XI-th International Conference on Computational Heat, Mass and Momentum Transfer **(ICCHMT 2018)**

Conference program

Conference venue: Galaxy Hotel, ul. Gęsia 22, Kraków

1. Few words about the ICCHMT2018 Conference

Tradition is that the engineers and scientists come together to share experiences every two years on the international conference. Great need to organize a meeting before, disturbed the existing trend. In 2018 we fell the honour of organizing the conference in Cracow, Poland. We hope that this meeting will be productive not only for the exchange of experiences, ideas and changes in methods and applications computational in the topics of fluid dynamics and heat and mass transfer, but also will be a good opportunity for young engineers and scientists to learn about new trends in computational methods.

Conference history	
1999 – Magusa, Cyprus	2011 – Istanbul, Turkey
2001 – Rio de Janeiro, Brazil	2015 – Istanbul, Turkey
2003 – Banff, Canada	2016 – Cracow, Poland
2005 – Paris, France	2017 – Seoul, South Korea
2007 – Canmore, Canada	2018 – Cracow, Poland
2009 – Guangzhou, China	

Conference topics	
✓ Heat Exchangers / Heat Pipe	✓ Complex Chemical Reaction Modeling
✓ Internal Flow and Heat Transfer	✓ Compressible Flows
✓ Micro/Nano Heat and Mass Transfer	✓ Convection and Buoyancy-Driven Flows
✓ Mixing Devices and Phenomena	✓ Double Diffusive Convection
✓ Multi-Phase Flows	✓ Fluid Flow and Heat Transfer in Biomedical Devices and Biotechnology
✓ Optimization in Thermal Engineering	✓ Fluid Machinery
✓ Reactive Flows and Combustion	✓ Granular Flows
✓ Steam and Gas Turbines	✓ Heat and Mass Transfer in Manufacturing and Materials Processing
✓ Technology for Renewable Energy Sources	✓ Heat and Mass Transfer in Nuclear Applications
✓ Thermal Flow Visualization	✓ Heat and Mass Transfer in Particle-Laden Flows
✓ Thermal Fluid Machinery	✓ Energy Saving Process
✓ Transport Phenomena in Porous Media	✓ Thermal Heat Fluxes
✓ Waste Management and Waste Disposal	✓ Urban energy Flows
✓ Advanced Numerical Methods	✓ Computational Thermal Fluid Dynamics
✓ Aeronautical and Space Applications	✓ Building-integrated Energy and Power Systems
✓ Bio-Fluidics and Biomedical Engineering	

In 2018 year the conference is organized by Cracow University of Technology, Institute of Thermal Power Engineering. The conference partners are:

- ✓ University of Calgary, Schulich School of Engineering (Canada)
- ✓ Department of Astronautics Engineering, Electrical and Energy (DIAEE) Sapienza University of Rome (Italy)
- ✓ Laboratory of Mechanics and Technology (LMT), University Paris Saclay (France)

2. Cracow City

Cracow is one of the most beautiful cities in Europe. Numerous tourist attractions e.g. Cracow monuments and rich cultural offer of the city have been appreciated worldwide. In 2005. Cracow took 5th place on the list of the most interesting cities in Europe, prepared by the prestigious magazine "Travel and Leisure". However, in 2006. American agency Orbitz castle Krak recognized as the most fashionable in the world. Cracow is the administrative centre of Malopolska and one of the most important centres of the economic, scientific and cultural country. Until 1795. Cracow was the official capital of the Polish, and remind us that in numerous monuments.

For centuries the **Main Market Square** was the main commercial and administrative center of Cracow. Today, around the largest medieval square in Europe thriving social life, and such a disc Market is the perfect venue for holidays and occasional fairs, as well as various festivals and concerts. The Main Market Square is one of the biggest in the Europe, and commonly visited by the tourists from all parts of the world.

Wawel castle is located on a hill overlooking the Vistula River. It is particularly important that the historical reasons, was the seat of kings, and the burial place of many Polish celebrities. Legend has it that in prehistoric times at the foot of Wawel Castle in the cave lived predatory dragon who terrorized local people until ingenious cobbler tossed him to eat lamb stuffed with burning sulphur.

Church of the Virgin Mary is located in the north - east corner of the main square. The diagonal alignment with the axis of the market shows that the first Romanesque temple was built in this place before the foundation of the town (1257 year). The current three-nave basilica maintained in the Gothic style was built at the end of the fourteenth century. The chapels were built in the fifteenth century. Afterwards, the main body of the church has changed slightly over next centuries.

Standing in the middle of the Market Square, the **Cloth Hall** is one of the most typical sights of Cracow. As in the past, this building meets primarily commercial, but now instead of visiting Cloth merchants primarily tourists. Beneath the Cloth Hall exists the created in the modern style the underground Cracow Museum.

3. About the organizer

Cracow University of Technology

Faculty of Mechanical Engineering

Institute of Thermal Power Engineering

Institute of Thermal Power Engineering (I TPE) from Cracow University of Technology provides a wide range of research and education in the field of advanced energy technologies. ITPE performs expert works for the power sector, as well as investigations of the most advanced technologies for energy generation. Thus, ITPE is providing technical solutions and advanced analysis for the broad range of power technologies, such as:

- thermal power engineering,
- process engineering,
- clean coal and gas technologies,
- renewable and sustainable energy sources.

The main advantage of the Institute is the experienced scientific, engineering and technical staff as well as numerous modern laboratory facilities. ITPE research team was involved in the realization of various international (COST 538 − High−Temperature Plant Lifetime Extension, TEWI IT Platform – EU Operational Program) and over 100 nationwide research projects.
Scientific activity of ITPE results in cooperation with many industrial and scientific partners, at home and abroad, and providing numerous implementation for the industry, involving:

- design, optimization, and monitoring systems for power boilers,
- shortening the start-up time of steam boilers and the entire power plant due to monitoring of thermal stresses in criterial boiler components,
- monitoring of pressure components remnant lifetime for steam boilers,
- inverse heat conduction methods including measurements of heat flux and heat transfer coefficient,
- numerical modeling of steam superheaters using CFD simulations (Ansys Fluent, CFX) and own codes,
- design, optimization and CFD analysis of heat exchangers,
- identification of actual working conditions for power units (including temperature, heat flux, heat transfer coefficient, thermal conductivity, thermal stresses, and pollutants emission measurements),
- optimization of power equipment operation,
- HVAC systems design and optimization.

Cooperation with the industry:

1. Nuclear Power Plant Forsmarks Kraftgrupp AB, Huvudforradet, SE-74203 Osthammar – determination of the heat flux density at the surface of the fuel rods of a nuclear reactor.
2. Comex S.A., Olav Ingstadsvei 5, 1309 Rud, Norway – investigation of the flow phenomenon occurring in industrial jet mills.
3. Électricité de France R&D - EDF Polska – optimization of steam boilers.
4. ČEZ S.A., Skawina Power Plant– optimization of steam boilers.

International cooperation:

1. University of Calgary, Canada
2. La Sapienza University of Rome, Italy
3. University of Bologna, Italy
4. University of Goettingen, Germany
5. Technical University of Hamburg-Harburg, Germany
6. Universität Stuttgart, Germany, Institut für Feuerungs- und Kraftwerkstechnik (IFK),
7. Universität Stuttgart, Materialprüfungsanstalt, Germany,
8. Shizuoka University, Department of Mechanical Engineering, Hamamatsu, Japan,
9. Universität Duisburg-Essen, Institut für Energie- und Umweltverfahrenstechnik, Umweltverfahrenstechnik und Anlagentechnik, Germany,
10. Université de Nantes, France,
11. Technische Universität Dresden, Fac. of Mechan. Engineering, Inst. of Power Engineering,Cranfield University, Energy Technology Centre at Cranfield University, England,
12. Pennsylvania State University, USA.

Keynote Speakers

Henrik Lund, Aalborg University, Denmark

BIO

Dr Henrik Lund is Professor in Energy Planning at Aalborg University and Editor-in-Chief of Elsevier International journal ENERGY. For more than 25 years, his area of expertise has been energy system analysis, energy planning and energy economics. He is the author of more than 200 books and articles and on the Thomson Reuters list of the most highly cited researches in the world.

Title: Smart Energy Systems and the Danish Plans for Renewable Energy

Abstract

This lecture presents the learning of a series of studies that analyze the problems and perspectives of converting the present energy system into a 100 percent renewable energy system using a smart energy systems approach. As opposed to, for instance, the smart grid concept, which takes a sole focus on the electricity sector, smart energy systems include the entire energy system in its approach to identifying suitable energy infrastructure designs and operation strategies including transportation and aviation. The typical smart grid sole focus on the electricity sector often leads to the definition of transmission lines, flexible electricity demands and electricity storage as the primary means to deal with the integration of fluctuating renewable sources. However, the nature of wind power and similar sources has the consequence that these measures are neither very effective nor cost-efficient. The most effective and least-cost solutions are to be found when the electricity sector is combined with the heating sector and/or the transportation sector. Moreover, the combination of electricity and gas infrastructures may play an important role in the design of future renewable energy systems. This presentation illustrates why electricity smart grids should be seen as part of overall smart energy systems and with the case of Denmark illustrate how to design such future energy system.

Mustafa Mohamad, New York University, USA

BIO

Dr. Mustafa Mohamad received his Bachelor's degree in Engineering mechanics with a minor in mathematics in 2012 from the University of Illinois at Urbana-Champaign, graduating with highest honors as a Bronze tablet scholar. He obtained both his Master's degree in 2015 and PhD in 2017 from the Massachusetts Institute of Technology in Mechanical Engineering and Computation working on extreme events in dynamical systems. He is currently a postdoctoral associate at the Courant Institute of Mathematical Sciences at New York University.

