study on the Effect of Microstructure Spacing on Bubble Dynamics in Pool Boiling** Zhanru Zhou, Xinyue Hu, Haonan Wang, Wangguan Ren, Shenghong Huang University of Science and Technology of China
17:15-17:30	Oral lecture 146	**Data-driven guided physical-informed segmented neural network for liquid-vapor flash calculation** Jinyu Hua, Xin Du*, Feng Yang, Detang Lu University of Science and Technology of China
17:30-17:45	Oral lecture 126	**Thermoelastic damping dissipation on piezoelectric microscale device considering nonlocal strain gradient theory and dual-phase-lag model** Zhengzhong Xiong, Ailing He, Liang Gong, Bingdong Gu*, Yeshou Xu, Yuan Li, Jingyuan Zhuang Qinghai Minzu University
17:45-18:00	Oral lecture 127	**Coupled Wave Propagation on Micro/Nano-resonator Porous Structures Considering Space-time Microscale Thermoelasticity** Jingyuan Zhuang, Ailing He, Liang Gong, Bingdong Gu*, Yeshou Xu, Yuan Li, Zhengzhong Xiong Qinghai Minzu University

25/7/2025 - Friday - Afternoon **Address: Conference Room 2**		
Session:4 **Chair: Yi Huang**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 5	**AC Electric Field-Induced Interfacial Regulation of Microdroplets** Yi Huang Beihang University
14:30-14:50	Invited Talk 33	**Study of gas-liquid flow rates measurement in forced annular flow by differential pressure fluctuation** Hao-cun Wang, Qiang Xu, Xue-mei Zhang, Xiao-jun Ma, Lu-lu Li, Lie-jin Guo* Xi'an Jiaotong University
14:50-15:05	Oral lecture 57	**Spatial Distribution Measurement of Dispersed Particles in Two-Phase Flow** Xiaokun Zhang, Haibin Zhang*, Bofeng Bai Xi'an Jiaotong University
15:05-15:20	Oral lecture 53	**Turbulence dissipation during leakage flow in the scallop bionic seal of supercritical CO2 compressor** Enbo Zhang, Kunpeng Zhao, Bofeng Bai Xi'an Jiaotong University
15:20-15:35	Oral lecture 103	**Interfacial mass transfer of surfactants across the oil-water interface :a thermodynamic viewpoint** Wenzhu Xia, Boyao Wen, Zhengyuan Luo, Bofeng Bai Xi'an Jiaotong University
15:35-15:50	Oral lecture 114	**Thermocapillary Convection and Droplet Coalescence** Xing Li, Jianmei Zhao, Bofeng Bai Xi'an Jiaotong University
15:50-16:10	***Break & Poster Session***	
16:10-16:40	Keynote Lecture 11	**Bidirectional Phase Change Supercharging Flow Theory of Single-Screw Steam Compressor and Key Technologies for Cold/Hot State Cooperative Design** Zengli Wang China University of Petroleum (East China)
16:40-17:00	Invited Talk 41	**Progress on LOX Chill-down Process of an Exit-contracted Pipe** Jiaqi Zhang*, Quanqi Wang, Wenjing Qin National University of Defense Technology
17:00-17:15	Oral lecture 135	**The Effects of Oscillation on the Mobility of Wind-Driven Sessile Droplets** Zichen Zhang*, Guiping Lin, Xueqin Bu Beihang University
17:15-17:30	Oral lecture 132	**Performance evaluation of a hybrid refrigeration system for telecommunication base stations** Peiyao Wang, Xueqiang Li, Haoran Zhang, Zhili Sun , Shengchun Liu* Tianjin University of Commerce
17:30-17:45	Oral lecture 116	**Numerical Investigation of Transpiration Cooling Flow and Heat Transfer Characteristics in RBCC Fuel Strut Microchannels** Tianyun Liu*, Yuan Wang National University of Defense Technology
17:45-18:00	Oral lecture 78	**Influence of Leakage Phenomena on Mechanically Disturbed Dual Throat Nozzle and Optimization Design** Bingsong Lan, Shuai Huang,Jinglei Xu Nanjing University of Aeronautics and Astronautics

