

# Thermal

Temperature-, Heat-, Energy-, Reaction-, Mass-related Alliance to Communicate within, and Publicize beyond, the World Thermal Science and Engineering Community

*We would like to express our deepest sympathies to Turkish and Syrian people who have been severely affected by the earthquake on February 6, 2023.*



ICHMT



AIHTC



ASTFE



AUTSE



EUROTHERM

## Part 1

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## International Centre for Heat and Mass Transfer (ICHMT)

**Prof. Yildiz Bayazitoglu, President**

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Middle East Technical University, Türkiye, [ilker@ichmt.org](mailto:ilker@ichmt.org)

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### **Inaugural address of the President of ICHMT, Yildiz Bayazitoglu:**

On behalf of the officers, executive committee, scientific council, and the institutional members of the International Centre for Heat and Mass Transfer (ICHMT), I would like to express our sadness, deepest sympathies, and heartfelt condolences to the people of Türkiye and Syria affected by devastating two massive earthquakes started on 6<sup>th</sup> of February, 2023 and followed with aftershocks.

It is very humbling to serve as the next president of the ICHMT for the next four years. I look forward to leading and representing this incredible organization. I am honored and pleased to also have so much wonderful support from my colleagues in the ICHMT General Assembly. I am aware of the fact that accepting this position comes with great responsibilities.

The ICHMT is thankful to our departing president, Professor Dr. Terry Simon of the University of Minnesota, for his leadership and contributions during the last four years and for passing the baton to me to continue in his steps. We acknowledge and express our appreciation of all the past presidents, officers, executive committee, and scientific committee members, many of whom were mentors, professors, colleagues, and friends.

We are fortunate to have two new esteemed members serving as vice presidents, each from a different hemisphere. Professor Dr. Peter C. Stephan of Technische Universität Darmstadt and Professor Dr. Emeritus Hideo Yoshida of Kyoto University. I think that I as a Turkish-American help to round out our global representation. With their dedication and hard work, the ICHMT's general secretary, Professor Emeritus Dr. Ilker Tari of the Middle East Technical University (METU), and the ICHMT's Mrs. Tugba Gun kept the organization functioning during the difficult pandemic years. Their agreeing to continue to contribute is very much appreciated. I intend, as was done in the past, to work closely with them, to build on the momentum created over the past few years to serve all international heat and mass transfer scientific communities.

For more than 55 years ICHMT provided a platform for academicians, scientists, engineers, and all researchers to publish their work, communicate and collaborate with each other, discuss their findings and other technical issues, form friendships, and share knowledge and know-how. I hope to continue ICHMT's goal of achieving technical advancement and excellence. Our previous presidents' footsteps will be followed.

I would like to encourage everyone in the ICHMT organization to be transparent, listen to debates, consider the critiques, to be kind and supportive, and caring, and finally to reach out for assistance when needed. I am excited to be able to contribute to the core functions of ICHMT to achieve its long-term vision. I know the role, as the president of the ICHMT, will be an intellectually stimulating and enjoyable experience. With your kind collaboration, I hope the ICHMT will further foster research, development, and learning, and advance our field beyond what we can imagine.

We encourage more women and more diverse group of members to become active in the ICHMT, and we provide the students and the young scientists opportunities to become involved with its functions. I consider myself very fortunate to have had the connections I developed while attending the ICHMT meetings. The ICHMT officers, the executive committee, and the scientific committee members with such a diverse set of



beliefs, backgrounds, skills, wisdom, experience, and brilliant minds will be harvested for the necessary innovative and collaborative solutions needed to slip through any possible barriers in our community.

### **Meetings Co-Sponsored by ICHMT:**

**“1st International Conference on Energy Storage and Savings, ICENSS”** was held in hybrid format, during 20 – 23 October 2022, in Xi’an, China. The Symposium Co-Chairmen were Dr. Yulong Ding from University of Birmingham, U.K.; Dr. Ho Seok Park from Sungkyunkwan University, South Korea and Dr. Qiuwang Wang, from Xi’an Jiao Tong University, China. Detailed information can be found on the website: <http://icnss.xjtu.edu.cn>

**“12th Mediterranean Combustion Symposium, MCS-2023”**, 23 – 26 January 2023, Luxor, Egypt. The symposium Co-Chairmen were Dr. Federico Beretta, Consiglio Nazionale delle Ricerche, Napoli, Italy; Prof. Nevin Selcuk, Middle East Technical University, Ankara, Turkiye; Prof. Mohy S. Mansour, Cairo University, Egypt and Prof. Andrea d’Anna, Università degli Studi di Napoli Federico II, Naples, Italy. Detailed information can be found on the website: <https://www.combustioninstitute.org/ci-event/12th-mediterranean-combustion-symposium/>

**The organization of several future meetings have continued. These are:**

### **Meetings to be Organized by ICHMT:**

**“10th International Symposium on Radiative Transfer, RAD-23”**, 12 - 16 June, 2023, in Thessaloniki, Greece. The Symposium Chairmen are Prof. Brent Webb, Brigham Young University, USA and Dr. Denis Lemonnier, ISAE-ENSMA, France. Detailed information can be found on the website: <https://www.ichmt.org/rad-23>



**“4th International Symposium on Gas Turbine Heat and Mass Transfer, Turbine-23”**, 6 – 8 September 2023, Roma La Sapienza University, Roma, Italy. The symposium Chairmen are Professor Richard Goldstein, University of Minnesota, USA and Professor Terrence W. Simon, University of Minnesota, USA. The website is under construction.

**“10th International Symposium on Turbulence Heat and Mass Transfer, THMT-23**, 11 – 15 September 2023, in Roma, Italy. The Symposium Co-Chairmen are Professor K. Hanjalic, Delft University of Technology, The Netherlands and Professor K. Suga, Osaka Metropolitan University, Japan and D. Borello, Università di Roma "La Sapienza", Italy. Detailed information can be found on the website: <http://www.thmt-23.org/>



**Meetings to be Co-sponsored by ICHMT:**

“**11th International Conference on Boiling & Condensation Heat Transfer, ICBCHT2023**”, 15 – 17 May 2023, at the University of Edinburgh, Edinburg, U.K.. The Symposium Chairman is Khellil Sefiane, University of Edinburgh, U.K. Detailed information can be found on the website: <https://icbcht11.eng.ed.ac.uk/>

“**14th International Conference on Thermal Engineering Theory and Applications, ICTEA-2023**”, 25 – 27 May 2023, in Yalova, Turkiye. The Symposium Chairman is Professor M. Ziad Saghir, Ryerson University, Canada. Detailed information can be found on the website: <https://www.ictea.ca/>

“**17th International Heat Transfer Conference, IHTC-17**”, 14 – 18 August 2023, Cape Town, South Africa. The Symposium Chairman is Josua P. Meyer, Stellenbosch University, South Africa. Detailed information can be found on the website: <https://ihtc17.org/>

“**8th METTI, Advanced School on Thermal Measurement and Inverse Techniques**”, 24 – 29 September 2023, Oleron island, France. The Symposium Chairman is Denis Maillet, LEMTA, Nancy, France. Detailed information can be found on the website: <http://metti8.sciencesconf.org>

**Officers of ICHMT**

Executive Committee 1.1.2023 - 31.12.2026		
<b>President</b>		
Yildiz BAYAZITOGU United States of America		
<b>Vice Presidents</b>		
Peter STEPHAN Germany	Hideo YOSHIDA Japan	
<b>Secretary General</b>		
Ilker TARI Türkiye		
<b>Executive Committee Chairman</b>		<b>Executive Committee Vice Chairman</b>
M. Pinar MENGÜÇ Türkiye		Pedro Jorge Martins COELHO Portugal
<b>Elected Executive Committee Members</b>		
Pedro Jorge Martins COELHO Portugal	Siaka DEMBELE United Kingdom	Paolo DI MARCO Italy

Leonid DOMBROVSKY Russia	Abel HERNANDEZ- GUERRERO Mexico	Denis LEMONNIER France
Wojciech LIPINSKI Poland	Shigenao MARUYAMA Japan	M. Pinar MENGÜÇ Türkiye
Abdulmajeed MOHAMAD Canada	Hélcio R. B. ORLANDE Brazil	Jacques PADET France
Aldo STEINFELD Switzerland	Qiuwang WANG China	Brent WEBB United States of America
<b>Financial Auditors</b>		
Kyle DAUN Canada	Yogesh JALURIA United States of America	Mikhail A. SHEREMET Russia
<b>Past Presidents who are ex-officio voting members of the Executive Committee</b>		
Maurizio CUMO Italy	Kemal HANJALIC Bosnia Herzegovina	Terrence (Terry) SIMON United States of America

<https://www.ichmt.org/p/officers-of-ichmt>

**Organization:**

- 40 Member Institutions from 31 countries
- More than 300 Scientific Council members
- Officers: President, Vice Presidents (2), Secretary General, Executive Committee (15), Financial Auditors (3)