Title: Strategies for extreme event quantification in intermittent dynamical systems

Abstract

A wide range of dynamical systems encountered in nature and technology are characterized by the presence of intermittent events with strongly transient characteristics, such as in turbulent fluid flows, water waves, chemical reactions, and numerous other engineering systems. Although extreme events typically occur infrequently, they usually have drastic consequences and are important to quantify for design optimization, uncertainty quantification, and reliability assessment. There is a practical need for quickly evaluating the probabilistic response, including extreme event statistics, for such systems that are undergoing transient and extreme responses, but unfortunately, the task is often too computational demanding to make such analysis feasible since intermittent events occur infrequently and have unique characteristics (traditional analysis fail to capture these critical events). We present a decomposition based probabilistic approach that can accurately capture the probability distribution, many standard deviations away from the mean, at a fraction of the cost of Monte Carlo simulations, for intermittent dynamical systems and present an adaptive sampling based method to capture response statistics via a limited set of experiments. We present applications of this method to prototype systems ranging from rogue waves in the ocean to structural systems subjected to extreme forcing events.

Qiuwang Wang, Xi'an Jiaotong University, China

BIO

Dr. Qiuwang Wang is now a full professor and vice-Dean of School of Energy and Power Engineering, Xi'an Jiaotong University. He is also the executive director of International Joint Research Lab of Thermal Science and Engineering, MOE of China. He is the Leader of Innovation Team in Key Areas of Ministry of Science and Technology (2016), and a recipient of National Funds for Distinguished Young Scientists by NSF of China (2010) and Changjiang Scholarship Chair Professor by Ministry of Education of China (2013). His research team obtained the 2nd Grade National Award for Technological Invention of China (2015) and National Science and Technology Progress Award of China (Innovation Team, 2017). Dr. Wang is now the China Delegate of Assembly for International Heat Transfer Conferences (AIHTC), a member of Scientific Council of the International Centre for Heat and Mass Transfer (ICHMT), Chair of ASME Heat Transfer Division K-18, an Associate Editor of Heat Transfer Engineering Journal, and Editorial Board Members for several international journals such as Energy Conversion and Management, Applied Thermal Engineering, Energies etc. He is the Initiator of International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control (IWHT) (since 2011, 2011-Xi'an, 2013-Xi'an, 2015-Taipei, 2017-Las Vegas). In China, he is a vice president of Chinese Society of Engineering Thermophysics in Heat and Mass Transfer. Dr. Wang's research interests include heat transfer enhancement and its applications to engineering problems, high-temperature/high-pressure heat transfer and fluid flow, transport phenomena in porous media, numerical simulation, prediction & optimization, etc. He has delivered more than 40 Plenary/Keynote/Invited lectures in international conferences or foreign universities. He has also been authors or co-authors of 4 books and more than 180 international journal papers. He has obtained 20 China Invent Patents and 2 US Patents.

Title: Investigations on interface behaviors between different materials by using molecular dynamics simulation

Abstract

Friction, sintering and welding are three quite important and complex processes in industry field. All of them contain various phenomena, such as diffusion, energy transformation, deformation and material transfer. Especially at the interface, the atoms diffusion between different materials can greatly change the physical and mechanical properties of the materials and further influence the whole process. Many work have been done on those three processes,

but most of them concerned about the the variation rules of macro properties. Therefore, very few of them realized that the nano-scale interface diffusion was of great importance. Therefore, we need to better understand the governing mechanisms of the interface diffusion with the ultimate goal of being able to predict and therefore control friction, sintering and welding processes in various industry applications. However, those interface diffusion is nanoscale and transient. It is not easy to be observed by the experiments. Molecular dynamics simulation is an efficient and suitable numerical method to qualitatively and identifiably model the nano-scale interface behaviors and show the processes with detailed microscopic structure evolution. Therefore, we use molecular dynamics simulation method to investigate the interface behavior in friction, sintering and welding processes. The presentation will include three parts as follows. In Part I, the dry friction with single crystal and polycrystalline, and the lubricant friction with third medium are performed by using MD simulations. The details of the microstructure evolution are investigated. The friction characteristics and friction heat dissipation process are also studied. The results show that the mixing layer formed at the interface is the key role during high-speed sliding which has great influence on changing the friction force and friction heat dissipation. The stable gradient structure at the interface has a good performance on enhancing the friction heat dissipation during high-speed sliding. Besides, the metal particles which are used as the lubricant additive can improve the heat conductivity of the lubricant, so as to remove the friction heat generated at the interface more quickly. In Part II, the MD simulations are used to reconstruct the nanostructure of the typical NiO-YSZ electrode. The sintering process of the electrode is simulated and it is found that sintering at relatively low temperature and high pressure could contribute to the densification of the anode. Then effects of the sintering temperature, sintering pressure and material composition on the nanostructure and thermophysical properties of the sintered anode are systematically discussed. Results in this study could provide a guide of the sintering conditions and composition during the experimental studies to obtain the desired properties of the SOFC anode. In Part III, with the help of MD method, the diffusion mechanism and influencing factors during the welding process is also simulated. Three Cu-Al models with different interface planes under the changes of elevated temperature are studied, and the diffusion coefficients of each element are also achieved. It can be found that the thickness of the transition layer increases with the temperature, and it is greatly influenced by the diffusion direction. The numerical result is validated by the computation of mean square displacement. The influencing mechanism of interface on diffusion in the resent study will provide significant guidance on the manufacturing of composite materials.

	21 May
08:00	**REGISTRATION**
08:45-9:00	**OPENING**
9:00-11:00	**KEYNOTE SESSION 1 (Rooms A-F)** **Session Chairmans: Wen Quan Tao, Abdulmajeed A. Mohamad, Jan Taler**
9:00-9:40	*Smart Energy Systems and the Danish Plans for Renewable Energy*, **Henrik Lund**
9:40-10:20	*Strategies for extreme event quantification in intermittent dynamical systems*; **Mustafa Mohamad**
10:20-11:00	*Investigations on interface behaviors between different materials by using molecular dynamics simulation*; Kai Chen, Pei Fu, Xionghui Li and **Qiuwang Wang**
11:00-11:20	**COFFEE BREAK**
11:20 - 13:20	**PARALELL SESSION 1**
11:20-13:20	**ENERGY SYSTEMS SIMULATION (Room A)** **Session Chairman: Ali Cemal Benim**
11:20-11:35	*The theoretical performance evaluation of hybrid pv-teg system*; Babu, Challa; Ponnambalam,P
11:35-11:50	*Finite element analysis of pultrusion processes with a complex temperature control*; Evgeny Barkanov, Pavel Akishin, Alexey Bondarchuk and Nikos Pantelelis
11:50-12:05	*Application of heat transfer and pressure drop correlations for evaporation of r227ea, r1234ze and r1234yf in plate heat exchangers in orc power plant*, Marcin Jankowski, Sławomir Wiśniewski, Aleksandra Borsukiewicz
12:05-12:20	*Heat Exchanger Network Retrofit Identification and Modelling*; Timothy G. Walmsley, Nathan S. Lal, Michael R.W. Walmsley, Petar S. Varbanov, Jiří J. Klemeš
12:20-12:35	*Exergy and energy analysis of a heat pipe solar collector*; Kods, Grissa; Adel M., Benselama
12:35-12:50	*Energy analysis of thermal drying: a comparative evaluation among three different scenario*; Andrea, Aquino; Anis, Mustapha; Pietro Poesio
12:50-13:05	*Energy Improvement of β -type Stirling Engine through Gas Blending: CFD Study*; Ahmed, Abuelyamen; Rached, Ben-Mansour
13:05-13:20	*A model of the innovating power plant equipped with liquid turbine and hydraulic-gas generator of working agent's flow, sources by waste heat*; Wojciech Bujalski, Kamil Futyma, Jarosław Milewski, Arkadiusz Szczęśniak
11:20-13:20	**FLOW SIMULATION (Room B)** **Session Chairman: Qiuwang Wang**
11:20-11:35	*A novel cfd multi-field concept of boiling including flow pattern transitions in a vertical pipe*; Thomas Höhne; Eckhard Krepper, Dirk Lucas
11:35-11:50	*Transition from convective to absolute instability in a horizontal porous flow*; Antonio Barletta, Michele Celli
11:50-12:05	*Numerical Study of the Effect of Forced convective Flow on Dropwise Condensation by Thermal LBM Simulation*; Shaofei, Zheng; Ferdinand, Eimann; Tobias, Fieback; Ulrich, Gross
12:05-12:20	*A two-fluid model for semi-dilute entangled polymer solutions*; Soroush Hooshyar, Natalie Germann

12:20-12:35	*An investigation of implicit turbulence modeling for laminar-turbulent transition in natural convection*; ChungGang Li, Makoto Tsubokura, WeiHsiang Wang, Keiji Onishi, Rahul Bale
12:35-12:50	*Numerical study of the effect of heat transfer on solid phase formation during decompression of CO_2 in pipelines*; Sergey Martynov, Wentian Zheng, and Haroun Mahgerefteh
12:50-13:05	*Computational modelling of dispersion flow and heat transfer from a leak in a buried high-pressure pipeline transporting ethylene*; Sergey Martynov , Haroun Mahgerefteh, Jerome Hebrard , Tomasz Olewski , Luc Véchot , and Ioannis Economou
13:05-13:20	*One-dimensional simulation of synergistic desulfurization and denitrification process for electrostatic precipitators based on a fluid-chemical reaction hybrid model*; Chao Zhang, Shuai Li, Jinlai Meng, Lixin Yang
11:20-13:20	**CONVECTION HEAT TRANSFER (Room C)** **Session Chairman: Mustafa Mohamad**
11:20-11:35	*Buoyancy driven convection for an inclined porous layer with isobaric boundaries*; Michele Celli, Antonio Barletta
11:35-11:50	*Mesoscopic simulation of natural convection and entropy generation in a square cavity with inner porous cylinder*; Vijaybabu, Thappali Rajendran; Dhinakaran, Shanmugam.
11:50-12:05	*Numerical Challenges with Convection in Concentrated Solution Theories and Their Application to 3D Simulations of Zinc-Air Batteries*; Tobias Schmitt, Birger Horstmann, Arnulf Latz
12:05-12:20	*Numerical investigation for convecive heat transfer and friction factor under pulsating flow conditions*; Erman Aslan, Mert Ozsaban, Guven Ozcelik, Hasan Riza Guven
12:20-12:35	*Determination of the heat transfer coefficient for an array of free surface water jets*; Arkadiusz Ryfa, Marek Rojczyk, Wojciech Adamczyk
12:35-12:50	*Optimum Conductivity Ratio and Wall Thickness for Conjugate Natural Convection in Vertical Eccentric Annuli*; Ahmad Jamal, Esmail M. A. Mokheimer, Maged A. I. El-Shaarawi
12:50-13:05	*Convection in vertical annular gap effected by rotating outer cylinder and imposed axial flow at inlet*; Chithrakumar V.K., Vasantha Krishnan, G. Venugopal, Gangadharan, Raj kumar M. R., Mattacaud Ramachandra Lal
13:05-13:20	*Identification of heat transfer coefficient for water spray cooling of high thermal conductivity materials*; Agnieszka Cebo-Rudnicka, Zbiegniew Malinowski
11:20-13:20	**INVERSE HEAT TRANSFER PROBLEMS AND OPTIMIZATION (Room D)** **Session Chairman: Haroun Mahgerefteh**
11:20-11:35	*Parametric optimization of longitudinal vortex generators in a rectangular microchannel for heat transfer enhancement*; Jianfei, Zhang; Long, Jia; Weiwei, Yang; Jan, Taler; Pawel, Ocłoń
11:35-11:50	*Multi-Objective Optimization of Laidback Fan-Shaped Film Cooling Hole on Turbine Vane Suction Surface*; Huang,Ying; Jingzhou, Zhang; Chunhua, Wang, Xingdan Zhu