25/7/2025 - Friday - Afternoon Address: Conference Room 3		
Session:5 **Chair: Dong Li, Hui Wang**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 6	**Fundamental Research on Solar Photothermal Utilization in Insulated Glazing Envelopes Embedded with Phase Change Materials** Dong Li Northeast Petroleum University
14:30-14:50	Invited Talk 94	**Experimental Investigation of Hypersonic Inlets Shock Wave/Boundary Layer Interaction Controlled by Plasma Actuation** Dongsheng Zhang, Hesen Yang, Hua Liang Air Force Engineering University
14:50-15:05	Oral lecture 112	**Mechanism of supercritical CO2 flow resistance in the circumferentially non-uniform heating vertical tubes** Kaize Yang, Boyao Wen, Bofeng Bai* Xi'an Jiaotong University
15:05-15:20	Oral lecture 134	**Influence of key coolant parameters on performance of two-phase immersion cooling data center** Shuo Li, Xueqiang Li, Haiwang Sun, Fei Wang a, Xinyue Wang, Shengchun Liu* Tianjin University of Commerce
15:20-15:35	Oral lecture 119	**Study on heat transfer deterioration of water phase change flow in a supercritical carbon dioxide-water printed circuit heat exchanger** Jingwen Liu, Guanyu Zhou, Ting Zhang, Xinzhuo Lin, Qiyuan Ma, Ting Ma,* Xi'an Jiaotong University
15:35-15:50	Oral lecture 32	**Numerical Study on Lead Oxide Precipitation in Liquid Lead-bismuth Eutectic** Jinye Luo, Maolong Liu Shanghai Jiao Tong University
15:50-16:10	***Break & Poster Session***	
16:10-16:40	Invited Talk 149	**The flow and heat transfer characteristics during the process of preparing fibers by melt spinning** Hui Wang
16:40-17:00	Oral lecture 97	**Experimental Study on Porous Steam Jet Direct Contact Condensation Morphology** Pengbo Wei, Zepeng Yuan, Xiao Su,Weixiong Chen, Daotong Chong, Junjie Yan Xi'an Jiaotong University
17:00-17:15	Oral lecture 83	**Analysis of Thermal Barrier Coating Heat-Transfer Performance and Insulation efficiency Considering the Aerodynamic Effects of Microparticle Deposition** Zhang Yeling, Wang Yubin, Wang Feilong Nanjing University of Aeronautics and Astronautics
17:15-17:30	Oral lecture 81	**Investigation on Novel Sand Ingestion Nozzle with Rotating Vane for Uniform Sand Distribution in Aeroengine Tests** HaiCheng Zhu, Yue Zhang*, Huabing Miao, Xiaoming He, Ziyun Wang Nanjing University of Aeronautics and Astronautics
17:30-17:45	Oral lecture 118	**Experimental study on heat transfer of a dual-phase-change Evaporator under Small Temperature Differences** Yu Bo, Liu ZH Xi'an Jiaotong University
17:45-18:00	Oral lecture 50	**Simulation Analysis of Thermal Transport Characteristics and Channel Dimensions in GaN-on-SOI Devices Based on Electron-Phonon Coupling** Guangyan Feng, Zhaoliang Wang* China University of Petroleum (East China)

26/7/2025 - Saturday - Morning **Address: Banquet Hall 2**		
Session:1 **Chair: Jingfa Li**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:20	Keynote Lecture 7	**Research Progress on Key Technologies of Hydrogen-Blended Natural Gas Pipeline Transportation** Jingfa Li Yangtze University
11:20-11:40	Invited Talk 101	**Numerical simulation of transient vortex and acoustic vibration characteristics caused by leaking holes in oil pipelines** Yingjie Chang, Xuebo Zheng* Chang'an University
11:40-11:55	Oral lecture 142	**Spectral control coating for solar photovoltaic/thermal system based on VO2 thermochromic material** Qing He, Xiao Ren, Liang Gong* China University of Petroleum (East China)
11:55-12:10	Oral lecture 109 Online	**4695 Battery Thermal Management: Hybrid Liquid Cooling-CPCM System with Supplemental Top-side CPCM Layers** Xiaodi Wu, Yunxiu Hu , Chenzhen Ji*, Xinghang Zhao, Zhuangzhuang Ji, Weisong Hu Tongji University
12:10-12:25	Oral lecture 28 Online	**Effect of slot overflow pipe on the performance of gas-liquid micro-cyclone separator** Junfeng Zhang, Xin Wang, Shenglei Zhang,Yang Lv China University of Petroleum (East China)

