ICTEA

DOHA, QATAR
FEBRUARY 25-28, 2018

INTERNATIONAL CONFERENCE ON THERMAL ENGINEERING THEORY AND APPLICATIONS

Experimental, Analytical, or Theoretical
Thermal and Energy Engineering

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2018 INTERNATIONAL CONFERENCE ON THERMAL ENGINEERING THEORY AND APPLICATIONS

A COLLABORATIVE EVENT THROUGH

TEXAS A&M UNIVERSITY at QATAR

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A HISTORY OF THE ICTEA

The ICTEA conference series was inspired to help provide an opportunity for professional development of scientists and engineers in the Middle East, including the Gulf region and North Africa. The need for such development persists, despite the strong commitment of regional governments to improving undergraduate education and to building research capabilities in institutions of higher learning. Until recently, attracting highly motivated academic staff to advance research agendas and to make significant contributions to GDP growth were not among the top priorities. But, thanks to the foresight of regional leaders, higher education in this part of the world is starting to change. However, the fact remains that highly skilled scientists and engineers in the region who are dedicated to research, often must seek work abroad in academic and research institutions in order to develop themselves professionally. Well-defined and focused high-quality scientific/technical meetings dedicated to forging contacts between academics and researchers in regional institutions of higher learning and their counterparts abroad are scarce. The purpose of starting a biannual international conference ideally to be rotated around the Middle East, Gulf and North African region countries was and still is to meet this need and to provide a well-structured platform to boost research activity and productivity in the region, as well as providing a point of contact and networking. Such a conference can serve as a focal point for the gathering of scientists and engineers who hail from this region and who are working abroad in Europe, North America and other industrialized parts of the world. “Thermal Engineering” was selected as an umbrella title for the conference series because of its encompassing meaning and because this research area is of great importance to the region. Topics related to environment, energy, petroleum, and construction are obvious examples of thermal engineering applications which are crucial to the economic development of the region.

At the time the decision was made to hold the first Conference on Thermal Engineering in Beirut from 31 May to 4 June 2004, Lebanon was poised to emerge from its long period of arrested development. The country had come out of a long civil war and the long and arduous process of rebuilding Lebanon had started. Beirut had experienced an explosive growth and rebuilding activity during the decade preceding 2004 with billions of dollars of investment and had regained some of its past glory and glitter worthy of its nickname “Paris of the East” of the 1950s and 1960s before the civil war. It was felt that the opportunity to start this exercise in Beirut to be rotated later to elsewhere could not be passed up.

The First International Conference on Thermal Engineering held under the patronage of his Excellency Emile Lahoud, the President of Lebanon, was successful beyond the best expectations of the organizers. The success of the conference could not have been achieved without the support of the Lebanese and Canadian governments. A large audience of scientists attended the meeting held in the Movenpick hotel on the Corniche. Selected peer-reviewed papers appeared in January 2006 in a special issue of the Journal of Applied Mechanics (Transactions of ASME – American Society of Mechanical Engineers) dedicated to ICTEA and edited by Dennis Siginer. The next ICTEA duplicated and even eclipsed the success of the first ICTEA. It was held in the United Arab Emirates at the Hilton Al Ain 3-6 January 2006 under the high patronage of His Excellency Sheikh Nahyan Bin Mubarak Al Nahyan with support of the UAE University. The third ICTEA was held with an even larger attendance in Amman, Jordan, at the Le Royale Hotel in the heart of Amman under the patronage of the Prime Minister of Jordan, His Excellency Dr. Ma'roof al Bakheit. The growing success of the conference series and the rapid recognition it gained and continues to gain is quite gratifying to its organizers and benefactors. The fourth ICTEA was held in Abu Dhabi in the United Arab Emirates on the campus of the Petroleum Institute in January 2009 and 177 papers comprised the program, with participation spread geographically further afield than ever before.