11:50-12:05	*Response surface optimization methods comparison based on the simply conduction-convection heat transfer case*; Przemyslaw Młynarczyk
12:05-12:20	*Numerical and experimental investigation on configuration optimization of the large-size ionic wind pum*p; Jianfei, Zhang; Lingjian, Kong; Jingguo, Qu; Shuang, Wang
12:20-12:35	*First and second order Dual phase lag equation*; Ewa Majchrzak, Bohdan Mochnacki
12:35-12:50	*Optimization of side holes in a double j stent for high urine flow in the stenotic ureter*; Hyoung-Ho Kim, Kyung-Wuk Kim, Young Ho Choi, Seung Bae Lee, Yasutaka Baba, Sang-Ho Suh
12:50-13:05	*QuickerSim CFD Toolbox for MATLAB - application in CFD and heat transfer*, Wojciech Regulski
13:30-14:20	**LUNCH**
14:20 - 16:20	**PARALELL SESSION 2**
14:20-16:20	**ENERGY SYSTEMS AND DEVICES (Room A)** **Session Chairman: Abdulmajeed A. Mohamad**
14:20-14:35	*Energy demand for water desalination in china*; Xuexiu Jia, Jiří Jaromir. Klemeš, Petar Sabev. Varbanov, Sharifah Rafidah Wan Alwi
14:35-14:50	*EGS Concept in Turkey*; Arif Mert Eker, Hüseyin Dünya
14:50-15:05	*Potentiality of Converting Low-Grade Industrial Waste Heat into Power in Oman*; Abdullah Al-Janabi, Ghassan Al-Hajri, Tariq Al-Maashani,
15:05-15:20	*Study of a Hydraulic System Converting Energy from Sea Waves near the Coast*; Mario Amelio, Silvio Barbarelli, Gaetano Florio, Nino Michele Scornaienchi
15:20-15:35	*A preliminary numerical study of the thermohydraulics of an EGS Project in Turkey*; Aydin Cicek, Ali Cemal Benim, Arif Mert Eker
15:35-15:50	*Multiphase CFD modelling of thermal radiation as a result of fires following a well blowout during shale gas production*; Haroun Mahgerefteh, Sergey Martynov, Kanokwan Buaprommart, Alberto Striolo
15:50-16:05	*Field and CFD study of fuel distribution in pf boilers*; Szymon Ciukaj, Bartłomiej Hernik
16:05-16:20	*Numerical modelling of Stirling engine for recovery of cryogenic exergy of LNG;* Adam Kabaj, Zbigniew Buliński, Tomasz Krysiński
14:20-16:20	**COMBUSTION (Room B)** **Session Chairman: Marcin Trojan**
14:20-14:35	*Numerical simulation of a simplified, transient, 2d, non-reactive heat transfer model of a lab-scale fixed-bed pyrolysis reactor;* Santiago Ortiz Ruiz; Gerardo Gordillo, Abdulmajeed Mohamad
14:35-14:50	*Thermal activation of the combustion chamber of a reciprocating internal combustion engine*; Zbigniew Sroka, Zbigniew Sadlak

14:50-15:05	*A numerical study on the flow distribution and pressure drop of parallel multi-cyclones in heat recovery boiler line*; Kyehwan Jang
15:05-15:20	*Numerical study of non-premixed cross flow biogas-air flames*; Harish, A; Bhupendra Kumar, Tyagi Raghavan, V.
14:20-16:20	**THERMAL ENERY STORAGE AND UTILIZATION (Room C)** **Session Chairman: Ulrich Gross**
14:20-14:35	*Numerical study of heat and mass flow in PHES Layered Bed Heat Storage*; Jędrzej Mosiężny, Bartosz Ziegler, Paweł Czyżewski
14:35-14:50	*Numerical Analysis of Thermal Ground Plane on A New Type Heat Exchanger* ; Shuang Han, Lixin Yang
14:50-15:05	*Experimental investigation of solar reflectance directional dependence of retroreflective materials*; Gabriele Battista, Luca Mauri, Chiara Colucci, Andrea Vallati, Roberto de Lieto Vollaro
15:05-15:20	*Energetic and exergetic analysis of three different configurations of a water-compressed gas energy storage*; Andrea Vallati, Giorgio Galli, Ciarra Colucci, Luca. Mauri, Paweł Ocłoń
15:20-15:35	*Numerical modelling of transient heat transfer in heat storage unit with channel structure*; Dawid Taler, Piotr Dzierwa, Marcin Trojan, Jacek Sacharczuk, Karol Kaczmarski, Jan Taler
15:35-15:50	*Energetic modernization of urban quarters towards the energy-plus house standard using linear optimization*, Matthias Słoński
14:20-16:20	**ENGINEERING APPLICATION (Room D)** **Session Chairman: Rachid Bennacer**
14:20-14:35	*Numerical Research on Effective Thermal Conductivities of Plain Woven C/SiC Composites*; Yong Liu, Zhiguo Qu, Jianfei Zhang
14:35-14:50	*Investigation of non-uniform temperature influence on plasmonic solar cell;* Jiajia Zhang, Zhiguo Qu
14:50-15:05	*Thermal validation, structural implications and redesign proposals of the multipurpose external dump of the Proton Synchrotron at CERN*; André Pilan Zanoni, Marco Calviani, Edouard Grenier-Boley
15:05-15:20	*Thermal performance and design improvement of beam stoppers under superficial heat transfer from intense ion beams in matter*; André Pilan Zanoni, Jose Antonio Briz Monago, Marco Calviani
15:20-15:35	*Numerical simulation of different data density of rough surfaces on thermal contact resistance of woven pierced composites*; Xing-Jie Ren, Jian-Jun Gou, Yan-Jun Dai, Wen-Quan Tao
15:35-15:50	*Computational analysis of wake effect and its relation to power deficit and spatial distribution of a wind farm*; Riveros Nieto, Daniel Esteban; Benavides Morán, Aldo Germán
15:50-16:05	*Design and Manufacture of a Marine Propeller for Scale Boat in Speed and Energy Efficiency Contest*; Riveros Nieto, Daniel Esteban; López Ochoa, Diana Maria
16:05-16:20	*Numerical Study on Dynamic Wettability of Microstructure Surface*; Shuang Han, Lixin Yang, Runhua Yang, Zihao Tian

16:20 – 16:40	**COFFEE BREAK**
16:40-18:00	**POSTER SESSION 1**

POSTER SESSION 1 **Session Chairman: Jian-Fei Zhang, Marimuthu Uthayakumar**	
1	*Heat transfer mechanism in block coal at high temperatures;* Ilmutdin Abdulagatov, Ada Ramazanova, Zumrud Abdulagatova, Ranjith Gamage
2	*Estimation of thermal parameters of a double-glazed air solar collector prototype; Hocine* Mzad; Abdessalam Otmani; Stanisław Łopata; Paweł Ocłoń
3	*Numerical analysis and simulation of the heat recovery from wastewater using heat exchanger*; Timea GABOR, Ancuta-Elena TIUC, Ioana Monica SUR, Iulian Nicolae BADILA
4	*Shape and operation optimization of a thick-walled power boiler component; Piotr Duda, Mirosław* W. Mrzygłód
5	*Modeling of the heat transfer process in an air heat pump fanless evaporator;* Piotr Kopeć, Beata Niezgoda-Żelasko
6	*Hydrodynamics of multiphase flow for cocurrent upward and downward flow in conventional channels and minichannels;* Daniel Janecki, Roman Ulbrich
7	*Study on thermal insulation of LNG cryogenic road tanker; Edward Lisowski, Filip Lisowski*
8	*Numerical analysis of reduction on Marangoni flow strength in an evaporating sessile drop; Sungchan Yun*
9	*The influence of temperature on algal biomass growth for biogas production; Monika Pawlita-Posmyk, Małgorzata* Wzorek, Małgorzata Płaczek
10	*The influence of the numerical solver selection on the nozzle impulse flow simulation results;* Przemyslaw Młynarczyk
11	*How the urban environment affects the microclimate and the building energy demand for the city of Rome*; Chiara, Colucci; Andrea, Vallati; Luca, Mauri.
12	*About the shortwave multiple reflections in an urban street canyon buildings related to three different European climate*; Chiara, Colucci; Andrea, Vallati; Luca, Mauri.
13	*Mathematical model of thermal conductivity for new structural and functional materials with a granular structure;* George Kuvyrkin, Inga Savelyeva, Daria Kuvshinnikova
14	*The application of Picard method in identification of the heat transfer coefficient in flow boiling in a minichanel*; Mirosław Grabowski, Sylwia Hożejowska, Anna Pawińska, Mieczysław E. Poniewski
15	*Effect of viscous dissipation in two-dimensional Stokes flow between rotating cylinders by boundary element method;* Tomasz Janusz Teleszewski
16	*Recent Developments of Treatment Technologies for Municipal Solid Waste Management;* Xuechao Wang, Yee Van Fan, Petar Sabev Varbanov, Jiří Jaromír Klemeš
17	*Theoretical modeling and experimental study of auxiliary concrete accumulator for solar heating systems*; Jacek Sacharczuk; Dawid Taler
18	*Modeling of thermal properties of a thermal insulation layered by transparent, opaque and reflective film;* Beata Grabowska; Jacek Kasperski
19	*Development of a low invasive and inexpensive albedometer for on scale models of urban canyons*; Luca Mauri, Gabriele Battista, Roberto de Lieto Vollaro
20	*Numerical model for the characterization of retro reflective materials behavior in an urban street canyon*; Luca Mauri, Chiara Colucci, Andrea Vallati.