26/7/2025 - Saturday - Morning **Address: VIP Lounge**		
Session:2 **Chair: Lin Zeng**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:20	Keynote Lecture 13	**Water management and pore-scale modeling in anion exchange membrane fuel cells to achieve high performance and durability** Lin Zeng Southern University of Science and Technology
11:20-11:40	Invited Talk 65	**A fast pore network model for spontaneous imbibition in Lithium-ion batteries** Huang Zehao, Xie Wenfeng, Zhao Honggang, Wang Duo Haifang (Shanghai) Technology Co., LTD
11:40-11:55	Oral lecture 46	**MD Simulation of the Mechanism of Hydrate Synthesis on CNTs Surfaces** Longjiang Guo, Weilong Wang, Zhaoliang Wang* China University of Petroleum (East China)
11:55-12:10	Oral lecture 110	**Coupling characteristics of Li/SF6 multiphase combustion and water two-phase boiling heat transfer in liquid metal combustor** Wang Yi, Zichuan Wang, Xuai Luo, Xuebo Zheng, Zhengyuan Luo*, Bofeng Bai Xi'an Jiaotong University
12:10-12:25	Oral lecture 99	**Synergistic Effects of Surfactants and Nanoparticles Co-Adsorption on Droplet Coalescence Dynamics** Weiyi Wang, Wei Wei, Zhengyuan Luo*, Bofeng Bai Xi'an Jiaotong University

26/7/2025 - Saturday - Morning Address: Conference Room 1		
Session:3 **Chair: Binbin Pei**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:20	Keynote Lecture 14	**Research on Key Integrated Technologies for CO2 Enhanced Oil Recovery and Storage** Tao Zhang China University of Petroleum (East China)
11:20-11:40	Invited Talk 54	**Interphasial Energy Transfer in Unstably Thermal Stratification Laden with Heated Particles** Binbin Pei, Kunpeng Zhao, Bofeng Bai Xi'an Jiaotong University
11:40-11:55	Oral lecture 141	**Influence of Thermophysical Factors on Sulfate Mineral Precipitation in Submarine Hydrothermal Fractures** Gaowei Yi, Da Zhang, Yan Li*, Wenlong Zhang Ocean University of China
11:55-12:10	Oral lecture 140	**Research on Interfacial Thermal Transport in Silicon-based FinFETs** Aolong Liu, Baoyi Hu, Zhaoliang Wang* China University of Petroleum (East China)
12:10-12:25	Oral lecture 115	**A scalable multiple emulsion preparation method via selective wetting modified PDMS microfluidics** Chong Guo, Boyao Wen, Zhengyuan Luo*, Bofeng Bai Xi'an Jiaotong University

26/7/2025 - Saturday - Morning Address: Conference Room 2		
Session:4 **Chair: Yujie Chen**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:20	Keynote Lecture 4	**Curve interface reconstruction algorithms for capturing the interface of two-phase flow** Yujie Chen Beijing Institute of Petrochemical Technology
11:20-11:40	Invited Talk 75	**Experimental and numerical study on the coupling heat transfer in Pb/Bi-Water coupled heat exchanger** Wencang Guo, Yunfan Liu, Yiwei Huang, Runze Liu, Xianliang Lei* Xi'an Jiaotong University
11:40-11:55	Oral lecture 138	**ProxyInvNet: A Decoupled, Physics-Informed Inversion Framework for Well Test Interpretation of Carbonate Reservoirs** Xianzong Zhou, Jun Yao*, Xi Li China University of Petroleum (East China)
11:55-12:10	Oral lecture 47	**Non-equilibrium Phonon Transport and Phonon Frequency Contribution Analysis in GaN HEMTs** Yongqing Zhang, Zhaoliang Wang* China University of Petroleum (East China)
12:10-12:25	Oral lecture 61	**Investigation of Efficient Flow Boiling Thermal Management in Manifold Microchannels for 3D Integrated Circuits** Bingcheng Li, Min Zeng*, Qiuwang Wang Xi'an Jiaotong University