**Publications:**

Proceedings of ICHMT Meetings

<https://www.ichmt.org/p/proceedings-of-ichmt-meetings>

Other Publications

<https://www.ichmt.org/p/other-publications>

ICHMT Digital Library

<http://dl.begellhouse.com/references/1bb331655c289a0a.html>



**Professor Richard J. Goldstein (1928 – 2023)**

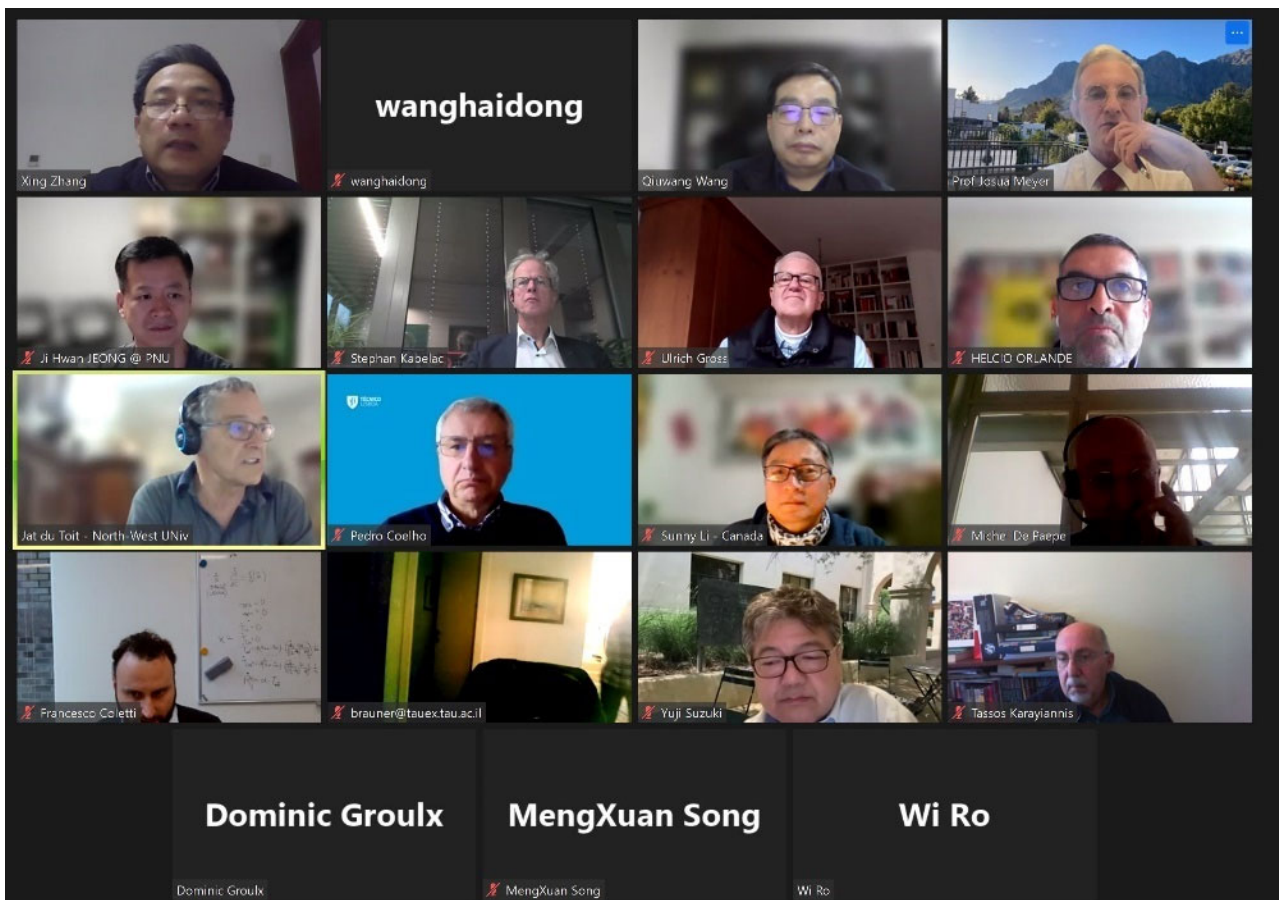


Professor Richard J. Goldstein, past President, vice President, and Executive Committee Member of ICHMT and its long-standing contributor and supporter, passed away on Monday, 6 March 2023, at the age of 94. Professor Goldstein was a world-renowned researcher, educator, mentor, and contributor of service in the fields of heat and mass transfer and energy engineering. He made major advances in optical measurement systems for fluid velocity and temperature, development of cooling designs widely used in high-performance gas turbines, and novel and important measurements in thermal convection. He pioneered laser Doppler velocimetry and hot-wire anemometry measurements and a variety of high-precision mass transfer-based techniques to study free and forced convection. The tribute by ICHMT can be found at <https://www.ichmt.org/>.

**Assembly for International Heat Transfer Conferences (AIHTC)  
17th International Heat Transfer Conference (IHTC-17)  
in Cape Town, South Africa, 2023**  
Xing Zhang Dept. of Eng. Mech., Tsinghua University  
x-zhang@tsinghua.edu.cn



Assembly for International Heat Transfer Conferences (AIHTC) aims to organize the most important academic conference in the international heat transfer academic society. The quadrennial International Heat Transfer Conference is also known as the Olympic conference in the heat transfer field. The 16th International Heat Transfer Conference was successfully held in Beijing, China in 2018. It was determined that the 17th International Heat Transfer Conference (IHTC-17) would be held in Cape Town, South Africa, in 2022. However, the preparation and organization of IHTC-17 were inevitably affected by the COVID-19 pandemic. In order to ensure the smooth holding and success of IHTC-17, the current president of AIHTC, Professor Xing Zhang, convened several online meetings with the vice-president, secretary and delegates from participating countries to discuss the conference plan, organization and details. Until November of 2022, the IHTC-17 conference had received 992 submitted papers, which was basically the same as the number of IHTC-16 conference in Beijing. The review process of submitted papers is now on-going. At present, the conference organization committee is organizing Panel Session and Special Lectures, including the Fourier Lecture, various awardee lectures (Nukiyama Award, William Begell Medal). Also, the preparation of exhibition and conference program is on-going. Thanks to the hard work of the conference organization committee, the organization of IHTC-17 conference is progressing smoothly. I believe that IHTC-17 will become a successful and wonderful academic event in the field of heat transfer, gathering strength from the whole heat transfer society and creating a better future.



Online meeting of AIHTC on Nov. 30, 2022.



## American Society of Thermal and Fluids Engineers (ASTFE)

**Prof. Yong X. Tao, President**

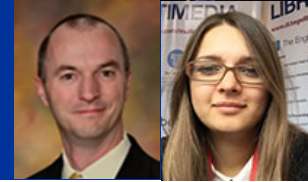
Cleveland State University, Cleveland, U.S.A., [y.tao19@csuohio.edu](mailto:y.tao19@csuohio.edu)

**Prof. Lorenzo Cremaschi, Chair, Executive Committee**

Auburn University, Auburn, U.S.A., [lzc0047@auburn.edu](mailto:lzc0047@auburn.edu)

**Ms. Anastasia Paulsen, Managing Director**

ASTFE, Danbury, U.S.A., [info@ASTFE.org](mailto:info@ASTFE.org)



### The 8th Thermal and Fluids Engineering Conference (TFEC 2023)

The 8th Thermal and Fluids Engineering Conference (TFEC 2023) was held in a hybrid (in person and virtual) mode during March 26-29, 2023. The chair and co-chairs of the conference were Drs. Samuel Graham, Nesrin Ozalp and Vikrant Aute. The program chair and co-chairs were Drs. Kevin Anderson, M. Reza Shaeri and Krishna Kota. The conference was hosted by the University of Maryland in College Park, Maryland and has accepted 460 submissions in the form of full papers, extended abstracts, and presentation-only papers. Participants from over 36 countries on nearly all continents attended the conference with 250 in person and 150 online. There were 24 in-person sessions and 10 virtual sessions. The technical program also hosted 3 plenary speakers, 9 keynote presentations, and 4 invited speakers in the Technology, Entrepreneurship and Communication (TEC-talk) session. These distinguished speakers from academia, industry, national labs, and federal agencies have covered a broad range of topics such as model validation, engineering education in post-corona future, next generation heat transfer fluids, tuning of phonon transport, gas turbine heat transfer and internal flow aerodynamics, sustainable energy and buildings, concentrating solar power, water-energy nexus, spacecraft engineering, distributed combustion, heat in hypersonics, and machine learning in CFD etc. In addition, one special poster session was run by Profs. Yong Tao, Cleveland State University and Yimin Zhu, Louisiana State University with 5 students presenting. This session showcases student presenters who participated in the NSF-funded IRES Track III project focused on International Research Experience and Professional Development in Built Environment Sustainability. Administered by Louisiana State University in collaboration with ASTFE and the National University of Singapore, the project offers students the opportunity to conduct research in Singapore on various topics related to built environment sustainability after receiving training through the Center of Leadership Development in Built Environment Sustainability. The session will highlight the experiences of these students and their research findings. The best poster award was presented to Thomas Firsich, a PhD student from Texas A&M University. A special luncheon talk was organized on Heat Transfer Multi-Objective Optimization via CFD Analysis. A panel on Multiphase CFD: Risks, Rewards, and Remorse was also organized. During the award luncheon on the second day of the conference, ASTFE fellow awards were presented to Professors Yong Tao, Vish Prasad, Nesrin Ozalp and Sherif A. Sherif. The inaugural ASTFE Early Career Researcher Award was presented to Prof. Yi Zheng of Northeastern University. In addition, the 2023 Thermal and Fluids Engineering Award was presented to Professor Jacob Chung of University of Florida in recognition of substantial contributions to thermal and fluids engineering.



**Prof. Jacob Chung**  
University of Florida



**Prof. Yi Zheng**  
Northeastern University





## Executive Committee Report

Formed in recognition of the continued growth and impact that the ASTFE is achieving, the EC's goal is to continue to expand ASTFE's impact in the fluids and thermal communities. Profs. Lorenzo Cremaschi (Auburn Univ., EC-chair), Wilson Chiu (Univ. of Connecticut), Jon Longtin (Stony Brook Univ.), Nesrin Ozalp (Purdue Univ. Northwest), and Ting Wang (The Univ. of New Orleans) are the five ASTFE members of the EC. One of its predominant roles is to oversee the annual Thermal and Fluids Engineering Conference (TFEC) and provide support to the conference organizers as the conference planning unfolds. After this year's marvelous 8th TFEC conference, held at the University of Maryland and led by Prof. Samuel Graham, Dean of A. James Clark School of Engineering, the EC is thrilled to work with Oregon State University President Jayathi Y. Murthy and the Oregon State Team in anticipation of the next TFEC conference in April 21-24, 2024. The announcement can be found in this link <https://www.astfe.org/tfec2024/>. The outstanding caliber of the TFEC chairs highlights the exceptional first-rate conferences that the EC continues to promote.



The EC also formed four new technical committees that will assist with the conferences, seminars, and workshops. The Thermal Sciences, Fluid Dynamics, Energy and Sustainability, and Ethics and Education Technical Committees bring together over 100 members across the world while promoting the mutual exchange of ideas, research, and innovation among thermal and fluids disciplines.

The EC co-sponsored several conferences beyond TEFC, including the upcoming 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMT-2023, IIT Patna). Membership outreach and communication are also part of the EC's recent activities, and several new programs that focus on students and industry-wide participation are under development.

### Professor Darrell Pepper



Thermal and fluids engineering community lost a long-time eminent scholar, academic leader and past ASTFE conference chair, Professor Darrel Pepper, formerly of University of Nevada, Las Vegas. Prof. Pepper passed away early this year. A special memorial reception was conducted during the 8<sup>th</sup> Thermal and Fluids Engineering Conference at the University of Maryland.

Prof. Pepper earned his degrees in Mechanical Engineering from the University of Missouri, Rolla where he received a Doctorate in Mechanical Engineering in 1973, a Master's degree in Aerospace Engineering 1970, and Bachelor of Science in Mechanical Engineering in 1968. After serving in military and industry, Prof. Pepper began his academic career and taught at University of South Carolina, Georgia Institute of Technology, California State University and at UNLV (starting in 1992). Darrell served as Chairman of Mechanical Engineering Department for 6 years, and Interim Dean for the College of Engineering.

Prof. Pepper was an Editor-in-Chief, Editor, and Associate Editor of many of the heat transfer engineering journals and has over 350 journal publications, over 150 reviewed conference proceedings. Dr. Pepper co-authored 4 textbooks on the Finite Element Method, a book on Indoor Air Pollution Modeling, and a book on Finite Element, Boundary Element, and Meshless Methods. Prof. Pepper was recognized with many awards including: George Westinghouse Medal; AIAA Energy Systems Award; AIAA Sustained Service Award; College of Engineering Distinguished Scholar Award; Harry Reid Silver State Award; Elected to Academy of Mechanical and Aerospace Engineers; Eric Reissner Medal (ICES); Tau Beta Pi Distinguished Researcher; Barrick Distinguished Scholar Award; Distinguished Scholar Award College of Engineering; Outstanding Faculty Member, Regents of UCCSN; Fellowship National Science Foundation. Prof. Pepper was a consultant for over 20 companies and laboratories and participated in many organizations, including: • Life Fellow of ASME • Fellow of the Royal Aeronautical Society, FRAeS • Associate Fellow AIAA • Fellow of Wessex Institute of Technology.