21	*Numerical analysis of flow in a modular heat exchanger used in a food* industrial plants; Wojciech, Judt; Jarosław, Bartoszewicz;
22	*An inverse geometric problem in steady state heat* conduction - the solution and stability analysis ; Leszek, Hożejowski
23	*Use of 3-D modeling for hydraulic calculation of heat accumulator;* Olha Kletska, Anatoliy Falendysh, Artur Kagramanian, Andrii Onyshchenko
24	*Simulation of a continuous casting process subjected to water-sprays cooling;* Hocine Mzad; Abdessalam Othmani; Kamel Bey, Stanisław Łopata
25	*Numerical determination of temperature distribution in heating network; Pawel Ocłoń, Marzena* Nowak-Ocłoń
26	*Nonlinear mathematical model of a steam boiler with natural circulation;* Marcin Trojan
27	*The use of hot water storage tanks to increase the flexibility of thermal power plants,* Trojan Marcin, Taler Jan, Dzierwa Piotr, Taler Dawid, Kaczmarski Karol
28	*Simulation of steam superheater operation under expansion conditions; Wiesław Zima*
29	*Influence of biomass co-combustion on heated surfaces thermal efficiency; Karol Witkowski, Sławomir Grądziel*
30	*Analysis of thermal and flow phenomena occurring in the natural circulation boiler evaporator*; Sławomir Grądziel
31	*Determination of boiler start-up curves due to stresses in critical pressure elements*; Piotr Dzierwa
32	*The use of a quasi-stationary approach to determine the permissible temperature rates in pressurized thick-walled elements;* Piotr Dzierwa
33	*Quasi-steady state in pressure parts of boilers heated nonuniformly on the circumference;* Piotr Dzierwa
34	*Buoyancy-induced convection from a pair of horizontal cylinders enclosed in a square cooled cavity*; Marta Cianfrini; Massimo Corcione; Emanuele Habib; Pawel Oclon, Alessandro Quintino; Elisa Ricci; Vincenzo Spena; Andrea Vallati
35	*Laminar natural convection from a vertical array of heated cylinders inside a square cavity*; Marta Cianfrini; Massimo Corcione; Alessandro Quintino; Elisa Ricci; Vincenzo Spena
36	*Air flow characteristics of a room with air vortex diffuser*; Marek Borowski, Marek Jaszczur, Daniel Satoła, Michał Karch
37	*CFD consideration of influence of mixing parameter in parallel flow regenerative shaft kilns using porous media model*; Kamyar Mohammadpour, Eckehard Specht
38	*Evaluation and selection of energy technologies using a simple multi-attribute decision making method,* Ravipudi Venkata Rao, Jan Taler and Paweł Ocłoń
39	*Experimental and numerical investigation on characteristics of electrostatic air accelerator with multiple needles-to-mesh electrode*; J. F. Zhang, S. Wang, M. J. Zeng, Z. G. Qu
40	*Leiderfrost evaporation of water droplet;* Tadeusz Orzechowski
41	*Natural convection from a pair of differentially-heated horizontal cylinders in a nanofluid-filled inclined square enclosure,* Massimo Corcione, Emanuele Habib, Alessandro Quintino, Elsia Ricci
42	*Numerical Simulation of Premixed Hydrogen Flame Past a Quenching Mesh*; Ali Cemal Benim, Bjoern Pfeiffelmann
43	*Numerical Study of Lifted Hydrogen Flame*; Sohail Iqbal, Ali Cemal Benim, Franz Joos
44	*Heat Transfer and Fluid Flow Behaviours of a Circular Twisted Channel*; Suvanjan Bhattacharyya, Himadri Chattopadhyay, Arnab Banerjee, Ali Cemal Benim
45	*Numerical study on bouncing dynamics of an unequally combined drop on a solid surface*; Sungchan Yun
46	*Bouncing characteristics of an ellipsoidal drop on a solid surface*; Sungchan Yun
47	*Numerical study on sloshing characteristics with Reynolds number variation in a*

	rectangular tank; Hyunjong Kim, Mohan Kumar Dey , Nobuyuki Oshima, YeonWon Lee
48	*An investigation of the electrical load temporal resolution on the photovoltaic system electrical energy flows;* Marek Jaszczur, Janusz Teneta, Qusay Hassan, Michal Dudek
49	*Thermal analysis of a photovoltaic module under varying environmental conditions*, Marek Jaszczur, Janusz Teneta, Qusay Hassan, Ewelina Majewska
50	*An analysis of the innovative exhaust air energy recovery heat exchanger*, Marek Jaszczur, Marek Borowski, Daniel Satoła, Michał Karch
51	Optimized design and manufacturing of a marine propeller for a competition boat for speed and high efficiency races*; Daniel Riveros, Diana López*

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Keynote Speakers

Ulrich Gross, TU Bergakademie Freiberg, Germany

BIO

Ulrich Gross is a Professor of Mechanical Engineering at TU Bergakademie Freiberg in Germany. He received the academic grades of a Dr.-Ing. (1983) and Dr.-Ing. habil. (1990) both from Stuttgart University. He owned the chair of Engineering Thermodynamics from 1992 until his retirement in 2015. In 2016 he was a Visiting Professor at TU Cracow/Poland (Politechnika Krakowska). He served his university in various positions – Head of the Department, Dean of the Faculty, Founding Director of the Interdisciplinary Ecological Centre of the University, Member of the Board of Trusties. Main research interests include thermophysical properties, mainly thermal conductivity of materials up to 1600 ° C; fundamental investigations of phase change heat transfer; geothermal energy; optimization of thermal processes and saving of energy. Dr. Gross has authored and co-authored more than 200 journal and conference publications, besides editing some books. He served the scientific community as an elected member of the review board of DFG (German Research Foundation). He is member of the Scientific Council of the International Centre of Heat and Mass Transfer and Delegate to the Assembly for International Heat Transfer Conferences. He also serves as one of the editors-in-chief of the International Journal of Thermal Science. His efforts have been honored by the Weisbach medal for excellence in teaching (2008), by the election as a full member of the Saxon Academy of Sciences in 1999 and as a member of the German Academy of Science and Engineering (acatech) in 2006, and finally became an Honorary Senator of the Technical University of Freiberg (2015).

Title: **Geothermal Heat Pipes (Theory and Application)**

Abstract

In the context of current discussions on stable energy provision, geothermal energy stored in the accessible parts of the earth's crust is gaining increasing interest. Due to the very high temperatures in the earth's core, there is a long-term stable heat flow in the uppermost part of the earth's crust, characterized by a mean temperature gradient of about 0.03 K/m. One of the promising ways to use this kind of energy is the establishment of geothermal heat pipes which will be subject of this lecture. The heat pipes are embedded in vertical boreholes with a typical depth in the order hundred meters. There are, however, concepts that go down to 7000 m. The heat pipe itself represents a closed system which contains a well-defined amount

of a pure liquid flowing down the inner wall of the tube as a thin film, gradually evaporating where heat is absorbed from the ambient rocks. The vapor is condensed at the upper end of the tube where it delivers thermal energy to a heat pump. Due to their favorable conditions for temperature profile and heat transfer such probes are much more powerful than those with circulating water. The lecture will deal with the peculiarities of the heat and fluid flow processes inside a geothermal heat pipe where hydrodynamics and possible rupture of the liquid film play an important role, as well as the liquid-vapor countercurrent flow situation and the establishment of a liquid pool at its bottom. Selected results of own experiments will be presented and analyzed.

Pradeep Bansal, Viking Range, Middleby Corporation (USA)

BIO

Dr. Bansal currently works for Viking Range, Middleby Corporation (USA) as their R&D Lead of Energy Efficiency and Refrigeration. Previously he worked at Oak Ridge National Laboratory (USA) as Distinguished R&D Scientist during 2010-15, and the University of Auckland (New Zealand) as Professor (Personal Chair) of Mechanical Engineering and Associate Dean Postgraduate of the Faculty of Engineering during 1988-2012. He has presented numerous plenaries and published over 260 technical papers and three books. He is a Fellow of ASHRAE and Vice-President of Commission B1 of the International Institute of Refrigeration. He is currently serving as an Executive Editor of Applied Thermal Engineering, and Associate Editor of J. Science and Technology for the Built Environment (previously HVAC&R), and J. of Process Mechanical Engineering (IMechE, UK).

Title: Shaping the world of energy efficient refrigerators through government regulations, product innovations and novel technologies

Abstract

A tremendous effort has been devoted to improving the energy efficiency of home appliances around the world over the past 2 decades, where the adoption of energy labelling, and the enforcement of Minimum Energy Performance Standards (MEPSs) have led to significant energy savings. These efforts are continuing to bring innovation in refrigerator cabinet (i.e. advanced insulation, improved gaskets), sealed refrigeration system (e.g. low GWP refrigerants, efficient fans, compressors and heat exchangers, adaptive defrosts etc.), user-friendly features (e.g. double doors, internet connectivity, on-line access, internal cameras, music/TV) and legislative improvements enforcing more stringent MEPSs. Increased global competition and improved energy efficiency policies of various governments are responsible for bringing innovation into user friendly product development where more energy efficient

products are now appearing in the market. The talk will present an overview of some of the recent advancements including novel/alternative technologies that are responsible for the development of energy efficient household refrigerators.