26/7/2025 - Saturday - Morning **Address: Conference Room 3**		
Session:5 **Chair: Feng Han**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:05	Oral lecture 67	**Multiscale Molecular Simulation of CO_2 Composite Flooding: Microscopic Mechanism Analysis Based on MDMC Method** Dianqing Zhang, Tao Zhang, Liang Gong China University of Petroleum (East China)
11:05-11:20	Oral lecture 63	**A Modified Numerical Model for the Dense Powder Conveying in Powder Fueled Ramjets** Shilin Gao, Haibin Zhang*, Bofeng Bai Xi'an Jiaotong University
11:20-11:35	Oral lecture 34	**Numerical investigation on overall cooling effectiveness of impingement effusion cooling with low Reynolds number under rotation conditions** Feng Han, Haotian Pu, Jiaona Chen, Weijian Xu, Wentao Jiang1, Junkui Mao* Nanjing University of Aeronautics and Astronautics
11:35-11:50	Oral lecture 49	**Energy Flow Optimization of Carbon Capture System Based on Cascade Heat Pump** Zhongyi Sun, Zhaoliang Wang* China University of Petroleum (East China)
11:50-12:05	Oral lecture 98	**Thermal design of multi-functional heat exchanger of reheating steam Rankine cycle for underwater propulsion system** Yinuo Liu, Jianwei Chen, Tingyu Zheng, Boyao Wen, Zhengyuan Luo*, Bofeng Bai Xi'an Jiaotong University
12:05-12:20	Oral lecture 128	**Performance prediction and analysis of oil-gas-containing wastewater heat exchangers under oil film adhesion and non-oil film adhesion conditionsr** Yanlong Zhang, Liang Gong, Xinyue Duan* China University of Petroleum (East China)

26/7/2025 - Saturday - Morning Address: Conference Room 5		
Session:6 **Chair: Chao Wang**		
Time (Beijing)	Activity	Title, Authors and Affiliation
10:50-11:20	Keynote Lecture 9	**High-entropy Catalyst for Efficient and Stable Steam Reforming towards Low-Carbon Hydrogen Production** Chao Wang Guangdong University of Technology
11:20-11:40	Invited Talk 113	**Turbulent convective heat transfer of impinging jet and film-cooled C3X vane via a mixed very-large eddy simulation model** Gaoqian Lu, Xingsi Han* Nanjing University of Aeronautics and Astronautics
11:40-11:55	Oral lecture 96	**Simulation Study on the Hazards of Blowout Jet Fire in Hydrogen-Mixed Natural Gas Storage Well** Wang Ke*, Jundong Lin China University of Petroleum, Beijing
11:55-12:10	Oral lecture 80	**Low–Temperature Difference Free–Piston Stirling Cooler Performance under Multi–Harmonic Drive** Yajuan Wang, Jun'an Zhang*, Fei Duan*,Shan Du,Junde Guo Xi'an Technological University
12:10-12:25	Oral lecture 64	**Heat Transfer Mechanism of Carbon Dioxide in Transition Boiling Region** Haohao Zhao, Yin Fang, Xianliang Lei* Xi'an Jiaotong University

26/7/2025 - Saturday - Afternoon **Address: Banquet hall 2** **Online software: Voov Meeting**		
Session:1 **Chair: Chuanyong Zhu**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 10 Online	**Experimental observation of thermal pattern transition across an evaporating meniscus** Yuan Wang National University of Defense Technology
14:30-14:50	Invited Talk 74 Online	**Rapid pyrolysis simulation of pulverized tar-rich coal in transport bed based on a comprehensive reaction kinetics model** Panxi Yang, Wei Guo, Zunyi Yu, Hongqiang Li, Jing Wang, Keming Fu, Yuxing Zheng, Bolun Yang, Zhiqiang Wu* Xi'an Jiaotong University
14:50-15:05	Oral lecture 123 Online	**Conceptual Design of a Hydrogen Centrifugal Compressor based on AI/ML** Abdelkadir Belhadj*, Guillermo Hauke University of Zaragoza Spain
15:05-15:25	***Break & Poster Session***	
15:25-15:40	Oral lecture 121 Online	**Study on performance of PV-PEM water electrolysis direct coupling hydrogen production system** Yifei Wang, Xiaohong Yang*, Shuhan Du Inner Mongolia University of Technology
15:40-15:55	Oral lecture 27 Online	**Study on heat transfer characteristics of ultra thin heat pipe with microchannel on silicon substrate** Rongkuo Ding, Guodong Xia*, Ran Li, Chenchen Song Beijing University of Technology
15:55-16:10	Oral lecture 38 Online	**Numerical Analysis of Bubble Dynamics and Flow Boiling in Microchannels** Yi Jin, Ping Liu, Ruiqi Sun, Shiming Sang, Lianghong Hu, Zhiwen Wang Anhui University of Science and Technology
16:10-16:25	Oral lecture 31 Online	**Gas-Liquid Swirling Flow Patterns Identification based on Hybrid Deep Learning Model of Pressure Drop Signal** Zhimin Xie, Wen Liu Foshan University
16:25-16:40	Oral lecture 105 Online	**Nanocomposite Materials Engineering: Customizing MXene and Cobaltates for Efficient Electrocatalytic Hydrogen Evolution** Fanhang Yuan, Xiaohong Yang*, Kui Xi, Shuhan Du Inner Mongolia University of Technology