The fifth ICTEA was held in Marrakesh, Morocco. More than 120 papers were presented from 10 to 14 May 2010. The sixth ICTEA was held in Istanbul, Turkey. Large number of papers were presented from 29 May to 1 June 2012, thanks to the efforts of the local organizing committee of Istanbul Technical University, which held the conference on their Maslak campus. Two scientific journals are in the process of having a special issue, the first is the International Journal of Thermal Science and the second is the Journal of Fluid Dynamics and Material Processing. The seventh ICTEA was held in Marrakesh, Morocco, in May 2014. A large number of scientists from MENA region attended the conference and two ASME special issues journals are in preparation. The eighth ICTEA was held in Amman, Jordan, on the campus of the German-Jordanian University. The ninth International Conference on Thermal Engineering was held in Abu Dhabi, UAE, in collaboration with Alhosn University. The 10th International Conference on Thermal Engineering was held in Muscat, Oman, in collaboration with Sultan Qaboos University.

INVITED SPEAKERS

ABDULMAJEED MOHAMMAD

Merits of Nanofluids in Enhancing the Rate of Heat Transfer

Prof. Mohamad graduated with a Ph.D. from Purdue University, USA. From 1993-1999 he was a professor in the Eastern Mediterranean University, Cyprus. Since 2000 he has been professor of thermofluids in the Department. of Mechanical Engineering at the University of Calgary, Canada. From 2010 to 2012, he was acting dean of engineering in Alfaisal University. While at the University of Calgary, Mohamad has held several administrative positions, including director of graduate studies and acting director for the Centre for Environmental Engineering Research and Education. He is a Fellow of the American Society of Mechanical Engineer (ASME). He has been author or co-author of more than 230 papers and graduated more than 40 Ph.D. and M.Sc. students.

N.K. ANAND

Simulation of Turbulent Twin Jets

Dr. Anand is the executive associate dean of engineering, the James and Ada Forsyth Professor and Regents Professor in the Department of Mechanical Engineering at Texas A&M University, USA; and associate director of the Texas A&M Engineering Experiment Station. Anand has made many contributions in both the heat transfer and aerosol fields, which include the numerical modeling of conjugate heat transfer with applications to cooling of electronic equipment, heat transfer in serpentine channels, condensation of non-CFC refrigerants in smooth horizontal tubes, and modeling of transport of aerosols through sampling lines. During his tenure at Texas A&M, he has made quality his top priority. His publications are in archival flagship journals, such as the *ASME Journal of Heat Transfer, International Journal of Heat and Mass Transfer, Numerical Heat Transfer and Aerosol Science and Technology*.

S.A. SHERIF

Net-zero Energy and Latest U.S. Research in Renewable Energy and Energy Efficiency

Prof. S.A. Sherif is a professor of mechanical and aerospace engineering and is the founding director of the Wayne K. and Lyla L. Masur HVAC Laboratory, director of the Industrial Assessment Center (UF-IAC) and director of the Mobile Energy Laboratory (UF-MEL). He also served as co-director of the Southeastern Center for Industrial Energy Intensity Reduction at the University of Florida (2009-2013). He is a Fellow of ASME, ASHRAE and the Royal Aeronautical Society (RAeS), and an Associate Fellow of AIAA. He is a member of Commission B-1 on Thermodynamics and Transfer Processes of the International Institute of Refrigeration, a member of the Advisory Board of Directors of the International Association for Hydrogen Energy and a NASA Faculty Fellow. He is a founding member of the Board of Directors of the American Society of Thermal and Fluids Engineers. He served as the 2013-2014 chair of the ASME Heat Transfer Division Executive Committee (2009-2016) and a member of the ASME's Basic Engineering Group Operating Board (2010-2014). Dr. Sherif has more than 400 refereed publications and two U.S. patents, and is the primary editor of the CRC/Taylor & Francis Handbook of Hydrogen Energy.