## Asian Union of Thermal Science and Engineering (AUTSE)

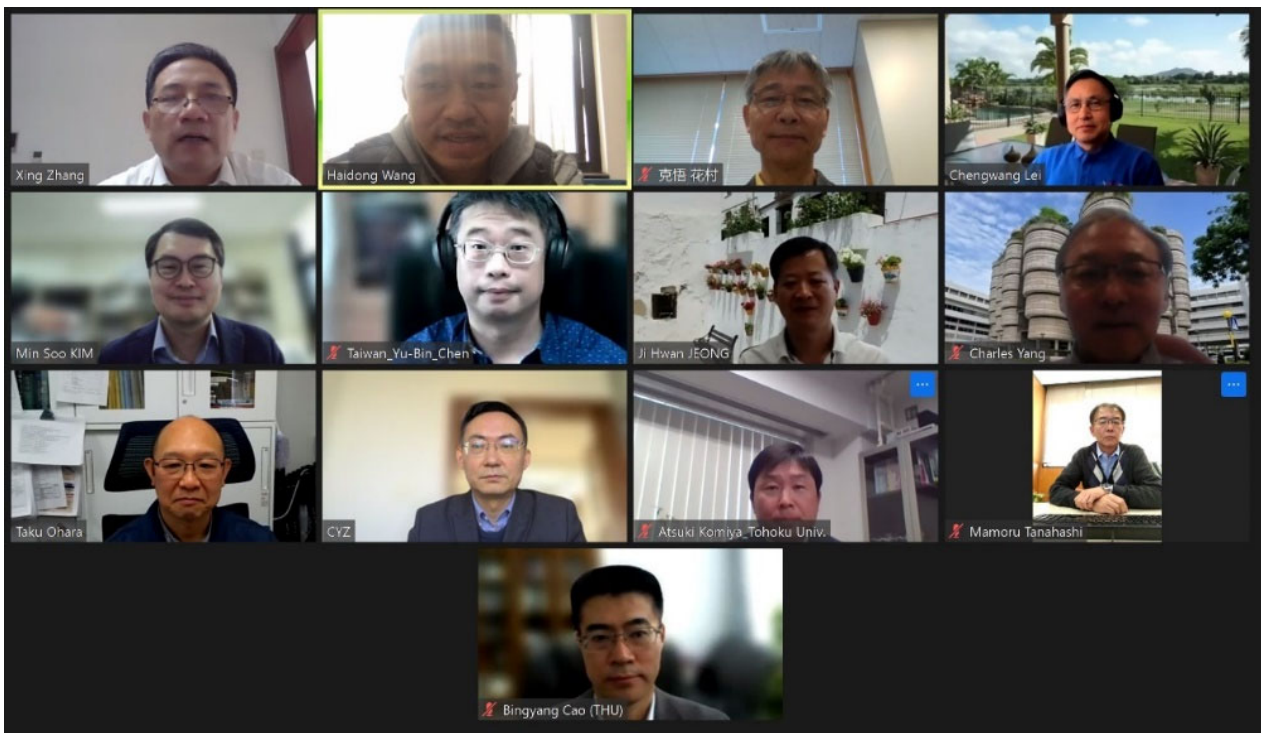
Xing Zhang

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The work of Asian Union of Thermal Science and Engineering (AUTSE) has progressed smoothly. A brief introduction to the main events of AUTSE recently is given here. On Sep. 20, 2022, AUTSE held a council meeting of the executive board members. I was elected to be the new president, and Prof. Min Soo Kim and Prof. Katsunori Hanamura were elected to be the vice-presidents of AUTSE in that meeting. Thirteen distinguished professors from Australia, China, Chinese Taipei, India, Korea, Japan and Singapore become the new executive board members of AUTSE. More detailed introduction to the new executive board members can be found in the website of AUTSE at [http://autse-asia.org/?page\\_id=53](http://autse-asia.org/?page_id=53). Under the guidance of new executive committee, the work is going well for AUTSE in 2023. On Feb. 27, 2023, AUTSE held a meeting of executive board (EB) members online. In that meeting, three young researchers (Dr. Aoran Fan (China), Dr. Hyeong-U Kim (Korea) and Dr. Yutaku Kita (Japan)) were decided to receive the Young Scientist Awards. The EB members also discussed the Fellow election of AUTSE and progress of the 3rd Asian Conference of Thermal Sciences (ACTS) in Shanghai of China, 2024. Besides that, the possible candidate for the William Begell Medal and further development of the academic society for thermal science in Asia were also discussed in the meeting. Nowadays, we have seen the dawn of ending the worldwide pandemic. Many international conferences and communication events will be back to normal. AUTSE will make greater contributions to build a more creative and dynamic academic society for thermal science in the future.



Online meeting of AUTSE EB members on Feb. 27, 2023.

**EUROTHERM****Pedro Jorge Martins Coelho, Secretary**

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**Past Eurotherm Seminars**

- **Eurotherm Seminar No. 115 – Caloric Heating and Cooling**

The Eurotherm Seminar No. 115 on Caloric Heating and Cooling (<https://eurotherm.et.utwente.nl/>) was held online from 13<sup>th</sup> to 15<sup>th</sup> July 2021. This seminar, which was aimed at the presentation and discussion of the state-of-the-art and modern trends in caloric heating and cooling technologies, was chaired by Prof. Ekkes Brück from the Technical University of Delft, The Netherlands, and co-chaired by Dr. Mina Shahi, from the University of Twente, The Netherlands, and Prof. Muhammet S. Toprak, from the KTH Royal Institute of Technology, Sweden. There were three plenary speakers: Dr. Bing Li, from the Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China, Prof. Sebastian Fähler, from the Leibniz Institute for Solid State and Materials Research, Dresden, Germany, and Dr. Franca Albertini, from the Institute of Materials for Electronica and Magnetism – National Research Council, Italy. Thirty-three oral presentations were presented and there was an average of 55 daily attendees. Theoretical, numerical and experimental approaches for the development of caloric materials and devices were presented encompassing the following topics: fabrication and characterization of caloric materials, synthesis and stability of magnetic fluids, caloric devices and applications for cooling and heating, design and analysis of permanent and electro magnet assemblies, fluid flow and heat transfer characteristics in magnetic regenerator, caloric heat pumps, caloric devices for electricity generation, long term reliability issues in caloric devices, system level performance evaluation of caloric devices, and life cycle analysis of caloric devices.

**Future Eurotherm Seminars**

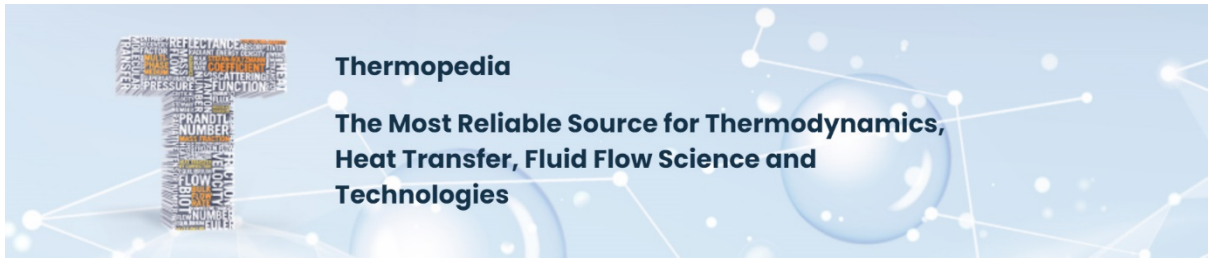
- **Eurotherm Seminar 116 - Innovative Solutions for Thermal Energy Storage Deployment**

The Eurotherm Seminar No. 116 on Innovative Solutions for Thermal Energy Storage Deployment (<https://eurotherm.udl.cat/>) will be held in Lleida, Spain, from 24<sup>th</sup> to 26<sup>th</sup> May 2023. This seminar will bring together researchers and practitioners from academia and industry who are working in the rapidly expanding field of thermal energy storage (TES). The last innovations in TES technologies (sensible TES, latent TES, and sorption and chemical reactions TES) will be presented and discussed. The final goal of the use of TES is the decarbonisation of the different sectors (i.e., energy sector, building sector, industrial sector, and transport sector) to achieve the climate change mitigation goals within the United Nations sustainable development goals. The seminar is chaired by Prof. Luisa F. Cabeza from the University of Lleida, Spain, Prof. Gennady Ziskind from the Ben Gurion University of Negev, Israel, and Prof. Michel de Paepe, from the Ghent University, Belgium. Two previous Eurotherm seminars on this subject were organized with between 200 and 300 attendees, and about 250 attendees are expected this year. The most recent trends in areas such as novel storage materials, advanced storage concepts and configurations, TES for renewable energy systems, TES in buildings and industry, use of advanced techniques such as artificial intelligence in TES, and social, environmental, and educational aspects will be addressed. Theoretical, numerical, and experimental approaches will be presented for the entire range of applications, from material characterization to complete storage systems.



## **Eurotherm Seminar 117 - METTI-8 Advanced School on Thermal Measurements and Inverse Techniques**

The French Heat Transfer Society (SFT-Société Française de Thermique) is organizing the 8<sup>th</sup> METTI advanced school on Thermal Measurement and Inverse Techniques (<https://metti8.sciencesconf.org/>) at Oleron Island (France) from 24<sup>th</sup> to 29<sup>th</sup> September 2023. Finding ‘causes’ from measured ‘consequences’ using a mathematical model linking the two is an inverse problem. This is met in different areas of physical sciences, especially in Heat Transfer. Techniques for solving inverse problems as well as their applications may seem quite obscure for newcomers to the field. Experimentalists desiring to go beyond traditional data processing techniques for estimating the parameters of a model with the maximum accuracy feel often ill prepared in front of inverse techniques. In order to avoid biases at different levels of this kind of involved task, it seems compulsory that specialists of measurement inversion techniques, modelling techniques and experimental techniques share a wide common culture and language. These exchanges are necessary to take into account the difficulties associated with all these fields. It is in this state of mind that this school is proposed. The METTI Group (Thermal Measurements and Inverse Techniques), which is a division of the French Heat Transfer Society (SFT), has already run or co-organized seven similar schools, in the Alps (Aussois, 1995 and 2005), in the Pyrenees (Bolquère-Odeillo, 1999), in Brasil (Rio de Janeiro, 2009), in Bretagne (Roscoff, 2011), in Pays Basque (Biarritz, 2015) and in Porquerolles island (Porquerolles 2019). For this eighth edition the school is again open to participants from the European Community with the support of the Eurotherm Committee. About 80 to 100 attendees and instructors (Ph.D. Students, academics, and R&D engineers) from different countries are expected. Lectures will be given on the following topics: generalities on inverse problems, linear and nonlinear estimation, contact and non-contact thermal sensors, measurement noise, large scale optimization, regularization, function estimation, signal processing, model reduction or identification.