26/7/2025 - Saturday - Afternoon Address: VIP Lounge		
Session:2 **Chair: Kaituo Jiao**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:20	Invited Talk 71	**Handling fracture intersections in the enriched-embedded discrete fracture model (nEDFM)** Kaituo Jiao, Bo Yu Yangtze University
14:20-14:35	Oral lecture 55	**Ultrahigh Photothermal Evaporation Rates Achieved by a 3D Hollow Biomimetic Interfacial Evaporator** Rongde Sun, Chengzhen Sun* Xi'an Jiaotong University
14:35-14:50	Oral lecture 137	**Simulation research on thermal management of lithium-ion battery module based on bionic liquid cold plate** Mengdi Li, Ying Yin, Dexin Zhang, Liang Gong a*, Kefang Zhang China University of Petroleum (East China)
14:50-15:05	Oral lecture 40	**Study on the permeability characteristics of porous media in bone** Runjing Guan, Liang Gong*, Tao Zhang* China University of Petroleum (East China)
15:05-15:25	***Break & Poster Session***	
15:25-15:40	Oral lecture 129	**Investigation of Gas Channeling Mechanisms and Influencing Factors during CO_2 Flooding in High-Dip Heterogeneous Reservoirs** Ning Zhou, Chuan-Yong Zhu, Tao Zhang,and Liang Gong* China University of Petroleum (East China)
15:40-15:55	Oral lecture 133	**Performance evaluation of waste heat recovery based on single-phase immersion cooling data center** Shentong Guo, Yifan Zhang, Haiwang Sun, Xueqiang Li, Shengchun Liu* Tianjin University of Commerce
15:55-16:10	Oral lecture 125	**Multi-objective Optimization of the Microchannel Structure Parameters of the Tesla Valve** Yunxin Zhu, Ying Yin, Dexin Zhang, Liang Gong * China University of Petroleum (East China)
16:10-16:25	Oral lecture 151	**Experimental study on wall sticking motion of oil droplets in near wall flow field** Yishuo Han, Limin He, Yuling Lyu, Xiaolei Lu, Feng Rong China University of Petroleum (East China)
16:25-16:40	Oral lecture 29	**Comparison of Turbulence Models for CFD simulation of a quadcopter** Khan Muhammad Arslan, Xue Kuiju, Liangyu Zhao Beijing Institute of Technology
16:40-16:55	Oral lecture 130	**Fluid flow and heat transfer characteristics of double-layer jet microchannel heat sinks with ribbed cavities of different shapes** Xueqing Wang, Ying Yin, Dexin Zhang, Xinyue Duan, Liang Gong* China University of Petroleum (East China)

26/7/2025 - Saturday - Afternoon **Address: Conference Room 1**		
Session:3 **Chair: Huang Zehao**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:20	Invited Talk 23	**Experimental Investigation on Cooling Heat Transfer Characteristics of Subcritical and Supercritical Fluids in a Single-Unit Printed Circuit Heat Exchanger** Yifan Yang, Lam Lam, Zehao Ni, Lap Mou Tam* and Afshin J. Ghajar University of Macau
14:20-14:35	Oral lecture 56	**Numerical study of sand trajectory characteristics in a turbofan engine fan stage** Bo Guan, Haibin Zhang, Bofeng Bai Xi'an Jiaotong University
14:35-14:50	Oral lecture 45	**Non-steady-state Thermal Transport Simulation in AlGaN/GaN FinFETs under Strain Effects** Baoyi Hu, Zhaoliang Wang* China University of Petroleum (East China)
14:50-15:05	Oral lecture 35	**Molecular dynamics simulation on thermophysical properties prediction of supercritical H2O/CO2/H2 and H2O/CO2/H2/CO mixtures** Tete Gui, Jiasunle Li, Zhiwei Ge*, Liejin Guo Xi'an Jiaotong University
15:05-15:25	***Break & Poster Session***	
15:25-15:45	Invited Talk 68	**The acoustic sorting characteristics of ellipsoidal microparticles: A three-dimensional numerical study** Yu-Hui Hua, Zeng-Yao Li* Xi'an Jiaotong University
15:45-16:00	Oral lecture 76	**Sessile Droplet jetting Induced by Surface Acoustic Waves** Wanting Liang, Long He* Shaanxi University of Science and Technology
16:00-16:15	Oral lecture 84	**Turbulence dynamics of cohesive particles in gas-liquid pipe flow** Huaxu Wan, Junhao Yan, Kunpeng Zhao, Bofeng Bai* Xi'an Jiaotong University
16:15-16:30	Oral lecture 91	**Bubble departure model in saturated pool boiling: concurrence of local growth and collapse** Run-Sheng Qi, Zeng-Yao Li* Xi'an Jiaotong University
16:30-16:45	Oral lecture 60	**Molecular simulation on natural hydrogen adsorption in nanopores** Duxue Wang, Tao Zhang, Liang Gong China University of Petroleum (East China)