YOGESH JALURIA

Solution of Inverse Problems in Thermal Systems

Dr. Yogesh Jaluria is Board of Governors Professor and Distinguished Professor at Rutgers, the State University of New Jersey, USA. His research work is in the field of thermal science and engineering, covering areas such as convection, fires, materials processing, thermal management of electronics, energy, and optimization of thermal systems. He is the author or co-author of eight books and editor or co-editor of 13 conference proceedings, eight books, and seven special issues of archival journals. He has contributed more than 500 technical articles, including more than 200 in archival journals. He received the prestigious 2007 Kern Award from AIChE, the 2003 Robert Henry Thurston Lecture Award from ASME and the 2002 Max Jakob Memorial Award — the highest international recognition in heat transfer — from ASME and AIChE. He is currently president of the American Society of Thermal and Fluids Engineers.

AHMED S. KHAN

UAV Technology: Applications and Challenges for Standards Development

Dr. Ahmed S. Khan is a professor of electronics and electrical engineering in the College of Engineering and Information Sciences at DeVry University, USA. Khan has 32 years of experience in research, instruction, curricula design, development, evaluation, implementation and program accreditation, management and supervision. Khan received an MSEE from Michigan Technological University, an MBA from Keller Graduate School of Management, and his Ph.D. from Colorado State University. His research interests are in the areas of nanotechnology and social and ethical implications of technology. He teaches wireless engineering; network engineering; fiber optic communications; science technology and society; and project management. He is the author of many educational papers and presentations. He has been author or co-author of many books, including the most recent, Nanotechnology: Ethical and Social Implications, CRC Press (2012).

FEI DUAN

From Droplet Impacting, Droplet Train Impingement to Spray Cooling

Dr. Fei Duan joined Nanyang Technological University, Singapore, in July 2008 after a three-year postdoc study at the University of Toronto in Canada. Now he works there as an associate professor. He graduated with his Ph.D. from the University of Toronto During his Ph.D. studies, he also worked as a visiting scientist in the Institute of Fluid Mechanics at Friedrich-Alexander-University in Erlangen-Nuremberg, Germany. His research covers droplet evaporation dynamics, Marangoni flow, nanofluid drying, enhanced thermal cooling for industrial applications and data center management, efficient cogeneration system, etc. Duan has advised 13 Ph.D. and seve master's research students. Duan has published about 180 journal papers, conference papers and book chapters — among them, more than 100 peer-reviewed journal papers. He is a member of ASME, ACS and APS.

DEAN VUCINIC

Advancements in Human Heart Modeling and Simulation

Prof Dean Vucinic joined Vesalius College (VeCo) — which is affiliated with the Vrije Universiteit Brussel (VUB) — as senior scientist and advisor in 2017. He has been affiliated with VUB since 1988. Before joining VeCo, he was guest professor and senior research scientist at the VUB Faculty of Engineering Sciences as member of two of its departments: Mechanical Engineering (MECH) and Electronics and Informatics. His Ph.D. thesis became a book in 2010 (ISBN 978-3-8383-3500-1). In the early 90s, he developed "CFView — Computational Field Visualization System," the first-ever interactive visualization software adapted to numerical simulation solvers, completely based on the object-oriented technology and fully implemented in C++. During more than 27 years at VUB, he successfully participated in more than 20 European projects under the European Frameworks, EUREKA/ITEA and Tempus educational programs, where more than 20 Ph.D.s based their visualization and data analysis applying CFView.