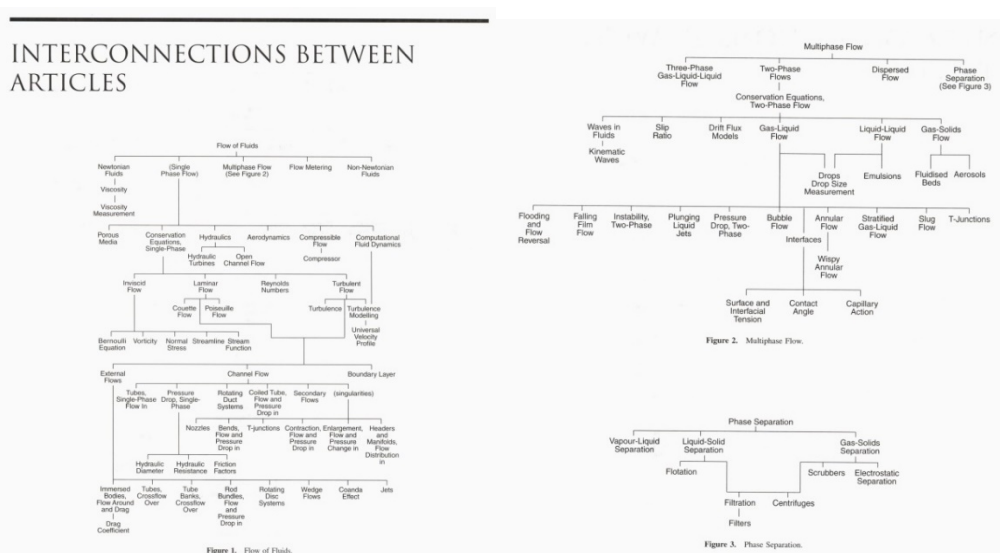
**THERMOPEDIA: The publisher’s view: origin and progress**

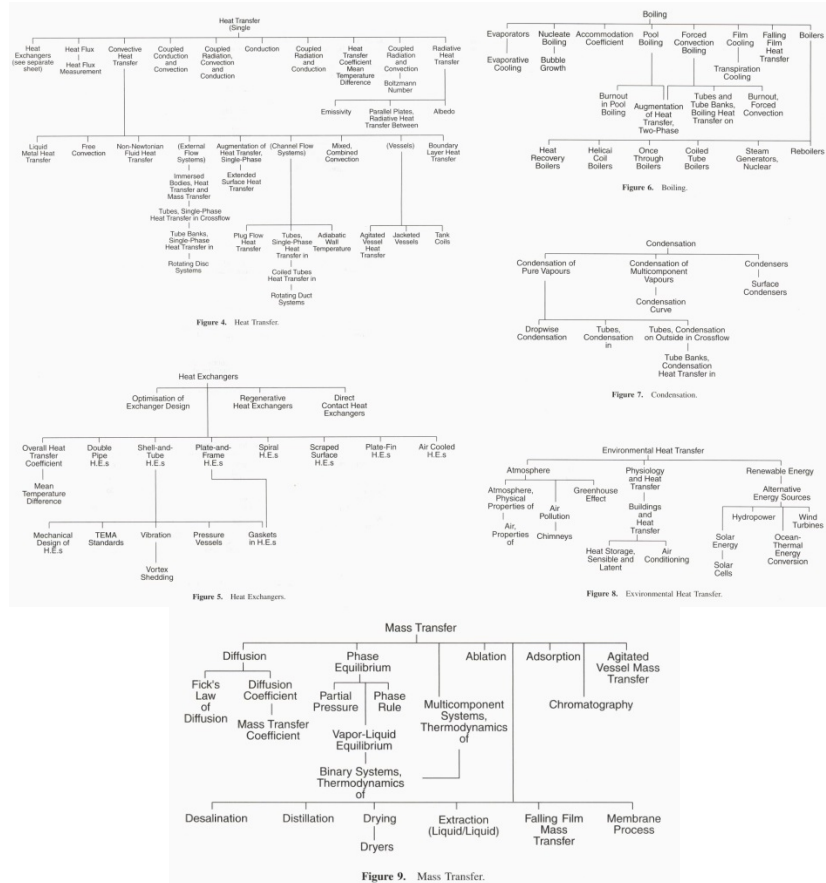
**Yelena S. Begell**, President, Begell House Publishers  
[elena@begellhouse.com](mailto:elena@begellhouse.com)

**Thermopedia™** is a peer-reviewed web resource on thermal and fluids science and engineering written by foremost known scientists and experts in the world. It was derived from the famous *International Encyclopedia of Heat and Mass Transfer (IEHMT Encyclopedia)*.

“The idea for the encyclopedia arose when Dr. William Begell (Bill), the founder of Begell House Publishers, asked one of the editors and colleague, Professor Brain Spalding, what book on heat and mass transfer would be one they would most like to see on their shelves, After some thoughts, the idea for the encyclopedia was born. The concept was for a work that gave sufficient information on any given subject to answer a large fraction of queries but which, equally important, gave the reader an easy route into the most cogent review and tutorial literature sources (Hewitt et al., 1996).”

The original book was conceived of and developed by international team of editors and has a unique structure. “The reader may enter at any point and will be provided not only with a basic introduction but also with guidance to further information (Hewitt, et al. 1996).” The *IEHMT Encyclopedia* articles are structured for readers with cross-referencing terms and entries shown as “following from” and “leading to” providing more detailed information or associated topics. Nine areas were selected with interconnections between articles, shown in Figs. 1–9 (Hewitt, et al. 1996). The project was led by editors Geoffrey. F. Hewitt, George. L.





Figs. 1-9 Diagrams of IEHMT Encyclopedia article arrangements shown as “following from” and “leading to”

Shires, and Yury. V. Polezhaev, with the participation of colleagues from many countries. ICHMT was the official sponsor of the *IEHMT Encyclopedia*, which was completed by 1996 and released in 1997.

The world was changed by the Internet, and the Internet changed everything in publishing. As early as 1997, all STEM publishers started moving their content online. Begell House (Begell) started with the journals program; at the time, we had 32 titles.

When Geoff Hewitt, of Imperial College, London, was visiting Begell House in New York in early 2000, Bill and I had met with him in our Madison Avenue office. The future of the *IEHMT Encyclopedia* was discussed and ultimately selected as a priority to make it available online. The web title given to it was, “A-to-Z Guide to Thermodynamics, Heat & Mass Transfer, and Fluids Engineering.” Then I, together with the IT team, were blessed and supported by Bill and Geoff to move forward to create a pdf version of *IEHMT Encyclopedia*. The index was then set in HTML format linking to pdf articles, and the first online edition was released in 2002.

By 2003, however, we knew that pdf was not a proper format because the online edition did not receive much attention. Many debates took place. Geoff and I were advocating for an interactive HTML format. The challenge was not technical but financial, because *IEHMT Encyclopedia*, now “A-to-Z Guide to Thermodynamics, Heat & Mass Transfer, and Fluids Engineering,” was open and available for free, and no revenue was coming in to support future development.



At the same time, only McGraw Hill started converting its books into HTML format. It was an expensive exercise, and there were no business models on how to license such products. In order for us to go forward, we had to consider, not only the technical aspect, but financials as well because the entire *IEHMT Encyclopedia* had to be reset, edited for minor errors, and reformatted with higher quality figures. After long debates, a team of 13 people traveled to Imperial College, where we spent two weeks working with Geoff on all aspects of restructuring. By 2006, we completed full HTML conversion of the online “A-to-Z Guide to Thermodynamics, Heat & Mass Transfer, and Fluids Engineering.”

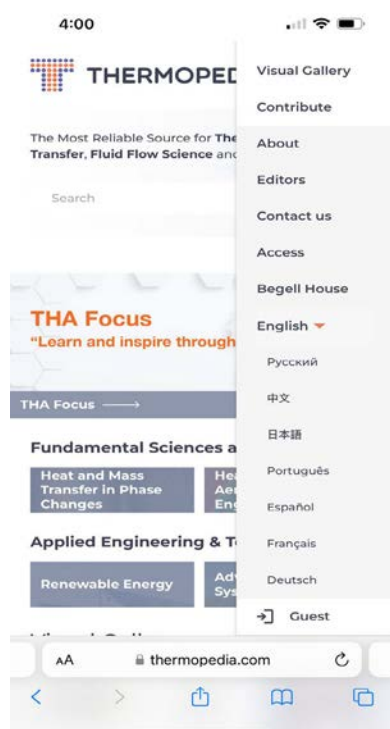
Later that year, it just so happened that I was on my way to London to meet Geoff and read on the plane an article that Wikipedia (Wiki) had just broken a record of one million users that year. The information about Wikipedia’s jump—even considering that it was an entirely different product—was an indicator. It was clear that something was wrong with the “A-to-Z Guide to Thermodynamics, Heat & Mass Transfer, and Fluids Engineering” because it did not take off as projected. I was concerned. The next day when I met Geoff at Imperial College, I told him, “Perhaps the title ‘A-to-Z Guide to Thermodynamics, Heat & Mass Transfer, and Fluids Engineering’ is too long.”

He said, “What do you mean by that?”

I replied, “It is too long, not catchy. We need to come up with one word that will be in the air, like Wikipedia.”

Geoff looked at me and said, “Why don’t you call it Thermopedia?”

And, thus, Thermopedia was born!



Thermopedia multi-language mobile webpage

Thermopedia transformed the team with a new energy wave and excitement. We reengaged in new restructuring, from interface design to technical aspects—the work started. One of the first tasks was the translations of all entries in the Index from English to seven languages: Russian, Chinese, Japanese, Portuguese, Spanish, French, and German. Begell had published a glossary of technical terms and descriptions with 380 entries, which was already available in eight languages, and this glossary was incorporated into Thermopedia.

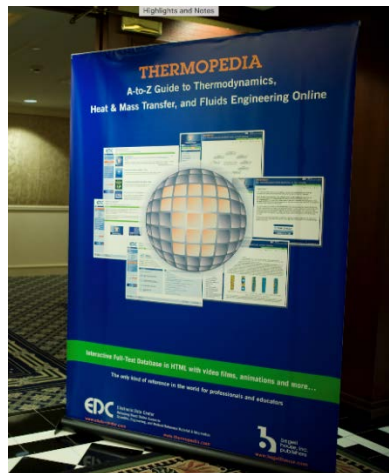
While having useful similarities, such as multi-language implementation, nonetheless Thermopedia was entirely different. Wiki accumulates content by articles written by anyone and also provides an option for anyone to update and change published articles. Our web-platform was set for exclusive editorial and author use; unlike Wiki, no strangers could come and challenge or edit the published peer-reviewed content. Thermopedia’s philosophy for content development, updates, and inclusions stands on the foundation of the highest academic and technical standards. Thus, the quality, accuracy measures, and control are the first priority. All articles are peer reviewed and by invitation only.







In 2008, Thermopedia was successfully launched and celebrated in Boston during the ASME Conference.



Pictures from the 2008 Thermopedia launch celebration

Thermopedia today is a state-of-the-art web reference with articles in HTML full text featuring 2D, 3D, animations, and films of experiments, and also has a Visual Gallery. The articles are arranged by scientific and engineering areas and interlinked to related topics. Its semantic web structure provides the ability to browse content that is hierarchically arranged and interlinked by correlations. The click on any major subject area provides a view of all related topics.

With the continued updates by 2015, Thermopedia exceeded one million views per year and, by 2022, gained more than five million visitors. It remains the most comprehensive peer-

reviewed web resource to guide those interested in the key subjects in thermal and fluids sciences and engineering.