Kamel Hooman, The University of Queensland, Australia

BIO

Dr Hooman is the Director of the Renewable Energy Conversion Centre of Excellence at The University of Queensland, with an annual average external income of over $1 m, working on enabling technologies for small scale renewable power generation. His research focuses on thermofluids engineering using numerical, theoretical and experimental techniques. He is contributing to Journal of Porous Media, Heat Transfer Engineering and Energies as an associate editor. He serves on many editorial boards and has acted as guest editors for some journals with Applied Thermal Engineering being the latest one. He has received awards and fellowships from the Emerald, Australian Research Council, Australian Academy of Science, National Science Foundation China, and Chinese Academy of Sciences. With over 150 journal papers and some book chapters, he has also presented as keynote/plenary in numerous conferences and meetings. While a full time academic staff at The University of Queensland, Dr Hooman has held visiting professor positions in Europe and Asia.

Title: Natural draft dry cooling towers; modeling, simulation and experimental analysis

Abstract

Natural draft dry cooling tower is the preferred option for heat removal from renewable power plants in Australia. Numerical simulation of heat and fluid flow through such cooling towers, however, faces formidable challenges partly because of the multi-scale nature of the problem. This paper lists the latest developments in the field and offers enabling shortcuts to model and simulate such cooling towers. Theoretical, experimental and numerical results will be presented to investigate the effects of key parameters including the tower and heat exchanger dimension on top of ambient conditions.

	22 May
8:00-9:00	**REGISTRATION**
9:00-11:00	**KEYNOTE SESSION 2 (Rooms A-F)** **Session Chairman: J. J. Klemes; M. Ciałkowski; J. Taine**
9:00-9:40	*Geothermal Heat Pipes (Theory and Application)*; **Ulrich Gross**
9:40-10:20	*Shaping the world of energy efficient refrigerators through government regulations, product innovations and novel technologies*, **Pradeep Bansal**
10:20-11:00	*Natural draft dry cooling towers; modeling, simulation and experimental analysis*; **Kamel Hooman**
11:00-11:20	**COFFEE BREAK**
11:20 - 13:20	**PARALELL SESSION 1**
11:20-13:20	**HEAT TRANSFER AND ENERGY ENGINEERING (Room A)** **Session Chairman: Jun Ishimoto**
11:20-11:35	*Predictive Control of Temperature in Residential Building Using Electric Underfloor Heating System*, Maciej Ławryńczuk, Paweł Ocłoń
11:35-11:50	*Study on the thrust vector control based on a dual-throat concept*; Kexin Wu, Heuy Dong Kim and Yingzi Jin
11:50-12:05	*Numerical Study of liquid jet impingement cooling of a thermoelectric generator*; Björn Pfeiffelmann, Ali Cemal Benim, Franz Joos
12:05-12:20	*Energy transfer including solid-liquid phase transformation aspects in modelling of additive layer manufacturing using Lattice Boltzmann – cellular automata methods*; Dmytro Svyetlicnyy, Michal Krzyzanowski
12:20-12:35	*Analysis on Heat Transfer Characteristics for a Launcher Barrel in the Process of Altering Rate Firing*; Huizhi He, Xiaobing Zhang
12:35-12:50	*A wind box approach enhances the ventilation of a natural draft dry cooling tower in crosswind;* Weiliang Wang, Hai Zhang, Junfu Lyu, Qing Liu, Guangxi Yue, Weidou Ni
12:50-13:05	*Effects of density changes on the thermodynamic behavior of a spherically confined phase change material*; José A. Otero, Ernesto M. Hernández, Rubén D. Santiago, Francisco Castillo, Raúl Martínez
13:05-13:20	*Development and validation of an inverse method for identification of thermal characteristics of a short laser pulse;* Piotr Łapka; Karol Pietrak, Małgorzata Kujawińska, Marcin Malesa, Łukasz Oniszk
11:20-13:20	**CONJUGATED HEAT TRANSFER (Room B)** **Session Chairman: Sławomir Pietrowicz**
11:20-11:35	*Computational study for engineering design of a tubular air heater*; R.V. Reji, S.K. Raman, Y.H. Jung, H.D. Kim
11:35-11:50	*Determination of the Heat Exchanger heat transfer coefficient of a Coupled Natural Circulation Loop System*; Akhil, Dass D ; Sateesh, Gedupudi.
11:50-12:05	*Trefftz method in solving the pennes' and single-phase-lag heat conduction problems with perfusion in a skin*; Grysa Krzysztof, Maciag Artur
12:05-12:20	*Conjugate heat transfer in woven wire meshes*; Martens, Sebastian; Piesche, Manfred

12:20-12:35	*Analysis of heat transfer in coated bed of adsorption chiller*; Karolina Grabowska, Marcin Sosnowski, Jaroslaw Krzywaski, Karol Sztekler, Wojciech Kalawa, Anna Żyłka, Wojciech Nowak;
12:35-12:50	*Verification of the heat transfer model for screw reactor*; Anatoliy Levin
12:50-13:05	*Optimization of one pass PV/T air system with off-set strip fin*; Moustafa Al-Damook, Darron Dixon-Hardy, Peter J. Heggs Joshua Cottom, Mansour Al Qubeissi, Issam Mohammed Ali Aljubury
13:05-13:20	*Full scale analysis of thermal storage tank co-existing heating and cooling PCM; Jae Dong Chung, Jiwon Gim, Abhishek Awasthi, Binit Kumar*
11:20-13:20	**ENGINEERING APPLICATION (Room C)** **Session Chairman: Kamil Śmierciew**
11:20-11:35	*Contribution to study the heat transfer within exhaust valve at diverse engine speeds*, Cerdoun Mahfoudh, Carcasci Carlo, Khalfallah Smail, Ghenaiet Adel
11:35-11:50	*Gas flow modeling for permeability determination in porous rock sample using Maxwell slip model*; Paweł Madejski, Paulina Krakowska, Edyta Puskarczyk, Magdalena Habrat, Mariusz Jędrychowski
11:50-12:05	*Dynamics of Powdered Emulsions via a Hybrid Microfluidic Device*; Milad Azarmanesh, A. A. Mohamad, Amir Sanati-Nezhad, Saleh Bawazeer
12:05-12:20	*Numerical simulation of fast atmospheric pressure discharge in gas diode with plane-grid cathode system*; Vasily Kozhevnikov, Andrey Kozyrev, Natalia Semeniuk, Alexander Kokovin
12:20-12:35	*Study of granular flow in screw feeder using analytical and discrete element method*; Dheeraj Minglani, Abhishek Sharma, Ram Dayal
12:35-12:50	*Development of hybrid model based on LBM and CA devoted for phase transformation – simulation of heat flow with consideration of latent heat*; Łukasz, Łach; Robert, Straka; Dmytro, Svyetlichnyy;
12:50-13:05	*Particle Separation and numerical parameter investigations in A validated Multi-phase model for dynamic separators*; Arun, Appadurai, Raghavan, Vasudevan
13:05-13:20	*A Numerical Simulation of a Line-type Paint Drying Furnace*, Jongrak Choi, Giyob Yang, Nahmkeon Hur
11:20-13:20	**HEAT TRANSFER (Room D)** **Session Chairman: Dawid Taler**
11:20-11:35	*Reconstruction of the boundary condition in the binary alloy solidification problem with the macrosegregation and the material shrinkage phenomena taken into account*; Adam Zielonka; Edyta Hetmaniok; Damian Słota
11:35-11:50	*Heat transfer study on a hybrid smooth and spirally corrugated tube*; Chen Yang, Min-rui Chen, Jin-yuan Qian, Zan Wu, Zhi-jiang Jin, Bengt Sunden
11:50-12:05	*Influence of radiative heat transfer on measuring thermal conductivity of semi-transparent materials with hot wire method*; Hu Zhang; Yixin Ma; Xian Wang; Yueming Li; Wenquan Tao

12:05-12:20	*Thermal fluctuations in heated walls in the backward facing step geometry*; Jure Oder; Iztok Tiselj
12:20-12:35	*Prediction of heat transfer correlations in a low-loaded plate- fin-and-tube heat exchanger based on flow-thermal tests*; Dawid Taler; Jan Taler
12:35-12:50	*Numerical modelling of molten metal free-surface within induction furnace with cold crucible*; Jacek Smolka, Piotr Bulinski, Slawomir Golak, Roman Przylucki, Michal Palacz, Grzegorz Siwiec, Bartlomiej Melka, Leszek Blacha
12:50-13:05	*The Porous Media Theory applied to Radio Frequency Catheter Ablation*; Marcello Iasiello, Assunta Andreozzi, Nicola Bianco, Kambiz Vafai
13:30-14:20	**LUNCH**
14:20 - 16:20	**PARALELL SESSION 2**
14:20-16:20	**MODELING AND SIMULATION (Room A)** **Session Chairman: Jerzy Banaszek**
14:20-14:35	*Prediction of a Methane Circular Pool Fire with fire Foam*; Camilo Sedano, Omar Lopez, Alexander Ladino, Felipe Muñoz
14:35-14:50	*Numerical study of sediment erosion and surface roughness analyses in francis turbine*; Md, Rakibuzzaman; Hyoung-Ho, Kim; Kyungwuk, Kim; Nohyun, park; Sang-Ho, Suh
14:50-15:05	*Numerical simulation of hydrodynamics of badush dam*; Younis Saeedrashed, Ali Benim
15:05-15:20	*Finite elemet modeling of thermal contact resistance*;Siddappa PG, and Andallib Tariq
15:20-15:35	*A new efficient pressure-based algorithm for steady and unsteady incompressible flows*; Jinping, Wang; Jianfei ,Zhang; Zhiguo, Qu; Wenquan ,Tao
15:35-15:50	*Numerical investigation of particle separation in dynamic separators using validated multi-phase model*; Arun Appadurai; Vasudevan Raghavan
15:50-16:05	*Numerical Simulation of Ophthalmic Laser Surgeries by a Local Non-thermal Equilibrium Two-Temperature Model*; Bin Chen; Yibo Zhao; Dong LI
16:05-16:20	*Study on effect of nozzle pressure ratio in dual bell nozzles*; Kexin Wu, Heuy Dong Kim and Yingzi Jin
14:20-16:20	**HEAT TRANSFER AND FLUID FLOW SIMULATION (Room B)** **Session Chairman: Kamel Hooman**
14:20-14:35	*Numerical analysis of a combi-steamer top hood*; Mieszko Tokarski; Arkadiusz Ryfa; Piotr Buliński; Marek Rojczyk; Andrzej Kuroś; Andrzej J. Nowak
14:35-14:50	*Numerical Investigation of the Thermal Response to Skin Tissue during Laser Lipolysis*; Bin Chen, Yue Zhang, Dong Li
14:50-15:05	*Estimation of the parameters non-equilibrium mathematical model of heat and mass transfer through the porous material*; Zbigniew Buliński, Helcio R.B. Orlande, Tomasz Krysiński, Łukasz Ziółkowski, Sebastian Werle
15:05-15:20	*Numerical and Semi-analytical solutions for the liquid-solid interface dynamics problem*; Suset Rodríguez, José A. Otero, Ernesto M. Hernández, Raúl Martínez, Rubén D. Santiago, Francisco Castillo