AGENDA

Sunday, February 25, 2018

5-7 p.m.	Registration
7-9 p.m.	Reception

Monday, February 26, 2018

7:30-9 a.m.		Registration
9-9:30 a.m.		Opening Ceremony
9:30-10 a.m.		*Invited Speaker:* **S.A. SHERIF, USA**
10-10:30 a.m.		Coffee Break
10:30-11 a.m.		*Invited Speaker:* **N.K. ANAND, USA**
Session: **FUEL**		*Chair:* **DR. ISSA CHAER**
11-11:30 a.m.	80	Modifying zeolitic imidazolate frameworks for the separation of CO2 in gas mixtures *Amro Mohamed, Panagiotis Krokidas and Ioannis G. Economou*
11:20-11:40 a.m.	27	Flow and pressure response through porous filter during soot filtration and oxidation *Kazuhiro Yamamoto, Ryo Komiyama, Tatsuya Sakai*
11:40-noon	62	Influence of nanoscale additives on the alternative fuel spray *Kumaran Kannaiyan, Reza Sadr*
Noon-12:200 p.m.	67	Mimetic finite difference method for modeling of geochemical reactive transport in subsurface reservoirs *Qiangshun Guan, Ahmad Abushaikha*
12:20-1:20 p.m.		Lunch Break

1:20-1:50 p.m.		*Invited Speaker:* **YOGESH JALURIA, USA**
Session: **RENEWABLE ENERGY**		*Chair:* **DR. MUFTAH EL NAAS**
1:50-2:10 p.m.	59	Viability of airborne wind energy in the United Kingdom *Zhihui Ye, Harry Lawner, Issa Chaer, Marcus Ross*
2:10-2:30 p.m.	2	Aerodynamics influence of different nose cones and diffusers on the power generation efficiency of wind turbines *Uzaldin Sadick Abdulhussain Al Khnak, Khalid Said Salmeen Al Hinai*
2:30-2:50 p.m.	46	Energy consumption in office buildings with phase change materials *Ahmad Sleiti and Edward Naimaster*
2:50-3:10 p.m.	75	Novel thermomechanical refrigeration cycle utilizing waste heat *Ahmad Sleiti, Anas Rasras, Md Warkejuddin Ahmed, Mohammas Alam and Alexander Kronberg*
3:10-3:30 p.m.	68	Experimental study on geochemical reactions between recharge desalinated water and subsurface carbonate reservoir *Xuan Li, Ahmad Abushaikha, Aziz Rahman*
3:30-3:50 p.m.	79	Multiphase flow behavior during CO2 geo-sequestration in carbonate formations *Shachi Srivastava, Brijesh Kumar Yadav, M. Aziz Rahman, Mayur Pal*
3:50-4:05 p.m.		Coffee Break
4:05-4:25 p.m.	64	Smart cities thermal networks *Issa Chaer, Ian Pope, Alex Paurine*
4:25-4:45 p.m.	54	A model for bainite formation at isothermal temperatures *Gaganpreet Sidhu, Seshasai Srinivasan, Sanjiwan Bhole*
4:45-5:05 p.m.	49	A study on the approximation model of boiler tube wall panel behavior using finite element analysis *Hyun-Soo Kim, Won-Seok Kim, Jung-Hoon Choi, Jong-Wook Lee*
5:05-5:25 p.m.	30	Optimal ecological performance investigation of a quantum harmonic oscillator brayton refrigerator *Xiaowei Liu, Lingen Chen, Shuhuan Wei, Fankai Meng*

Tuesday, February 27, 2018

8 a.m.-noon		Undergraduate Engineering Research Symposium
Session: **THERMO-FLUID**		***Chair:*** **DR. YOGESH JALURIA**
9-9:20 a.m.	48	Investigations on the stability and thermal conductivity of cnt/metal nanocomposites-based nanofluids *Nurettin Sezer and Muammer Koc*
9:20- 9:40 a.m.	55	Near-wall velocity measurements in the impingement zone of a simple micro-jet stream *Anoop Kanjirakat, Reza Sadr, Jorge Alvarado*
9:40-10 a.m.	28	The influence of external magnetic field on thermal conductivity of fe3o4-water magnetic nanofluid *Serkan Doganay, Alpaslan Turgut, Abdulkareem Alasli, Levent Cetin*
10-10:20 a.m.	81	Evaluation of nanofluids performance with vortex generators for enhanced micro-channel heat transfer *Mushtaq. T. Al-Asadi, M.C.T. Wilson*
10:20-10:50 a.m.		Coffee Break
10:50-11:20 a.m.		***Invited Speaker:*** **AHMAD KHAN, USA**
Session: **COMPUTATIONAL FLUID DYNAMICS**		***Chair:*** **DR. AHMAD SLEITI**
11:20-11:40 a.m.	36	Heat transfer enhancement due to internal circulation within a rising fluid drop *Binu T V, Sreenivas Jayanti*
11:40 a.m.-noon	65	Computational fluid dynamic investigation of hydrodynamics in cylindrical and annular fluidized bed reactors *Mohammed Khan, Tariq Shamim*
Noon-12:30 p.m.	61	Transient analysis of air bubble rise in stagnant water column using CFD *Ahmer A. B. Baloch, Haider Ali, Furqan Tahir*