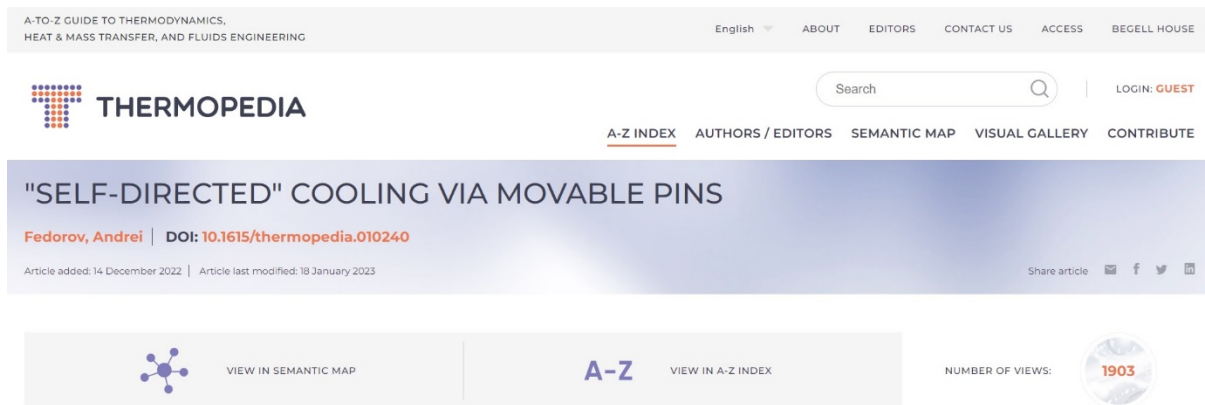
We experienced enormous pain, loss, and a void with the passing of Professor Geoff Hewitt in 2019. Thermopedia had reached 2.2 million users by then. To continue his legacy, in 2021 Begell invited Dr. Nesrin Ozalp, together with Begell Advisory Board, to relaunch Thermopedia's updates, web design interface, semantic Tree-Map and invite new editors. The Editorial Board has been rotating and expanding with new invitations, and Thermopedia is now comprised of 30 editors.



Fig. 14 Thermopedia Focus web link

Dr. Ozalp initiated Thermopedia Focus, the series column of novel research, innovations, and breakthroughs in applied thermal fluids built on the fundamentals of thermodynamics, heat transfer, and

fluid mechanics that is publishing in a short format articles on novelties and breakthroughs (<https://thermopedia.com/focus>). Since the launch in January 2023, the published articles gained close to 1,000 views in less than one week and exceeded 1,000 visits after 10 days of publication.



Thermal management of microprocessors is challenging due to highly localized and transient cooling of chips. Dr. Andrei Fedorov, Professor of Mechanical Engineering at Georgia Tech, developed a dynamically-adaptive, fully-passive thermal management material and microfluidic system for the form factor restricted thermal solution addressing both sustained and burst heat dissipation with transient power profiles.

Fig. 15 An example of an article in Thermopedia Focus that has gained over 1,000 views

Starting in 2023, the Editorial Board functions as a vertical structure with the Executive Board setting the direction for future updates. Each Executive Editor, based on his overview his/her topical subject area works with his selected coeditors and authors. The updates will be largely focusing on important interdisciplinary topics and areas, especially the latest developments. Our goal is to (i) bring the knowledge of what is known and (ii) reach out to what is *new* and may be coming for the key to understanding energy in all its forms and changes in nature. The collaborations with companies, R&D, and the industrial sector will be expanded by commissioning special topical updates on equipment and the latest enhancements by industry. Our inclusions will explore areas for experimental and applied AI in heat transfer technologies.

We recently asked ChatGPT, “Can we find information on falling film evaporators in Thermopedia?” We received the following answer:

“Yes, Thermopedia is also a great online resource for information on falling film heat exchangers. Thermopedia is an online encyclopedia of thermodynamics and heat transfer that provides in-depth information on a wide range of topics related to heat transfer and heat exchangers.

“Thermopedia offers a comprehensive collection of articles on heat exchangers, including falling film type, and covers topics such as design, operation, performance, and maintenance. The articles are written by experts in the field and are peer reviewed to ensure accuracy and reliability.

“In addition to articles, Thermopedia also offers a glossary of heat transfer terms, interactive simulations and animations, and a collection of case studies and examples.

“Thermopedia is an excellent resource for engineers, researchers, and students who are looking to deepen their understanding of heat exchangers, including falling film types. However, keep in mind that the content on Thermopedia is technical and may require a basic understanding of thermodynamics and heat transfer to fully comprehend,” as per ChatGPT (2023).

I thank Hideo for inviting me to write this article. We welcome like-minded researchers and scholars to join our team to bring your updates to Thermopedia and this newsletter.

### **References**

Hewitt, G. F., Shires, G. L., and Polezhev, Yu. V., *International Encyclopedia of Heat and Mass Transfer*, Preface, CRC Press, Boca Raton, 1996.  
Chat GPT, OpenAI, Microsoft, 2023.





**Members in the five world organizations**

(The order of ASTFE, EUROTHERM and AUTSE is changed corresponding to the geographical one.)

<b>Member †</b>	<b>ICHMT</b>	<b>AIHTC</b>	<b>ASTFE</b>	<b>EUROTHERM</b>	<b>AUTSE</b>
Australia					
Austria					
Belarus					
Belgium					
Brazil					
Canada					
China					
Chinese Taipei					
Czech Republic					
Egypt					
Finland					
France					
Germany					
Greece					
Hungary					
India					
Ireland					
Israel					
Italy					
Japan					
Mexico					
Morocco					
New Zealand					
Poland					
Portugal					
Romania					
Russia					
Serbia					
Singapore					
South Africa					
South Korea					
Slovenia					
Spain					
Sweden					
Switzerland					
Thailand					
The Netherlands					
Türkiye					
UK					
USA					
<b>40</b>	<b>31</b>	<b>18</b>	<b>2</b>	<b>16</b>	<b>7</b>

† The meaning of “Member” is different for the five world organizations.

**ICHMT:** Members are based on Member Institutions. <https://www.ichmt.org/p/member-institutions>**AIHTC:** Members are based on Countries. <http://www.aihtc.org/officers.html>**ASTFE:** USA (but, basically worldwide, particularly North America). <https://www.astfe.org/about/>**AUTSE:** Members are based on Countries/Regions. [http://autse-asia.org/?page\\_id=21](http://autse-asia.org/?page_id=21)**EUROTHERM:** Members are based on Countries. <http://www.eurothermcommittee.eu/membership.php>

Japan, Member of ICHMT, AIHTC, AUTSE (3)

1. State-of-the-Art MEMS Sensing Technology

Osamu Nakabeppu, Tomohide Yabuki, Kazuhito Dejima

2. Report on JSME Thermal Engineering Conference 2022, Japan

Shigeo Maruyama, Shohei Chiashi and Ikuya Kinefuchi

1. State-of-the-Art MEMS Sensing Technology



**Osamu Nakabeppu**, Department of Mechanical Engineering, Meiji University, onakabep[at]meiji.ac.jp

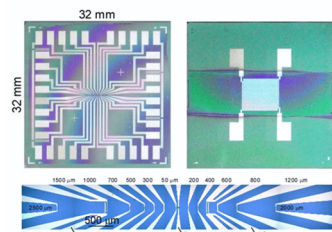
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**Kazuhito Dejima**, School of Engineering, The University of Shiga Prefecture, dejima.k[at]mech.usp.ac.jp

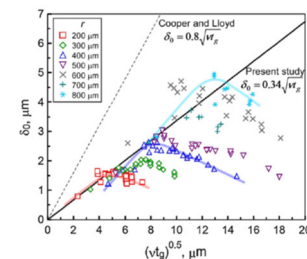
Over the past two decades, MEMS (Micro Electro Mechanical Systems) technology has advanced significantly. Thin film thermal sensors open the door to unraveling complex heat transfer processes. Here, we will focus on surface temperature and heat flux measurement using the MEMS sensors and introduce the latest status.

Microlayer formation characteristics is important for developing a reliable nucleate boiling heat transfer model which is based on accurate physical mechanisms. In our studies [1] [2], transient heat conduction analysis using the local wall temperature measured with a MEMS sensor (**Fig. 1.1**) are applied to estimate the spatial distribution of initial microlayer thickness under pool boiling bubbles and heat transfer characteristics. Recently, the hydrodynamic characteristics of microlayer formation in the pool boiling were also investigated based on the relationship between derived initial microlayer thickness and microlayer formation velocity which is determined by the transient local heat flux data (**Fig. 1.2**) [3]. It was found that the trend of microlayer thickness changes depending on the thickness of the velocity boundary layer outside the bubble foot developed with bubble growth.

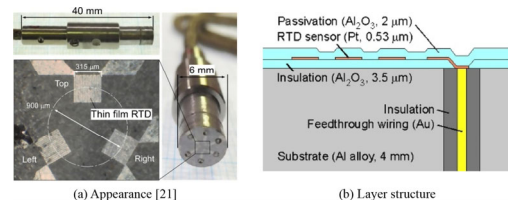
The MEMS technology is beginning to be used in the development of next-generation high-efficiency automobile engines both for spark-ignition (SI) [4] and compression-ignition (CI) [5]. Wall heat transfer is one of the most important aspects for heat loss mitigation study of engines. The local instantaneous heat transfer characteristics were investigated using an originally developed thin-film RTD sensor (**Fig. 1.3**) [4]. The MEMS sensor could clearly detect the cycle-by-cycle heat flux (**Fig. 1.4**). It was found that the local instantaneous heat flux (heat transfer coefficient) had a strong cycle-to-cycle variability of the order of 0.1–1.0 MW/m<sup>2</sup> (of 0.1–1.0 kW/(m<sup>2</sup>·K)), not only in fired operations but also a motored operation. In addition, it was shown that the heat fluxes at the adjacent points exhibited similar but different values, which indicates that there were turbulent eddies of sub-millimeter scale and they affected the local heat transfer. Since the local instantaneous heat transfer had quite different characteristics from the average, advanced design and control based on the understandings of the local instantaneous characteristics will be required for the further improvement of the SI & CI engine’s thermal efficiency.



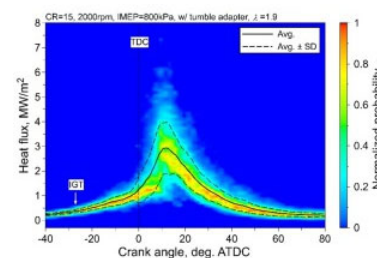
**Fig. 1.1** MEMS sensor for isolate bubble pool boiling [1].



**Fig. 1.2** Relation between initial microlayer thickness and velocity boundary layer thickness [3].



**Fig. 1.3** Three-point MEMS heat flux sensor [4].



**Fig. 1.4** Probability distribution of heat flux for a lean fired condition [4].



- [1] Yabuki T., Nakabeppu O. (2014) Int J. Heat Mass Transfer 76:286–297, [2] Yabuki T., Nakabeppu O. (2016) Int J. Heat Mass Transfer 100:851–860, [3] Yabuki T., Nakabeppu O. (2017) Heat Mass Transfer 53:1745–1750, [4] Dejima, K., Nakabeppu, O.(2022) Applied Thermal Eng. 201: 117747, [5] Dejima, K., Nakabeppu, O., Moussou, J., Pilla, G. (2022), Int. J. Engine Research 23:497–511.