26/7/2025 - Saturday - Afternoon Address: Conference Room 2		
Session:4 **Chair: Junfen Li, Qi Xiao**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:20	Invited Talk 69	**Numerical Investigation of Film Cooling Hole Layout Effects on Blade Leading Edge Cooling Performance Blade Leading Edge Cooling Performance** LI Junfen*, WU Yuhang, ZHANG Mingzhe, ZHANG Lina Zhengzhou University of Aeronautics
14:20-14:35	Oral lecture 89	**Experimental Study on Ignition and Combustion Characteristics of Polyolefin-Coated Lithium Particles in SF_6 Environment** Haoqi Wu, Zhengyuan Luo, Bofeng Bai* Xi'an Jiaotong University
14:35-14:50	Oral lecture 77	**Mathematical model of separate heat pipe with partially filled flow condenser** Zhuang Chang, Zhentao Chen, Bofeng Bai* Xi'an Jiaotong University
14:50-15:05	Oral lecture 44	**Microscopic Kinetic Mechanisms of Methane Hydrate Decomposition in Oil-Containing Systems** Shuangshuang Meng, Weilong Wang, Cuixia Shi, Zhaoliang Wang* China University of Petroleum (East China)
15:05-15:25	***Break & Poster Session***	
15:25-15:55	Keynote Lecture 12	**Simulation of High-Viscosity Oil-Gas Two-Phase Flow and Gas Removal Process** Qi Xiao Wuhan Second Ship Design and Research Institute
15:55-16:10	Oral lecture 37	**Comparative Study of Convective Schemes for Finite Volume Lattice Boltzmann Methods** Peng Ding, Yuxiang Zou China University of Petroleum (East China)
16:10-16:25	Oral lecture 87	**Flow and Thermal Characteristics of Graded-Channel Laminate Structures for Transpiration Cooling in Engine High Heat Flux Components** Lingmeng Kong*, Yuan WANG National University of Defense Technology
16:25-16:40	Oral lecture 90	**The application of PINN model combined with N-S equation in the prediction of Venturi tube velocity field** He Su China University of Petroleum (East China)
16:40-16:55	Oral lecture 52	**The influence of hydrogen blending ratio on the initial transient flow field and concentration field of buried hydrogen blended natural gas leakage** Xinyu Wen, Tao Zhang, Liang Gong China University of Petroleum (East China)

26/7/2025 - Saturday - Afternoon **Address: Conference Room 3**		
Session:5 **Chair: Zongbo Zhang, Qingyao Luo**		
Time (Beijing)	Activity	Title, Authors and Affiliation
14:00-14:30	Keynote Lecture 15	**Investigation of Ultrasound Enhanced Mass and Heat Transfer in Microchannels** Zongbo Zhang China University of Petroleum (East China)
14:30-14:45	Oral lecture 131	**Impact of Coupled Catalyst Layer Porosity and Freeze-Thaw Cycles on Proton Exchange Membrane Fuel Cell Performance** Jianshan ,Lin Yuan Li Qinghai Minzu University
14:45-15:00	Oral lecture 145	**Molecular dynamics simulation of the effect of water on the rheology of heavy oil emulsions** Jiakai Shi, Yuling Lyu China University of Petroleum (East China)
15:05-15:25	***Break & Poster Session***	
15:25-15:55	Keynote Lecture 17	**Surface Heterogeneity Effects on Thermal Transport across Solid--Liquid Polymer Interfaces: A Molecular Dynamics Study** The University of Tokyo Qingyao Luo
15:55-16:10	Oral lecture 92	**Phase Behavior and Critical Properties of Long-chain Alkane Confined in Shale Nanopores: A Gauge-Gibbs Monte Carlo Simulations Study** Yifan Li, Jun Yao* China University of Petroleum (East China)
16:10-16:25	Oral lecture 144	**Mechanisms of surfactant influence on deformation and motion of water droplets in oil under DC electric fields** Wanrui Li, Xiaoming Luo, Ke Xu China University of Petroleum (East China)
16:25-16:40	Oral lecture 111	**Study on the thermal conductivity of unsaturated fine sandy soil in the near phase transition zone based on lattice Boltzmann method** Fuqing Cui, Te Liu, Jine Liu, Jingwen Liu, Zhiyun Liu, Qifan Zhang, Ting Ma* Xi'an Jiaotong University
16:40-16:55	Oral lecture 152	**Molecular Dynamics Simulation of CO2 Dissolution and Diffusion in High-Viscosity Crude Oil** Wei Xia, Yubo Wang, JiangTao Wu*, Chuan-Yong Zhu*, Tao Zhang, and Liang Gong Xi'an Jiaotong University