12:20-12:40 p.m.	70	Adiabatic air-water flow visualization and pressure drop in wavy mini-channels *A. Hendy, A. Almomani, D. Rahman, Y. Al-Hamidi, Mohammad A Rahman, Ibrahim Galal Hassan*
12:40-1:10 p.m.		***Invited Speaker:*** **A.A. MOHAMMAD, CANADA**
1:10-2:10 p.m.		Lunch Break
Session: **NUMERICAL AND EXPERIMENTAL APPROACH**		***Chair:*** **DR. AHMAD SAMI ABUSHAIKHA**
2:10-2:30 p.m.	6	Solving non-linear equations by six-order compact finite difference schemes optimized by maximum error norm *Kaveh Fardipour, Kamyar Mansour*
2:30-2:50 p.m.	15	Finite element analysis of composite wind turbine blade under the critical loads *Mourad Nachtane, Mostapha Tarfaoui, Dennoun Saifaoui, Ahmed El Moumen*
2:50-3:10 p.m.	60	CFD study on the vapor route of conventional med desalination plant *Abdelnasser Mabrouk, Ahmed Abotaleb*
3:10-3:30 p.m.	66	Experimental investigations on 49 cm^2 serpentine bipolar plate of a proton exchange membrane fuel cell *Antony Alex, Austin George, Bijo Thomas, Bonny Antony, Rajesh Baby*
3:30-3:45 p.m.		Coffee Break
3:45-4:05 p.m.	8	Experimental and simulation study of water immersion cooling of canned carrot puree *Hakima Acheheb, Amina Adjout, Sabrine Gouba*
4:05-4:25 p.m	58	An experimental investigation of boundary layer transition on rotating cone with different apex angle *Kamyar Mansour, Pejman Mansour Shojaei, Morteza Ghasemi*
4:25-4:45 p.m.	42	Numerical solution of axial flow around a projectile *Ghazal Hosienzadeh, Kamyar Mansour*

4:45-5:05 p.m.	51	Thermal optimisation of fin clusters for heatsink purposes *Muadh Al Hamdani, Mansour Al Qubeissi, Moustafa Al-Damook, Darron Dixon-Hardy, Peter Heggs*
5:05-5:25 p.m	45	Impact of corrected activity coefficient on the estimated droplet heating and evaporation *Nawar Al-Esawi, Mansour Qubeissi, Sergei Sazhin, Nwabueze Emekwuru, Mike Blundell*
7-9 p.m.		Dinner

Wednesday, February 28, 2018

Session: HEAT AND MASS TRANSFER I		*Chair:* DR. AZIZ RAHMAN
8:30-8:50 a.m.	77	Large eddy simulation for prediction of flow in close-coupled elbows *Mohammed Karbon and Ahmad Sleiti*
8:50-9:10 a.m.	69	Turbulence modelling of non-newtonian fluids using a modified rans based model *Xiao Hiong, Mohammad A Rahman, Yan Zhang*
9:10-9:30 a.m.	38	Local stability of a generalized irreversible heat engine with linear phenomenological heat transfer law working in an ecological regime *Lingen Chen, Xiaohui Wu, Xiaowei Liu*
9:30-9:50 a.m.		Coffee Break
9:50-10:20 a.m.		*Invited Speaker:* FEI DUAN, SINGAPORE
10:20-10:50 a.m.		*Invited Speaker:* DEAN VUCINIC, BELGIUM