15:20-15:35	*Numerical investigation of passive stabilization of the surface temperature using pcm and metal foam*; Mirosław Seredyński
15:35-15:50	*Experimental and numerical investigation of impact of vacuum level on microstructure and effective thermal conductivity of carbon fibre reinforced epoxy composites manufactured by vacuum bag method*; Michał Kubiś, Mirosław Seredyński, Łukasz Cieślikiewicz, Tomasz Wiśniewski, Anna Boczkowska
15:50-16:05	*Numerical investigation of a solar air heater duct exploiting von-Karman effect*; Gaurav Chhaperwal, Ankur Srivastava, Ram Dayal
16:05-16:20	*Influence of crystal growth kinetics on prediction of macro-segregation by micro-macroscopic simulation of binary alloy solidification*; Mirosław Seredyński, Marek Rebow, Jerzy Banaszek
14:20-16:20	**TURBULENCE AND HEAT EXCHANGERS (Room C)** **Session Chairman: Sang-Ho Suh**
14:20-14:35	*Turbulence models impact on the flow and thermal analyses of jet impingement*; Tomasz Kura, Elżbieta Fornalik-Wajs, Jan Wajs and Sasa Kenjeres
14:35-14:50	*Modified algebraic model of laminar-turbulent transition for internal flows*; Konrad, Nering; Kazimierz, Rup
14:50-15:05	*Fouling process simulation of a fin-and-tube heat exchanger*; Turo Välikangas
15:05-15:20	*Prediction of Hydraulic Performance of Shell-and-tube Heat Exchanger: Comparison of 1D and CFD-Porous Media Approaches;* Kalioudjoglou Loïck, Bonneau Clément, Melot Vincent, Auvity Bruno, Josset Christophe, Merriaux Yoann
15:20-15:35	*Comparison of heat transfer in gravity-driven particles flow near different heat exchange surface*; Zhigang Guo, Jian Yang, Tuo Shi, Yingxue Hu, Qiuwang Wang
15:35-15:50	*Turbulent flow and heat transfer in an impinging jet on protruding hot surface using nanofluids*; Maheandera Prabu Paulraj, Santosh Kumar Sahu, Uthayakumar Marimuthu, Pushpanjay Kumar Singh, Avadhesh Kumar Sharma
15:50-16:05	*On the development of an analytical solution for moving bed heat exchangers via integral transform methods*; Pedro Isaza; Markus Bussmann
14:20-16:20	**TWO PHASE FLOWS, NANOFLUIDS AND HEAT TRANSFER (Room D)** **Session Chairman: Mikhail Sheremet**
14:20-14:35	*On modeling of the initial stage of nonstationary nucleate boiling for the high heat fluxes*; Anatoliy Levin, Polina Khan
14:35-14:50	*Experimental validation of pressure drop models during flow boiling of R134a – effect of flow acceleration and entrainment*; Muszyński, Andrzejczyk, Dorao
14:50-15:05	*Numerical research of solidification dynamics with anisotropy and thermal fluctuations*; Sławomir Pietrowicz, Przemysław Smakulski, Jun Ishimoto
15:05-15:20	*Application of the immersed boundary method for modelling of heat and fluid flow in layers of granular matter*; Ewa Szymanek, Artur Tyliszczak
15:20-15:35	*Thermal management of machine compartment in a built-in refrigerator*; Milind Devle, Ankur Garg

15:35-15:50	*Numerical identification of temperature dependent thermal conductivity using least squares method* Authors: Anna Ivanova, Stanislaw Migorski, Rafal Wyczolkowski
15:50-16:05	*Analysis of dusty Casson fluid flow past a permeable stretching sheet bearing power law temperature and magnetic field*, Jafar Hasnain; Zaheer Abbas; Mariam Sheikh
16:50-20:00	**CRACOW GUIDED TOUR**

Keynote Speakers

Božidar Šarler, University of Ljubljana, Slovenia

BIO

Professor Božidar Šarler is Chair of Department of Fluid Dynamics and Thermodynamics at the Faculty of Mechanical Engineering, University of Ljubljana. He is also Head of Laboratory for Simulation of Materials and Processes at the Institute of Metals and Technology in Ljubljana, Slovenia. He has worked outside Slovenia cumulative for more than four years as a visiting researcher or professor at Centre of Nuclear Studies, Saclay; University Erlangen-Nuremberg, Nuremberg; Argonne National Laboratories, Chicago; University of Nevada, Las Vegas; University of Pierre and Marie Curie, Paris; Polish Academy of Sciences, Warsaw and University of Parthenope, Naples. He is holding adjunct professor position at University of Southern Queensland, Australia and Taiyuan University of Technology, China

His present research interest is computational modeling of materials and processes, development of meshless numerical methods and physical models for multiphase systems, modeling, simulation, verification and optimization of continuous casting of aluminum alloys and steel. He was responsible for modernization and introduction of computational modeling in several steelworks and aluminum plants in Europe and China. He has published 150 scientific papers, 15 book chapters and edited 8 books with selected papers from international conferences and contemporary research. Contributed to 250 technical reports

He has managed several international projects within EU frameworks, NATO, and National Academies, USA. He received the following awards and recognitions: 2009 EMERALD Literati Highly commended and 2014 Best paper award. 2006 Highest Slovenian state recognition for technology. 2016 Highest Slovenian state award for science, 2017 ICCES award. Best paper selection at 9 international conferences. He presented keynotes at conferences of the prestigious type like EUROMAT, EUROSIM (EU), THERMACOMP (UK), ICCES (USA), TMS (USA) and Asian Congress on Computational Mechanics (Singapore). He is currently a member of the editorial boards of several international journals and two book series. He has organized eight international conferences on solid-liquid phase change processes, moving and free boundary problems, and meshless methods. His Ph.D. students received several awards such as two times ECCOMAS best Ph.D. finalist award, Jožef Stefan golden emblem award, best Ph.D. in heat and fluid flow award, etc.

Title: Heat, Mass and Momentum Transfer Computations by Meshless Methods

Abstract

The structure of a novel meshless solution procedure for calculation of heat, mass, and momentum transfer problems, coupled with solid mechanics and electromagnetic fields, is presented. The multiphysics solution framework is coupled to multiple scales by incorporating the cellular automata and the phase-field concepts of microstructure evolution. The solution procedure is defined on a set of nodes which can be non-uniformly distributed. The domain and boundary of interest are divided into overlapping influence areas. On each of them, the fields are represented by the collocation with radial basis functions or by least squares approximation on a related sub-set of nodes present in the influence area. In the case of cellular automata modelling, the transition rules are defined for the states of the set of nodes in the influence area. The timestepping is performed in an explicit way. All governing equations are solved in their strong form, i.e no integrations are performed. The polygonisation is not present. The large deformation and growth problems are handled by node redistribution and activation of additional nodes, respectively. The solution procedure can be easily and efficiently adapted in node redistribution and/or refinement sense, which is of utmost importance when coping with fields exhibiting sharp gradients such as phase field variable or enthaply in phase-change problems. Step by step benchmarking of the method is represented, folowed by applications to several large scale industrial problems, particularly in the field of thermomechanical processing of steel and aluminum alloys, and related determination of defects such as porosity, macrosegregation and hot tearing. The method is extremly simple to code and accurate, allowing straightforward parallelization. Besides this, the inclusion of complicated physics can be performed in a straightforward manner, reducing the developement time. The coding in 2D or 3D is almost identical.

Jiří Jaromír Klemeš, Brno University of Technology, Czech Republic

BIO

Prof Dr-Hab Jiří Jaromír Klemeš, DSc Head of "Sustainable Process Integration Laboratory – SPIL", NETME Centre, Faculty of Mechanical Engineering, Brno University of Technology - VUT Brno, CZ and Emeritus Professor at "Centre for Process Systems Engineering and Sustainability", Pázmány Péter Catholic University, Budapest, and at FIT, Pannonia University, Veszprem, HU. Previously the Project Director, Senior Project Officer and Hon Reader at Department of Process Integration at UMIST, The University of Manchester and the University of Edinburgh, UK. Founder and a long-term Head of the Centre for Process Integration and Intensification – CPI2, University of Pannonia, Veszprém, Hungary. Awarded by the EC with Marie Curie Chair of Excellence (EXC). Track record of managing and coordinating 93 major EC, NATO and UK Know-How projects. Research funding attracted over 23 M€.
Co-Editor-in-Chief of Journal of Cleaner Production and Chemical Engineering Transactions, Subject Editor of ENERGY and Emeritus Executive Editor of Applied Thermal Engineering. The founder and President of 22 y of PRES (Process Integration for Energy Saving and Pollution Reduction) conferences. Chairperson of CAPE Working Party of EFCE, a member of WP on Process Intensification and of the EFCE Sustainability platform. He authored and coauthored over 400 papers, h-index reaching 50. A number of books published by Elsevier, Woodhead, McGraw-Hill; Ashgate Publishing Cambridge; Springer; WILEY-VCH; Taylor & Francis). Several times Distinguished Visiting Professor at Universiti Teknologi Malaysia and University Technology Petronas, Malaysia; Xi'an Jiaotong University; the South China University of Technology, Guangzhou and Tianjin University in China; University of Maribor, Slovenia; the Brno University of Technology and the Russian Mendeleev University of Chemical Technology, Moscow. Doctor Honoris Causa of Kharkiv National University "Kharkiv Polytechnic Institute" in Ukraine, the University of Maribor in Slovenia, University POLITEHNICA Bucharest, Romania. "Honorary Doctor of Engineering Universiti Teknologi Malaysia". Awarded with "Honorary Membership of Czech Society of Chemical Engineering", "European Federation of Chemical Engineering (EFCE) Life-Time Achievements Award" and "Pro Universitaire Pannonica" Gold Medal.