Panel Discussion

26/7/2025 - Saturday - Afternoon Address: Conference Room 5 Time (Beijing): 14:00-16:00	
Mini-channel Heat Exchanger for Natural Gas Liquefaction Moderator: Min Zeng	
Name	**Affiliation**
Lapmou Tam	University of Macau, Macau, CN
Ting Ma	Xi'an Jiaotong University, CN
Qian Zhang	DWELL Company Limited, CN
Wenliang Qin	DWELL Company Limited, CN
Keyong Cheng	Institute of Engineering Thermophysics, Chinese Academy of Sciences, CN
Linghong Tang	Xi'an Shiyou University, CN
Dawei Guo	Institute for the Development and Quality, Macau, CN
Zhilong Cheng	Xi'an Jiaotong University, CN
Hanbing Ke	State Key Laboratory of Marine Thermal Energy and Power, CN

Poster Session

No.	Authors	Title of the presentation	Affiliation
S-22	Zhiwen Wang, Ping Liu, Lianghong Hu, Shiming Sang, Yi Jin	Experimental study of Tesla valve-type microchannel flow boiling visualization	Anhui University of Science and Technology
S-58	Hongshuo Qu, Libo Wang, Xiaosong Zhang*, Shifang Huang*	Aqueous Sodium Acetate and Potassium Acetate Solutions Used as Working Fluids in Frost-Free Air–Source Heat Pumps at 263–328 K	Southeast University
S-147	Wenwen Geng, Jinping Li, Xiaohua sun, Vojislav Novakovic	The influence of irradiance intensity on the performance of the micro-heat pipe PV/T system	Lanzhou University of Technology
S-62	Yu Yuan, Mingbo Sun, Chenglong Wang, Yiwen Xiao, Binhao Li, Zibo Zhou, Qi Chen, Suodangran Li, Zhenyu hu, Yuan Lin	A Study on the Impact of Multiphysics Coupling on Low-Equivalence-Ratio Combustion in Scramjet	National University of Defense Technology
S-66	Denghui He, Yiying Zhu, Mengmeng Li, Hao Shi, Yihui Jiang, Fei Cao, Shuhua Liang	Gas Atomization Process of Nano-particle-reinforced Copper-based Composite Melts	Xi'an University of Technology
S-148	Xinglong Shang	Topic1: Multiphase Flow and Heat Transfer Nonlinear Influence of Thermocapillary Effects and Soluble Surfactants on Wall-Attached Droplet Detachment in Poiseuille Flow	Xidian University
S-100	Jianwei Chen, Boyao Wen, Zhengyuan Luo*, Bofeng Bai, Liang Zhao	Cross-dimensional modeling of flow distribution and heat transfer performance of phase-change compact heat exchangers	Xi'an Jiaotong University
S-102	Feng Jiao, Hongwei Lin, Yongqing He*	Crossing of diamagnetic particles through the liquid-liquid interface	Southeast University
S-143	MA Xuezhong, Cheng Ke	Research on flow heat transfer mechanism and cooling characteristics of L-shaped channels in rotating rings for high-speed contact mechanical seals	Lanzhou University of Technology
S-30	Weixiong Wang, Dong Liu	Simulations of a Fluidized Bed Reactor for Solar-Driven Methane Dry Reforming	Nanjing University of Science and Technology

Conference Venue

Hotel Name: Crowne Plaza Qingdao Oriental Movie Metropolis

Address: Building 5, No. 2000, Binhai Avenue, Huangdao District, Qingdao, Shandong Province