Session: **HEAT AND MASS TRANSFER II**		*Chair:* **DR. UZALDIN SADICK AL KHNAK**
10:50-11:10 a.m.	10	Comparative analysis of a di diesel engine fuelled with ethanol blends during the experimental and numerical simulation cycle: performance and emissions *Mohammed Salih Mahjoub, Uzaldin Sadick Al Khnak*
11:10-11:30 a.m.	29	Development of self catalyzed in-situ biodiesel production process from gamma irradiated castor seeds (ricinus communis) using hybrid reactor *Kartik Thakkar, Surendra Singh Kachhwaha, Pravin Kodgire*
11:30-11:50 a.m.	82	Detonative combustion in a pulse combustor when enriching the heptane-Air mixture with oxygen *Kh. Alhussan, M.S. Assad, O.G. Penyazkov, I.I Chernuho*
11:50 a.m. - 12:10 p.m.	53	A modified solar basin using as a bubbler humidifier *Hanen Ben Halima, Nader Frikha, Slimane Gabsi*
12:10-12:30 p.m.	78	An experimental investigation of improved oil recovery in carbonate samples using foam flooding *Yossra Osman, Ibrahim Almaghrabi, M. Azizur Rahman, Thomas Seers*
12:30-12:50 p.m.	83	An experimental study of structured packing dehumidifier operating with liquid desiccant under variable fresh air ratios *Abdelhamid Attia, Mohamed A. Teamah, Wael M. El-Maghlany, A. E. El-Saharty*
12:50-2 p.m.		Lunch

POSTERS

71	The influence of groundwater on the bearing capacity of strip footings on sands *Alaoua Bouaicha, Abdelouahab Bouttout, Sid Ali Rafa, Idriss Rouaz*
24	Effects of geometry and buoyant-thermocapillary convection on vortex flows in an open cylinder *Malika Imoula, Rachid Saci, Mustapha Fekhar*
41	Effects of buoyancy on the reattachment length in flow over heated vertical backward facing step *Ajith Kumar, Sanju Santhosh*
35	Thermal and acoustic performance of the mortar mixing with crumb rubber used in building Abdelouahab Bouttout, Mohamed Amara
25	Combined turbulent natural convection and surface radiation in enclosure bounded by solid walls with different thermophysical properties *Igor Miroshnichenko, Mikhail Sheremet*
37	Numerical simulation of convective-radiative heat transfer in a square cavity having local triangular heat-generating source *Nikita Gibanov, Mikhail Sheremet*
18	Thermal performance in high porosity open-cell aluminum foams *Christopher Welsford, Pirassanth Thanapathy, M. Ziad Saghir, Ayman M. Bayomy*
14	Modelling and simulation of the mechanical response of composite nozzle for an optimal design of a tidal turbine *Mostapha Tarfaoui, Mourad Nachtane, Ahmed El Moumen*
72	Numerical analysis of a micro mixer connected with a micro oscillator *Abdelhakim Benali, Brahim Dennai, Rachid Khelfaoui*
83	An experimental study of structured packing dehumidifier operating with liquid desiccant under variable fresh air ratios *Abdelhamid Attia, Mohamed A. Teamah, Wael M. El-Maghlany, A. E. El-Saharty*
17	Analysis of the energy balance in the interaction zone during stainless steel laser cutting *Samia Aggoune, El-Hachemi Amara*
63	Modeling the temperature effect on PEM fuel cell performance *Yassine Amadane, Hamid Mounir, Abdellatif Elmarjani, Ghassane Ayad*

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