Title: **Process integration and energy saving**

Abstract

Energy its efficient use in production is key to ensuring the healthy functioning of the world economies. Climate change, together with the haze in growing megalopolises, and water scarcity in many areas are the key environmental challenges of our time. Polluted air and water,

especially in places with high population density and high resource demands, have been posing an increasing threat to the mankind. To solve those issues, a complex thinking is very much needed. Traditionally, the involvement of process, mechanical and chemical engineering was considered as a cornerstone of a successful outcome. The close and strategic collaboration from most fields is a strong requirement. The complex systems thinking requires a close synergy of technologists, managers and economists, policymakers and politicians and related social scientists. In this context, ensuring cleaner energy is the necessary condition for cleaner production, especially for reducing the emissions of greenhouse gases and other pollutants, which are directly related to the types and loads of the energy sources used. They are various emerging methodologies of sustainability assessment. The footprint methodology is one of gaining considerable attention. Greenhouse gases (ghg – rather than just carbon) footprint becomes a widely accepted environmental accounting tool for business managers, policy makers and non-governmental organisations, attempting to identify mitigation measures that reduce the threat of climate change. The industry is increasingly engaged as a part of policy development and product design. As an illustrative case study of a toll following complex systems thinking presents the development of Process Integration. It originated from Heat Integration to target the minimum heat requirements and following the demand being extended to Total Sites, Locally Integrated energy systems and even to self-sufficient regions methodology. To cover the complexity with wider scope targeting GHG and haze creating emissions, integration of renewable energy sources, biofuels, waste and effluents supply chains, investment, property and material recovery targeting.
The presentation will be concluded by suggestions for future research and the discussion and exchange of ideas are most welcome.

Jean Taine, École Normale Supérieure de Paris Saclay, France

BIO

Jean TAINE, 68 Issued from the Dept of Physics of École Normale Supérieure de Paris Saclay (ex Cachan), Master in Theoretical Physics of Un. Paris 6 (1972), “Dr es Sciences” in Chemical Physics from Université Paris Sud (1980), Full Professor of Ecole Centrale Paris (1981) Deputy Scientific Director in charge of all Engineering and Energy at the Ministry of Research of France (2002-2006), Editor of International Journal of Heat and Mass Transfer (from 2003), Author of a textbook « Heat Transfer » (5th edition in French, 1st in English in 2012) and coauthor of a book « Issues of Energy »(in French). Today position : Em. Professor of CentraleSupélec, College of Un. Paris -SaclayRecent and Today Research Fields (at EM2C lab., CentraleSupélec) - Coupled radiation and turbulent convection, application to turbulent

combustion: LSEP CK and Monte Carlo models coupled to LES and DNS.- Statistical approaches of radiation in porous media; Limitations of the Beerian model; Radiation models for Non Beerian effective phases; Radiation transfer and coupling with other heat transfer modes.

Title: Radiation transfer within non Beerian porous media. Coupling with other modes

Abstract

The Beerian assumption (exponential extinction) cannot always be applied to a homogenised effective phase of a porous medium. In all cases, it is valid at the two asymptotic limits of optically thick and globally optically thin phases. But, outside these limits, it is not valid for common media such as foams with opaque and transparent phases or within semi transparent insulation fibres, etc. Nevertheless, in the first case, it is rather approximately valid for high porosity values. In these conditions, the precise physical validity conditions of the Beerian assumption will be clearly defined and illustrated by some common examples.

A non Beerian effective phase is accurately and exhaustively characterised by an extinction cumulative distribution function G_{extv} and a scattering (or absorption) cumulative probability, instead of extinction and scattering (or absorption) coefficients. Indeed, $1 - G_{extv}$ is not an exponential function for a non Beerian effective phase. The scattering phase function, which a priori separately depends on the incident and scattering directions, is also directly determined in this approach, in practice based on a Monte Carlo characterisation method. In the common case of an effective phase associated with the transfer between opaque interfaces, extinction, scattering and absorption coefficients have no more physical meaning. An elementary emission term must then be expressed from the variation of the absorption cumulative probability.

A Generalised Radiative Transfer Equation (GRTE), based on the previously introduced radiative statistical functions, allows radiative flux and radiative power to be accurately determined within a non Beerian effective phase of any porous medium, i.e. with opaque and transparent real phases, semi transparent and transparent real phases or two semi transparent real phases. The GRTE, directly defined in terms of cumulative distribution functions, is solved by a Monte Carlo transfer method as easily as a classical RTE.

Within an optically thick effective phase, this GRTE degenerates into a classical Radiative Transfer Equa- tion (RTE) if two quantitative conditions are fulfilled. This RTE is characterised by generalised extinction and scattering (or absorption) coefficients, directly expressed vs the previous radiative statistical functions. It represents in fact, as for a Beerian medium, a Boltzmann's equation applied to the photon momentum distri- bution function. Its resolution by a perturbation method, similar to the Chapman- Enskog approach, leads for a statistically isotropic effective phase to introduce a scalar radiative conductivity (radiative Fourier's law) and for a statistically anisotropic one to introduce a radiative conductivity tensor.

Examples of radiative transfer results based on the GRTE and of couplings of radiation with other heat transfer modes will finally be presented. Some limitations of the Fourier's approach will be enlightened from these examples.

	23 May
8:00 – 9:00	**REGISTRATION**
9:00-11:00	**KEYNOTE SESSION 3 (Rooms A-F)** **Session Chairmans: Henrik Lund, Ulrich Gross, Ali Cemal Benim**
9:00-9:40	*Heat, Mass and Momentum Transfer Computations by Meshless Methods*; **Božidar Šarler**
9:40-10:20	*Process Integration and Energy Saving*; Jiří J. **Klemeš** and Petar S. Varbanov
10:20-11:00	*Radiation transfer within non Beerian porous media. Coupling with other modes*; **Jean Taine** and Franck Enguehard
11:00-11:20	**COFFEE BREAK**
11:20 - 13:20	**PARALELL SESSION 1**
11:20-13:20	**MODELING AND SIMULATION (Room A)** **Session Chairman: Piotr Dzierwa**
11:20-11:35	*Experimental investigations and numerical modeling of heat and mass transfer process in shell-and-tube heat exchangers with compact arrangements of tube bundles*; Valery Gorobets, Yurii Bohdan, Viktor Trokhaniak, Ievgen Antypov
11:35-11:50	*Coupled processes of moisture evaporation and multicomponent filtration in a porous medium subjected to microwave radiation;* Mikhail Britch, Nikolay Gorvachov, Ivan Kaznacheyeu, Dzmitry Makaranka
11:50-12:05	*Modeling of a re-heat two-stage adsorption chiller by ai approach*; Jaroslaw Krzywanski, Karolina Grabowska, Marcin Sosnowski, Anna Żyłka, Karol Sztekler, Wojciech Kalawa, Tadeusz Wójcik, Wojciech Nowak
12:05-12:20	*CFD analysis of phase change behavior of phase change material encapsulated in internally finned spherical capsule*; Kumaresan Govindaraj, Sathishkumar Ganesan, Revanth Gurusamy, Raju Govindaraj, Suvanjan Bhattacharyya
12:20-12:35	*Numerical study of flow and heat transfer characteristics due to highly confined flow through channel*; D Sathish Kumar
12:35-12:50	*The change of bifurcation phenomena of natural convection by self-induced magnetic field*; Jin Ho Oh, Il Seouk Park
12:50-13:05	*Non-adiabatic equilibrium and non-equilibrium CFD models for two-phase ejector design for CO2 refrigeration system*; Jacek Smolka, Michal Haida, Jakub Bodys, Armin Hafner, Michal Palacz, Andrzej J. Nowak, Krzysztof Banasiak
13:05-13:20	*Do ionic liquids replace water or nanofluids to enhance heat transfer in micro-channel systems?;* Mushtaq Al-Asadi, Waleed Al-Sallami
11:20-13:20	**ENHANCED HEAT TRANSFER (Room B)** **Session Chairman: Jan Taler**
11:20-11:35	*Numerical simulation of the parameters influencing flow condensation heat transfer in minichannel*; Jong Hyeon Son, Il Seouk Park
11:35-11:50	*Experimental investigation on straight and u-bend double tube heat exchanger with active and passive enhancement methods*; Rafał Andrzejczyk, Tomasz Muszyński
11:50-12:05	*Natural convection melting of nano-enhanced phase change material in a cavity with finned copper profile*; Nadezhda S. Bondareva and Mikhail A. Sheremet

12:05-12:20	*Flow and heat transfer characteristics of counter-current u-tube helical baffle heat exchangers*; Shifan Yang, Yaping Chen, Jiafeng Wu
12:20-12:35	*Numerical investigation on film cooling enhancement by upstream sand-dune-shaped ramp*; Shengchang Zhang, Jingzhou Zhang, Xiaoming Tan
12:35-12:50	*Design and analysis of synthetic jet for micro-channel cooling*; Mishra Ashish, Jain Anuj, Paul Akshoy Ranjan
12:50-13:05	*Experimental and numerical investigation of heat and mass transfer in low-temperature heat accumulator with phase transformations of accumulating material*; Valery Gorobets Ievgen Antypov, Viktor Trokhaniak, Yurii Bohdan
13:05-13:20	*Numerical study on moisture transfer of unsaturated porous medium*, Xiaoyan Ma, Rachid Bennacer, Farid Benboudjema, Georges Nahas
11:20-13:20	**ENGINEERING APPLICATION 2 (Room C)** **Session Chairman: Timothy Walmsley**
11:20-11:35	*Influence of forced convection on the evaporation and internal dynamics inside of an array of salt solution droplets*; Omar Al-Rawi, Mark Wilson
11:35-11:50	*Nonlinear Wooding-Bingham Convection*, D.A.S.Rees
11:50-12:05	*Molding the heat flow by a thermal cloak*; Jun Guo, Zhiguo Qu
12:05-12:20	*Dehydration performance and flow characteristics of supersonic separator*; Jae-Sung Lee, Youn-Jea Kim.
12:20-12:35	*Monitoring of transient thermal stresses in pressure components using an innovative technique for measuring the fluid temperature*; Magdalena Jaremkiewicz, Piotr Dzierwa, Dawid Taler, Jan Taler
12:35-12:50	*Modeling microwave heating of an oil palm mesocarp*, Ming Law, Jessie Chang
12:50-13:05	*Numerical study on thermoelectric-hydraulic performance of a novel thermoelectric generator integrated recuperator*; Ting Ma, Zuoming Qu, Xing Lu, Xingfei Yu, Yitung Chen, Qiuwang Wang.
13:05-13:20	*Possibility of the drag reduction effect application to reduce the cost of transport energy in water transport systems*, Bartosz Kopiczak, Zbigniew Matras
11:20-13:20	**NANOFLUIDS (Room D)** **Session Chairman: Andrea Vallati**
11:20-11:35	*Conjugate transient free convection in an inclined square porous cavity filled by a nanofluid using LTNE and Buongiorno's models*; Mikhail Sheremet, Ioan Pop
11:35-11:50	*Intensified Thermal Conductivity of Ultrasonically Prepared Graphene-Fe3O4 Nanocomposite based Nanofluid and Study of Rheological Properties*; Divya P. Barai, Bharat A. Bhanvase
11:50-12:05	E*ffects of Nanoparticles on Hydraulic Cavitation*; Min-rui Chen, Jin-yuan Qian, Zan Wu, Chen Yang, Zhi-jiang Jin, Bengt Sunden