## 2. Report on JSME Thermal Engineering Conference 2022, Japan



October 8–9, 2022 at the University of Tokyo, Tokyo  
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The Thermal Engineering Conference 2022 of JSME-TED was held on October 8th (Sat) and 9th (Sun), 2022 at the Hongo Campus of the University of Tokyo. General research presentations, etc. were basically face-to-face, but were carried out in a hybrid format that also used Zoom. This time, it was the first face-to-face meeting in four years (2019 canceled due to typhoon, 2020 and 2021 held online due to COVID-19), and 431 people (including invited speakers) participated. There were 222 academic presentations, 1 special lecture, and 2 lectures at the thermal engineering workshop held on the same day. In addition, two keynote lectures were given as invited lectures from overseas (Prof. Xing Zhang, Tsinghua University, China and Prof. Sung Jin Kim, KAIST, Korea).



The academic presentations of the Thermal Engineering Conference consisted of General Session (GS) and Organized Session (OS), and this time there were 28 GS presentations and the remaining 194 OS presentations. The OS accounts for a large proportion of the conference, and we are grateful to the organizers for their cooperation in organizing the program. A new OS (OS14: Nanoscale Thermal Control) was added to the existing 13 OSs. There were 19 academic presentations at OS14, and very lively discussions were held. The Thermal Engineering Conference is a research presentation meeting, where outstanding presentations are awarded the Young Excellent Lecture Fellow Award. There were many young speakers, and 121 presentations, more than half of the total, were judged. Many judges, including chairpersons of each session, cooperated in this evaluation.

In the special lecture, Mr. Shigeru Muraki, President of the Clean Fuel Ammonia Association, gave a lecture titled "Challenges in the Era of Great Energy Transformation - Roles of Hydrogen and Ammonia toward Carbon Neutrality". The regular thermal engineering workshop was held during the lunch break on the first day. Two industrial researchers gave lectures on the thermal design of semiconductor memory devices and high-precision measurement of water-cooling modules. A get-together (opinion exchange meeting) was held on the evening of the first day, and 110 people participated. Initially, we had planned to hold a get-together at the venue on the University of Tokyo campus, but due to the influence of the COVID-19, the venue was changed to Tokyo Garden Palace. A social gathering is an important place for communication between researchers, and its importance is increasing especially after self-restraint and online life.



We would like to express our gratitude to the many executive committee members and everyone involved in the Thermal Engineering Conference 2022 who cooperated in the preparation of the venue and the many students who cooperated in the venue management during the conference.

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## Russia, Member of ICHMT, AIHTC (2)

National Committee for Heat and Mass Transfer, Russian Academy of Sciences (NCHMT, RAS)

1. 8th Russian National Conference on Heat Transfer (RNCHT-8)
2. Thermophysics and Aeromechanics

1. 8th Russian National Conference on Heat Transfer (RNCHT-8), Moscow Power Engineering Institute, October 17-22, 2022. <https://rnhtc.mpei.ru/> (in Russian)



**Aleksey Dedov**, Professor, Corresponding member of the Russian Academy of Sciences, National Research University “Moscow Power Engineering Institute”, Moscow, Chairman of RNCHT-8 Organizing Committee, [dedovav@mpei.ru](mailto:dedovav@mpei.ru) or [dedovavl@mail.ru](mailto:dedovavl@mail.ru)

The Eighth Russian National Conference on Heat Transfer (RNCHT-8) is the largest event in Russia that brings together specialists in the field of heat transfer. The conference was held in face-to-face format. The conference was attended by more than 300 researchers - representatives of educational and academic institutions, leading industry research institutes, factories, and joint-stock companies. Leading Russian and foreign scientists presented 11 plenary and 12 keynote lectures on topical issues of heat and mass transfer at the conference:

- 1) The Kutateladze–Leontiev limit laws of heat transfer. Sixty years later;
- 2) Possible mechanisms of climate change;
- 3) Russia and the World in the age of global warming and counteracting it;
- 4) Heat and mass transfer and its applications at A.V. Luikov Institute of Heat and Mass Transfer – between the past and the future;
- 5) Active Brownian motion and quantum turbulence induced by laser radiation in a superfluid helium;
- 6) A new generation of high-performance energy;
- 7) Trends and achievements in the study of boiling processes;
- 8) Direct numerical simulation of turbulent wedges at supersonic velocities;
- 9) Active emulsions;
- 10) Thermal and physical-chemical processes in hydrogen production in a microstructural heat exchanger reactor;
- 11) Prospective directions for hydrodynamics and heat transfer in interconnected fluidized bed reactors for capturing CO<sub>2</sub> and hydrogen production;
- 12) Heat transfer and friction in dynamically nonequilibrium turbulent flows;
- 13) Comparison of thermophysical characteristics of nanofluids with single-walled and multi-walled carbon tubes;
- 14) Investigation of heat transfer during cooling of cylindrical bodies simulating tolerant fuel of nuclear power plants;
- 15) Interfacial heat transfer and the ability to control volumetric condensation in a dusty vapor-gas flow;
- 16) Influence of vortex formation effects on heat and mass transfer processes in nuclear power plants;
- 17) Numerical and experimental study of vortex intensification of heat transfer on structured surfaces with inclined grooves;
- 18) Thermocapillary rivulet structure in a locally heated vertical liquid film;
- 19) Application of the meshless method for numerical simulation of gas-dynamic interaction of particles with a shock layer;
- 20) Registration of the characteristics of the fire source in rooms;
- 21) Convective heat transfer in the presence of a heat-insulating body in the liquid volume;
- 22) A variation approach to the analysis of mathematical models of heat conduction taking into account spatial nonlocality;
- 23) Identification of heat transfer characteristics in coil windings high-temperature superconductors.

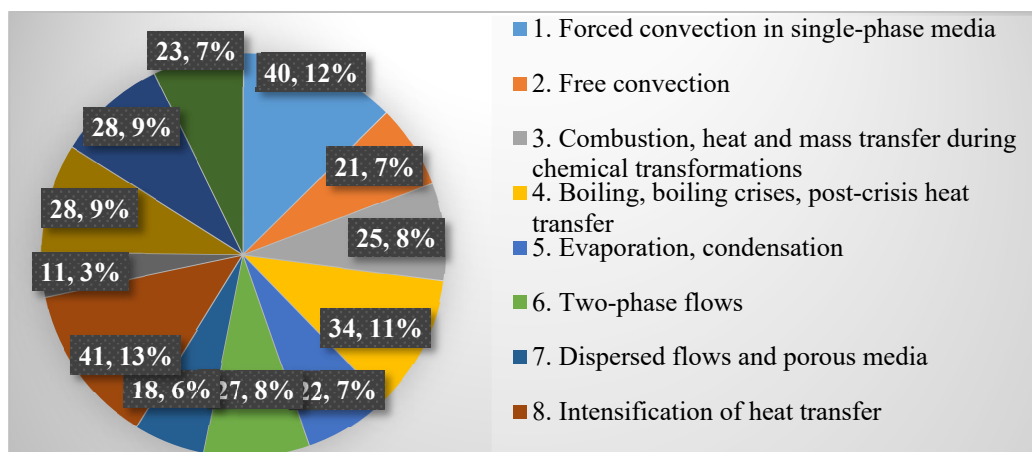


Fig. 1 Sessions (318 papers in total)

The conference programme included 318 papers, divided into 12 sessions (Fig. 1) in 12 sections: 1. Forced convection in single-phase media; 2. Natural convection; 3. Combustion, heat and mass transfer during chemical transformations; 4. Boiling, boiling crises, post-crisis heat transfer; 5. Evaporation, condensation; 6. Two-phase flows; 7. Dispersed flows and porous media; 8. Intensification of heat transfer; 9. Radiative and combined heat transfer; 10. Heat conduction, thermal insulation; 11. Non-traditional problems of heat transfer; 12. Youth section.

Each session included both oral presentations and poster sessions. The posters were mainly by young researchers. The authors of the three best posters in each section were awarded diplomas.

The conference included a round table "Thermophysical Problems in Nuclear Power Engineering".

The proceedings of the conference were published in two volumes.



**2. *Thermophysics and Aeromechanics*** is a journal offering original reports, reviews, and discussions on fluid dynamics, heat and mass transfer, turbulence, and other topics. The journal publishes articles of both a fundamental and applied nature, as well as theoretical and numerical modeling, experimental data and descriptions of experimental techniques and new engineering principles. Founded by the Siberian Branch of the Russian Academy of Sciences (SB RAS), Kutateladze Institute of Thermophysics SB RAS, and Khristianovich Institute of Theoretical and Applied Mechanics SB RAS in 1994, the journal “*Thermophysics and Aeromechanics*” welcomes contributions in English from all countries. Currently, the journal has contributors from Australia, Austria, Belarus, Belgium, Canada, China, India, Iran, Italy, Japan, South Korea, etc.

“*Thermophysics and Aeromechanics*” is a peer-reviewed journal. We use a single-blind peer review format. The average period from submission to the first decision is 52 days. The average rejection rate for submitted manuscripts is 42%. The final decision on the acceptance of an article for publication is made by the Editorial Board. Any invited reviewer who feels unqualified or unable to review the manuscript due to a conflict of interests should immediately notify the Editorial Board and decline the invitation. Reviewers should formulate their statements clearly and reasonably so that the authors can use reviewer’s arguments to improve the manuscript. Personal criticism of the authors should be avoided. Reviewers should indicate in the review (i) any relevant published work that has not been cited by the authors, (ii) anything reported in previous publications and that has not been referenced or cited appropriately, (iii) any significant similarity or overlap with any other manuscript (published or unpublished) of which they are personally aware.

Since 2006, the English version of the journal “*Thermophysics and Aeromechanics*” (its electronic version) has been available at the Springer website: <https://www.springer.com/journal/11510>

Email address for contacting the journal: [tanda@itp.nsc.ru](mailto:tanda@itp.nsc.ru)

- Offers original reports, reviews, and discussions on hydro-gas dynamics, heat and mass transfer, turbulence, and more
- Publishes articles of both a basic and applied character

Editor-in-Chief – Professor Sergey V. Alekseenko



**South Korea, Member of ICHMT, AIHTC, AUTSE (3)**

**1. Report on the Korean Society of Mechanical Engineering (KSME) Annual Meeting 2022**

Wonyoung Lee and Taesung Kim

**2. Special Topics in Journal of the KSME**

Wonyoung Lee and Taesung Kim

**3. Industry-Academia Joint Lecture on Next Generation HVAC-R**

Jaeseon Lee

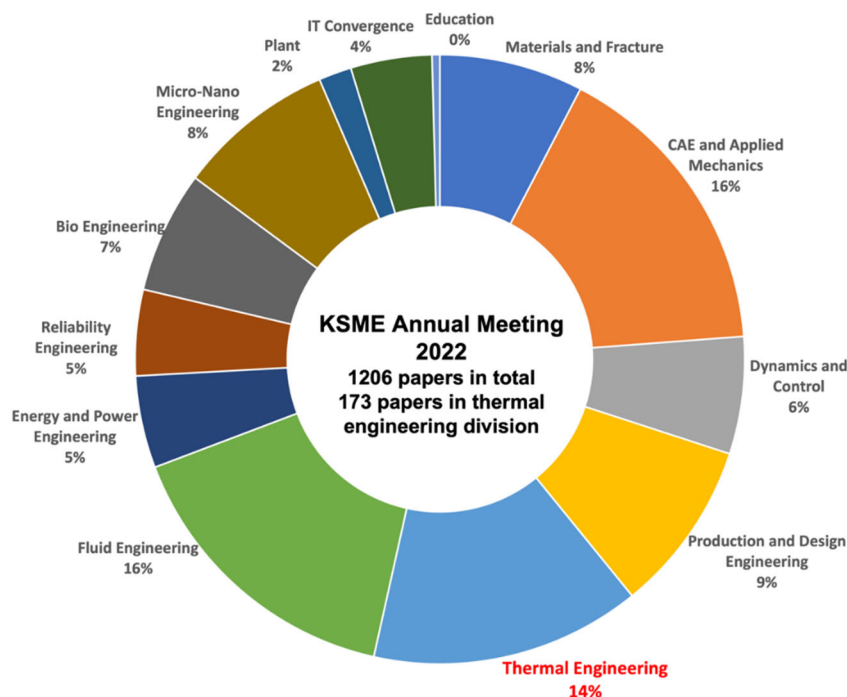
**1. Report on the Korean Society of Mechanical Engineering (KSME) Annual Meeting 2022**