Wifi: IHG ONE Rewards

The first connection method: the hotel guest's surname is pinyin plus the room number

The second connection method: access code 86180888

Map of Conference Rooms

Pictures of Conference Rooms

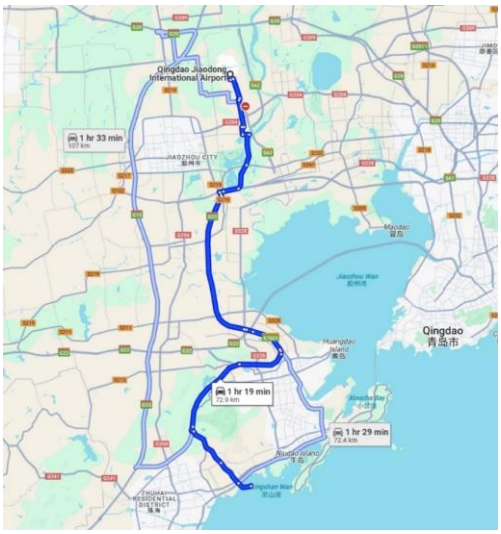
Traffic

Conference Venue: Crowne Plaza Qingdao Oriental Movie Metropolis

(1) Departure from **Qingdao Jiaodong International Airport**:

① Taxi (73 km, 80 min).

② Public transport (Airport Line 5, 130min). Get off at the Xingguangdao station, then walk to Crowne Plaza Qingdao Oriental Movie Metropolis.



Schematic Diagram Route 1

(2) Departure from **Qingdaobei Railway Station**:

① Taxi (45 km, 70min).

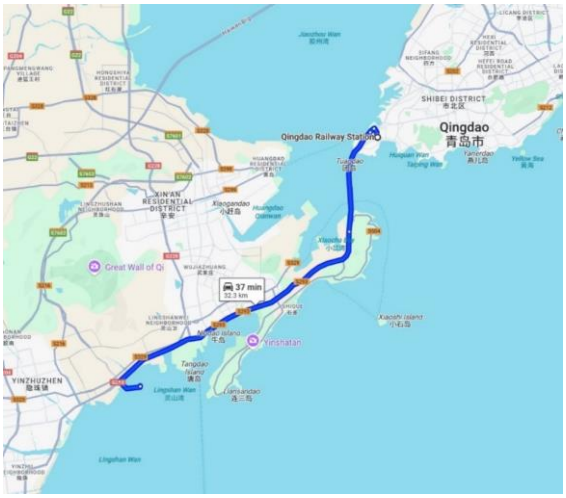
② Public transport (Subway line 1-Subway West Coast Express-Taxi, 96 min) Get off at the Jinggangshan station, then take the West Coast Express and get off at the Chaoyangshan station, then take a taxi.

Schematic Diagram Route 2

(3) Departure from **Qingdao Railway Station**:

① Taxi (32 km, 37 min).

② Public transport (Subway line 1- Subway West Coast Express-Taxi, 70 min)Get off at the Jinggangshan station, then take the West Coast Express and get off at the Chao yangshan station, then take a taxi.

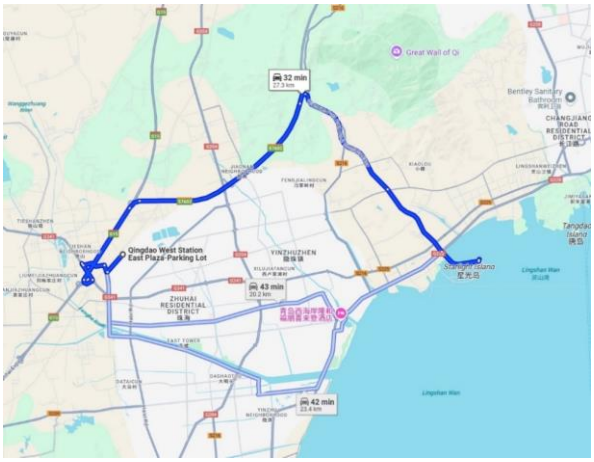


Schematic Diagram Route 3

(4) Departure from **Qingdaoxi Railway Station**:

① Taxi (20 km, 40 min).

② Public transport takes too long and is not recommended.



Schematic Diagram Route 4

Minutes of the Meeting

ISTFD 2025

THE 6TH INTERNATIONAL SYMPOSIUM ON THERMAL-FLUID DYNAMICS

JULY 24 - 26, 2025 QINGDAO, CHINA