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leewy@skku.edu <http://eclab.skku.edu>

**Taesung Kim**, School of Mechanical Engineering, Sungkyunkwan University  
tkim@skku.edu <http://nptl.skku.edu>

KSME Annual Meeting took place face-to-face during November 9 to 12, 2022 in Jeju, South Korea. Totally 1206 papers were presented including 66 keynotes through 13 divisions in the conference. The share of number of the presentation in each division is seen in a pie chart below. In Thermal Engineering Division, totally 173 papers were presented including 5 keynotes through 29 sessions. Keynotes speeches were “Estimation of airborne virus transmission from indoor air-conditioning units” by Prof. Man Yeong Ha, Pusan National University, “Hydrogen turbine” by Prof. Tong Seop Kim, Inha University, “Thermal-hydraulic characteristic of fluids in open-cell porous metal fins” by Prof. Ji Hwan Jeong, Pusan National University, “Machine learning-based signal quantification in optical diagnostics for real-time monitoring of chemical reactors” by Prof. Moonsoo Park, Sungkyunkwan University, “Energy harvesting performance of thermoelectric generator and photovoltaic systems” by Prof. Tae Young Kim, Seoul National University of Science and Technology, and “Plasma applications” by Dr. Hyeong-U Kim, Korea Institute of Machinery & Materials.



**Fig. 2.1** Number of presentations at KSME Annual Meeting 2022

## 2. Special Topics in Journal of the KSME



**Wonyoung Lee**, School of Mechanical Engineering, Sungkyunkwan University  
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The Korean Society of Mechanical Engineering (KSME) publishes the monthly Journal of the KSME. In addition to the trends in mechanical engineering, this journal provides information on the Internet, new technologies, new products, software, laboratories, and patents. It also contains interesting stories about our daily lives, such as university club introductions, essays, health information, life medicine, leisure, and more. The latest issue in February, 2023 contains the special topics about the recent trends in air conditioning and refrigerating systems. Six articles are published, including “R1233zd refrigerant based turbo refrigerating systems” by Dr. Cheolmin Kim, LG Electronics, “Dehumidifying air conditioning systems” by Dr. Insoo Hwang, Jyung Dong Navien, “Thermal air-conditioning systems for carbon net-zero” by Dr. Sungmin Woo, Samjungtech, “Mix-matrix membrane based dehumidifiers” by Prof. Minsung Kim, Joongang Chung-Ang University, “Solar radiation model research and applications” by Prof. Hyunjin Lee, Kookmin University, and “Polymer-based rotary regenerator type heat exchangers” by Prof. Dong-Wook Oh, Chosun University.

## 3. Industry-Academia Joint Lecture on Next Generation HVAC-R



**Jaeseon Lee** Dept. of Mech. Eng., UNIST, JaeseonLee@unist.ac.kr

The Thermal Engineering Division (TED) of the Korean Society of Mechanical Engineers (KSME) held a seminar on new technology trends related to next-generation HVAC-R in collaboration with industry and academia. This joint seminar was held between October 20 and 21, 2022 in Yeosu, a southern seashore city in South Korea. In the first session of the seminar, speakers from the industry gave presentations on changes in the refrigeration and air conditioning industry following energy efficiency improvements, environmental regulations, and carbon neutrality. Three speakers from the industry conducted the seminar, and the topics of each presentation were as follows.

- ‘Introduction of main technologies of turbo chiller applied with alternative refrigerant (R1233zd)’, Cholmin Kim, LG electronics Co.
- ‘Domestic dehumidification cooling system’, Insu Hwang, Kyungdong Navien Co.
- ‘The Role of Thermally Driven Chiller for Carbon Neutrality’, Sungmin Woo, Samjung Tech. Co.

Three speakers from academia gave lectures related to the issue, and the following topics were given.

- ‘Dehumidification technology using non-porous mix-matrix membrane’, Minsung Kim, Dept. of Mech. Eng. Chungang Univ.
- ‘Research and application of solar radiation model’, Hyunjin Lee, Dept. of Mech. Eng. Kookmin Univ.
- ‘An experimental study on the application of polymer materials to rotary regenerative heat exchangers’, Dongwook Oh, Dept. of Mech. Eng. Chosun Univ.

This seminar became an opportunity for 30 researchers in addition to 6 presenters to share various technical discussions and exchanges. The seminar is an annual event hosted by KSME TED. It was held on-line last year due to Covid-19 and then this year, it was held off-line again, so the enthusiasm for participation was high. In 2023, it is expected that the industry and academia will gather together again to become a venue for exchange on various topics related to thermal engineering.



Fig. 2.2 Industry-Academia Joint Lectures

**The Netherlands, Member of ICHMT, AIHTC, EUROTHERM (2)**

**1. Digital Teaching Heat Transfer with HeatQuiz**  
 Wilko Rohlfs and Reinhold Kneer

**2. Report on 1<sup>st</sup> Eurotherm Seminar on caloric heating and cooling**  
 Mina Shahi, Ekkes Brück, Muhammet S. Toprak

**1. Teaching Heat Transfer with HeatQuiz**



**Prof. Dr. Wilko Rohlfs**, Dept. of Mech. Eng., University of Twente, The Netherlands  
[w.rohlf@utwente.nl](mailto:w.rohlf@utwente.nl)

**Prof. Dr. Reinhold Kneer**, Institute of Heat and Mass Transfer, RWTH Aachen University, Germany

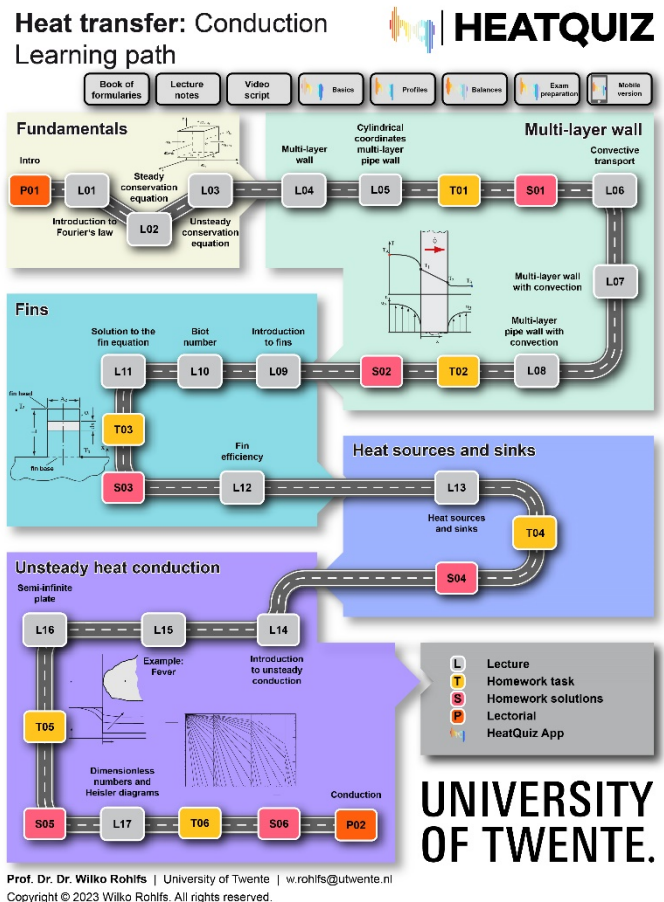
In recent years, there has been a significant increase in interest in digital teaching concepts. Online platforms such as "EDX" and "LinkedIn Learning" are now widely popular tools for education, extending beyond primary education. These platforms provide access to high-quality education from anywhere in the world, making education accessible to people who may have previously had limited access. Moreover, online and hybrid teaching methods have become the norm for active university students, particularly in light of the COVID-19 pandemic.

The online platform HeatQuiz, developed collaboratively by RWTH Aachen University (Germany) and the University of Twente, offers a comprehensive self-study course covering the topics of heat and mass transfer, as well as thermodynamics. It is freely accessible and uses a visual learning path to guide learners through a series of micro-lectures, quiz questions as well as tutorial questions with solutions. It also provides access to classical lecture notes, and a book of formularies. While HeatQuiz is designed for self-directed learning, it also forms the basis of a flipped classroom concept for large courses (with 250 students at the University of Twente and over 1000 students at RWTH Aachen University). During classroom sessions, students are encouraged to recapitulate and deepen their knowledge through discussions and everyday examples.

One of HeatQuiz's unique features is its collection of over 900 quiz questions, which train students to draw temperature profiles, define view factors and surface brightness, recapitulate dimensionless numbers, and develop energy balances.

The analysis of student performance in the HeatQuiz learning tool and its comparison with their exam results highlights a strong correlation between success rates and active participation. In fact, for certain question types, students who practiced with HeatQuiz achieved a success rate that was twice as high as those who did not.

This platform has been proven to be a highly effective tool for enhancing self-directed learning for students and other interested learners. In the upcoming years, the concept is planned to be transferred to more engineering courses such as mechanics, fluid mechanics, and elasticity theory. The collaboration between the universities is an excellent example of teaching partnership in the digital era.





2. Report on 1<sup>st</sup> Eurotherm Seminar on caloric heating and cooling (CHC 2021)



**Prof. Dr. Ekkes Brück**, Technical University of Delft, The Netherlands  
**Dr. Mina Shahi**, University of Twente, The Netherlands  
**Prof. Dr. Muhammet S. Toprak**, KTH Royal Institute of Technology, Sweden

The CHC 2021 conference (<https://eurotherm.et.utwente.nl>), originally planned to be held in the Netherlands but conducted virtually on 13th-15th July 2021 due to COVID-19 restrictions, was sponsored by the 4TU Center of Energy, BDR Thermea Group, Oversluizen Thermal Engineering, and Ferro Tec. The event featured 41 presentations, including 3 plenary talks, and a poster session. To enhance the interactivity of the poster presentation session, a brief pitch was recorded for each poster.

The presentations covered theoretical, numerical, and experimental approaches to the development of Caloric Materials & Devices, with a focus on recent developments and challenges in the fabrication of magnetocaloric, Barocaloric, and Elastocaloric devices, as well as advances in caloric-based devices such as heat pumps, refrigerators, and generators. The need for fostering collaboration within Europe was emphasized. The conference successfully brought together scientists and engineers from around the world to exchange knowledge and ideas. A breakdown of the number of presentations and participants by topic and country is provided in Figure 2.1.

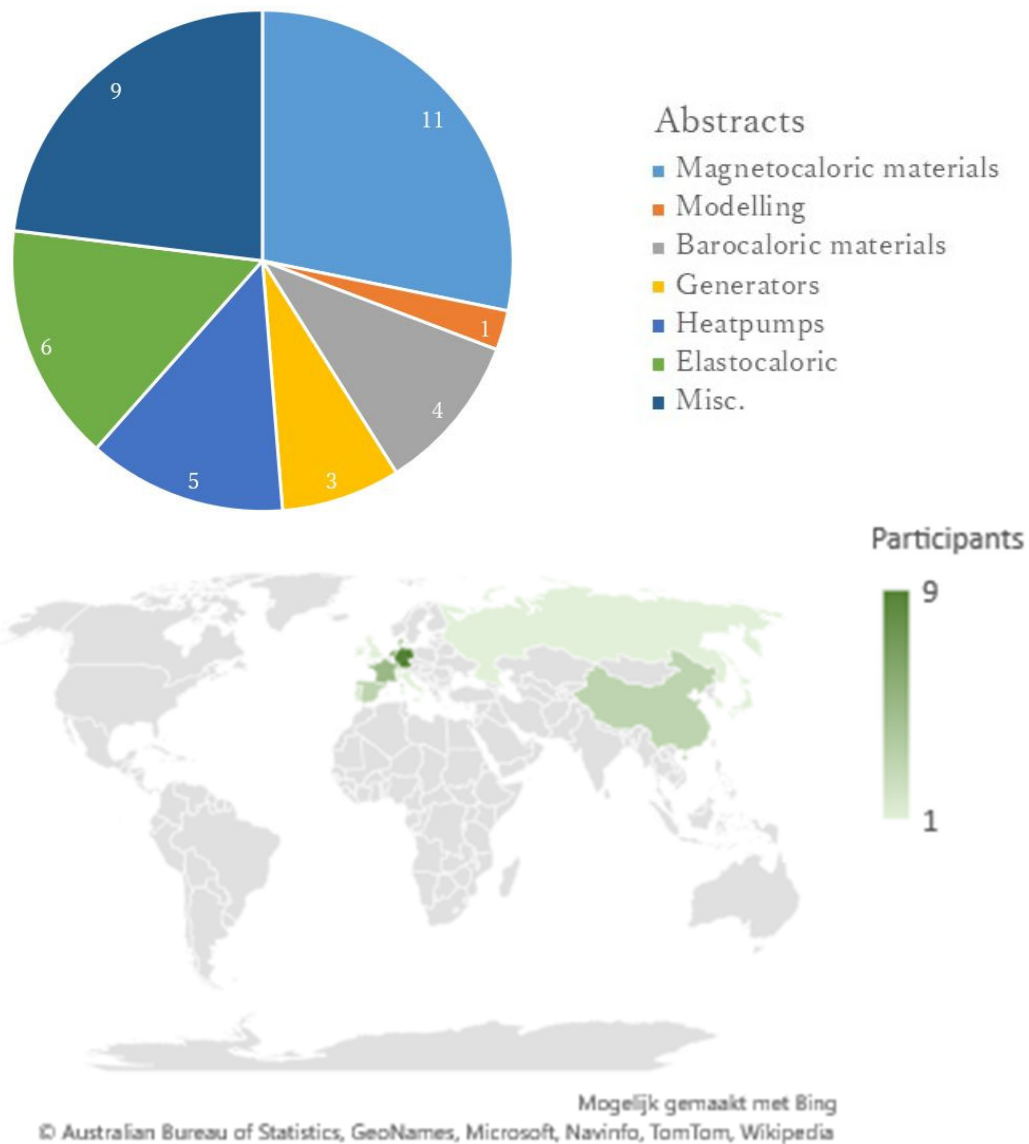


Fig. 2.1 Share of presentations and the participations per countries

## Türkiye, Member of ICHMT (3)

**1. Introduction of Sectoral Institutions: ASHRAE Turkish Chapter, TOBB HVAC Assembly, MMO, TTMD and ISIB, Atilla Biyikoglu**

**2. Preparatory Activities for 24<sup>th</sup> Congress of Thermal Sciences and Technology (ULIBTK'23), Atilla Biyikoglu**

### 1. Introduction of Sectoral Institutions: ASHRAE Turkish Chapter, TOBB HVAC Assembly, MMO, TTMD and ISIB



**Atilla Biyikoglu**, Dept. of Mech. Eng., The University of Gazi, 2022-2023 Vice-President of ASHRAE Turkish Chapter [abiyik@gazi.edu.tr](mailto:abiyik@gazi.edu.tr) <https://ashrae.org.tr/>

#### **Introduction of ASHRAE Turkish Chapter** (<https://ashrae.org.tr/>)

During the ASHRAE Winter Conference held in Dallas, January 26-30, 2013, ASHRAE members from Türkiye, applied to the Members Council expressing their interest in establishing a Turkish Section. On January 29, 2013, the application was approved and the "ASHRAE Turkish Section" was formed with 25 members. Thereafter, the ASHRAE Turkish Chapter was approved on 21st January 2014, at the ASHRAE Winter Conference in New York. Some of the key members who founded the chapter are, Dr. Mehmet Baris Ozerdem, Mehmet Kenan Dokumaci, Soner Bicer, Bahadırhan Tari, Dr. Kadir İsa, Dr. Atilla Biyikoglu and Dr. Ayhan Onat. As a result of the HVACR sectoral accomplishments done by the ASHRAE Turkish Chapter, the chapter was admitted to the HVACR Sectoral Assembly of TOBB (Union of Chambers and Commodity Exchanges of Turkey) that brings together all the associations and foundations actively working in HVACR industry. The ASHRAE Turkish Chapter representative for the Assembly is currently Chapter President Ahmet Goksin for the term of 2022-23.

#### **Introduction of TOBB HVAC Assembly** (<https://www.tobb.org.tr/>)

The Turkish HVAC Assembly was established within the framework of the "Establishment, Duties and Working Regulations of the Sectoral Assemblies of Türkiye", which was published in the Official Gazette dated 12/02/2005 and numbered 25725, within the body of the Union of Chambers and Commodity Exchanges of Turkey (TOBB). The Turkish Air Conditioning Assembly has been operating since July 2006 and, with its integrated structure that includes all the relevant parties of the HVAC sector, enables the formation of common views and the development of public-private sector cooperation and partnership as a contact point between the private sector and the competent authorities.

#### **Introduction of ISIB – Turkish Air Conditioning Industry Exporters Association** (<https://isib.org.tr/>)

ISIB is the only and coordinator exporter association in Turkish HVAC&R sector. Established in 2012, ISIB works towards bringing together all the exporter companies active in the Turkish HVAC&R sector under one roof and increasing the export potential of the sector.

In addition to the general tasks including but not limited to organizing national participation in fairs in markets with export potential, participating in sectoral fairs abroad, organization of sectoral trade delegations and purchasing delegations, organization of a design contest for HVAC&R sector, providing foreign trade trainings for companies, preparing sectoral country reports, organization of workshops and member meetings to discuss and solve sectoral problems, ISIB also supports the efforts of other individuals and organizations to increase the popularity of Turkish export products in world markets. In addition to the activities listed above, Turkish HVAC&R Exporters Association undertakes other duties including observation and research targeting the promotion of Turkish HVAC&R sector abroad, preparing brochures, catalogues and periodicals, advertising in sectoral media abroad, fair areas at times of fairs and the city centers, and sponsoring sectoral activities.

**Introduction of MMO - Chamber of Mechanical Engineers** (<https://www.mmo.org.tr/>)

UCTEA Chamber of Mechanical Engineers is a professional association as a public institution which was established in the context of the constitution of Republic of Türkiye in 1954. Chamber of Mechanical Engineers is one of the 24 constituent chambers of engineering of the Union of Chambers of Turkish Engineers and Architects. Chamber of Mechanical Engineers has become a wide spread organization; covering the whole country through its 18 Branches, 56 Provincial and 43 County Representative Offices, 7 Professional Auditing Offices, Notified Body, Accredited Inspection Center, Accredited Experimentation Laboratory, Accredited Calibration Laboratory, Accredited Personnel Certification Center, Welding Training and Inspection Center, Institute of Profession Education and 5 Applied Training Centers. The total number of chamber members has exceeded 130.000 in 2022, which were only 902 in 1954.

**Introduction of TTMD - Turkish Society of HVAC and Sanitary Engineers** (<https://www.ttmd.org.tr/>)

Turkish Society of HVAC and Sanitary Engineers (TTMD) was founded in 1992 with the goal of improving and fostering the services provided by Mechanical Engineers in heating, refrigerating, ventilating, air-conditioning, plumbing, insulation and control areas of the building industry. Today, TTMD has become an association where professionals from different disciplines, such as designers, consultants, reps, manufacturers, installers, operators, academicians etc, come together on a common platform for shared goals.

The foremost objective of TTMD is to contribute to the training and research of our professional colleagues, especially consisted of architects and engineers. With this ultimate goal, the association organizes seminars and technical courses; workshops, symposia, and congresses; conducts national and international projects and supports the researches conducted by universities and various research institutes. Apart from these, TTMD stands as a member of international associations such as ASHRAE and REHVA which are established with the common aim of sharing knowledge in a global platform.

**2. Preparatory Activities for 24th Congress of Thermal Sciences and Technology (ULIBTK'23)**



**Atilla Biyikoglu** Dept. of Mech. Eng., Gazi Univ. [abiyik@gazi.edu.tr](mailto:abiyik@gazi.edu.tr)

The 24th Congress of Thermal Science and Technology with International Participation, ULIPTK'24 <https://ulibtk2023.baskent.edu.tr/> , will be organized by Başkent University on 06-08 September 2023. The aim of our congress is to bring together scientists and researchers and to create a suitable platform where they share the results of their studies on heat science and technique. The congress will include new and original research and development studies on thermal systems, alternative and nuclear energy technologies. In order to bring together our scientists, researchers and industrialists in the public and private sectors, to ensure communication and contribute to the production of joint projects, all researchers and practitioners will attend our 24th Thermal Science and Technique Congress with International Participation, in the 100th Anniversary of our Republic, Başkent University Patalya Thermal Resort Hotel, Kızılcahamam <https://kizilcahamam.patalyahotels.com/tr/>, We are waiting for you in Ankara.

*Topics of the Congress*

- Alternative and Clean Energy Technologies
- Energy Conversion and Storage
- Energy Harvest and Environment
- Energy Policies and Energy Efficiency
- Artificial Intelligence Applications in Energy
- Power and Energy Engineering Applications
- Solar Energy and Fuel Cells
- Hydrogen and Nuclear Energy Applications
- Heating, Cooling and Ventilation Applications Congress
- Applications in Micro and Nano Dimensions

*Important Dates:*

Deadline for abstract submission	March 30th, 2023
Announcement of accepted abstracts	April 10 <sup>th</sup> , 2023
Deadline for full paper submission	May 2 <sup>nd</sup> , 2023
Announcement of accepted papers	July 31 <sup>th</sup> , 2023
Deadline for revised full papers	Aug 14 <sup>th</sup> , 2023