12:05-12:20	*Hall effects on hydromagnetic nanofluid flow in a rotating channel with the influence of radiation and slip condition*; Gauri Shanker Seth, Prashanta Kumar Mandal
12:20-12:35	*Numerical Simulation of Natural Convection of Glycol-Al2O3 Nanofluids from a Horizontal Cylinder*; Dorota Sawicka, Albert Baars, Janusz T. Cieśliński, Sławomir Smoleń
12:35-12:50	*Comparison of the experimental and numerical analyses of silver nanofluid under influence of strong magnetic field*; Elzbieta Fornalik-Wajs, Aleksandra Roszko, Janusz Donizak, Anna Kraszewska
12:50 – 13:05	*Engineering analysis of fluid-structure interaction in transient phenomena using autopipe computer software*, Maciej Rydlewicz, Wojciech Rydlewicz
13:30-14:20	**LUNCH**
14:20 - 16:20	**PARALELL SESSION 2**
14:20-16:20	**PORUS MEDIA (Room A)** **Session Chairman: Li-Zhi Zhang**
14:20-14:35	*Numerical investigation of natural convection in an inclined porous enclosure using non-darcian flow model*; Ibrahim Atiya Mohamed
14:35-14:50	*Numerical Investigation of Boiling and Forced Convection Heat Transfer in Inclined Porous Enclosure using Modified Enthalpy Formulation*; Omar Rafae Alomar, Rafie Rushdy Mohammed, Karam Hashim Mohammed
14:50-15:05	*Temporal and spatio-temporal stability analyses in mixed convection of a viscoelastic fluid in a porous medium*; Pooya Naderi, Mohamed Najib Ouarzazi, Silvia Da Costa Hirata, Haykel Ben Hamed, Hassen Beji
15:05-15:20	*A numerical study on the performance of an innovative three-fluids combined membrane contactor*; Ehsan Afrasiabian, Oleg Iliev, Inga Shklyar, Torben Prill, Carlo Isetti, Stefano Lazzari
15:20-15:35	*Heat and water transport in deformable porous media considering water phase change kinetics*; Marcin Koniorczyk, Dalia Bednarska
15:35-15:50	*Application of porous model for simulation of the flow through perforated plate*; Kamil Śmierciew, Dariusz Butrymowicz
15:50-16:05	*Natural convection in a rotating cavity partially filled with a porous medium under the effect of a local heater*; Stepan A. Mikhailenko, Mikhail A. Sheremet
16:05-16:20	*Comprehensive approach for porous materials analysis using a dedicated preprocessing tool for mass and heat transfer modelling;* Paulina Krakowska, Paweł Madejski, Magdalena Habrat, Edyta Puskarczyk, Mariusz Jędrychowski
14:20-16:20	**CFD SIMULATION (Room B)** **Session Chairman: Jian-Fei Zhang**
14:20-14:35	*CFD analysis of the mirror shape on the performance of the solar collector*; Zuzanna Kaczor, Zbigniew Buliński, Sebastian Werle
14:35-14:50	*High Performance Numerical Study of Flow and Heat Transfer in Simplified Models of Spacecraft Cabin under Various Ventilation Angles*; Jingjing Xia, Chao Zhang, Xian Wan, Hu Zhang

14:50-15:05	*CFD simulation of reactive flowin parallel flow regenerative shaft kilns using porous media model*; Kamyar Mohammadpour
15:05-15:20	*Direct numerical simulation of line source dispersion in a fully turbulent channel flow*; Asghar Noormohammadi, Bing-Chen Wang
15:20-15:35	*CFD based approach for predicting the heat transfer and flow characteristics of inline tube banks with large transverse tube spacing*; Niko Pietari Niemelä, Antti Mikkonen, Kaj Lampio, Turo Välikangas, Jukka Konttinen
15:35-15:50	*Analysis of dusty Casson fluid flow past a permeable stretching sheet bearing power law temperature and magnetic field*; Jafar Hasnain; Zaheer Abbas; Mariam Sheikh;
14:20-16:20	**FLUID MACHINERY SIMULATION (Room C)** **Session Chairman: Abdulmajeed A. Mohamad**
14:20-14:35	*Calculation of the Aerodynamics and Aeroacoustics of a Small Wind Turbine*; Fethi Gül, Michael Diederich, Ali Cemal Benim
14:35-14:50	*The Effect of Cylinder Volume on the Performance of Reciprocating Compressor*; Hyun-Oh Kim Lee, Kang Kim
14:50-15:05	*Computational analysis of the performance characteristics of a supercritical co2 centrifugal compressor;* S. K. Raman, H.D. Kim
15:05-15:20	*Rotordynamic behaior of 500mw steam turbine considering seal wear*; Yongbok Lee, Wonil Kwak, Jungwan Kim, Seseung Byun
15:20-15:35	*Computational analysis of cross flow turbine performance*; Vanessa Ruiz, Aldo Benavides
15:35-15:50	*Flow and FFT analyses for tip clearance effect in an operating Kaplan turbine*; Md Rakibuzzaman, Kyungwuk Kim, Hyoung-Ho Kim, Sang-Ho Suh
15:50-16:05	*Redesign of the rotor and guide vane and the flow analysis of a large axial-flow fan*; Xin Ai, Jin Xiong, Ruizi Zhang, Penghua Guo, Jingyin Li
14:20-16:20	**CONVECTION HEAT TRANSFER (Room D)** **Session Chairman: Wen Quan Tao**
14:20-14:35	*Three-dimensional high-fidelity simulations of Rayleigh-Bénard convection of yield stress fluids in cubic enclosures at high Rayleigh numbers*; Sahin Yigit, Josef Hasslberger, Nilanjan Chakraborty, Markus Klein
14:35-14:50	*Massively Parallel GPU-based implementation for DSMC Simulations of Rarefied Gas Flows Around a Blunted Cone*; Fan Bai, Wenquan Tao
14:50-15:05	*Numerical Study of An Assymmetrically Heated Rectangular duct with suspened cylinder*; Gaurav Kumar Chhaperwal, Ankur Srivastava, Ram Dayal
15:05-15:20	*Thermal Flow Characteristics of Ferrofluids in circular enclosure under external magnetic force*; Jaehee Kim, Jaesung Lee, Youn-Jea Kim
15:20-15:35	*Flow and heat transfer characteristics of cylindrical structures with corner radius variation (Tandem and Side by Side)*; Ehsan Adeeb, Chang Hyun Sohn
15:35-15:50	*Air forced convection over a two-sided plate extended by rectangular hollow blocks*; Vadim Dubovsky, Ruth Letan

15:50-16:05	*Modeling microwave heating of an oil palm mesocarp*; Ming Chiat Law, Jessie Sze Ling Chang
16:05-16:20	*A Numerical Simulation of a Line-type Paint Drying Furnace*, Jongrak Choi, Giyob Yang, Nahmkeon Hur
16:20 – 16:40	**COFFEE BREAK**
16:40-18:00	**POSTER SESSION 2**
18:45-19:00	**CONFERENCE POTOGRAPH**
19:00 – 22:00	**GALA DINNER**

POSTER SESSION 2 Session Chairman: Hocine Mzad, Artur Cebula	
1	*A study on the performance of ionic wind cooling system for LED*; Jie Feng, Changhong Wang, Zetao Xie, Qingming Liu
2	*The analysis of a jet structure inside a reverse chamber*; Robert Kłosowiak, Jarosław Bartoszewicz, Rafał Urbaniak
3	*Comparison of predictive methods for flow boiling heat transfer in conventional channels and minichannels – the effect of reduced pressure*; Dariusz Mikielewicz; Blanka Jakubowska
4	*Selection of the relevan turbulence model in a CFD simulation of a flow disturbed by hydraulic elbow – comparative analysis of the simulation with measurements results obtaining by the ultrasonic flowmeter*; Piotr Piechota, Piotr Synowiec, Wiesław Wędrychowicz, Artur Andruszkiewicz
5	*Experimental and numerical studies of flow and heat transfer conditions in a cavity*; Sebastian Rulik, Włodzimierz Wróblewski, Krzysztof Rusin
6	*Dynamic heat transfer through hollow wall blocks*; Roberto de Lieto Vollaro, Emanuele Habib, Marta Cianfrini
7	*Assessment of variability of acoustical energy generated by traffic volume*; Andrzej Bąkowski, Leszek Radziszewski, Vladimir Dekys, Paweł Świetlik
9	Effects of a flow mode transition on natural convection heat transfer in a heat tracing enclosure; C.J. Ho, Chi-Ming Lai, G.N. Sou, R.H. Chen
10	*Review and developing a mathematical models of working fluid for supercritical co2 cycles*; Jarosław Milewski, Marcin Wołowicz, Piotr Lis
11	*Influence of selected cycle components parameters on the supercritical co2 power unit performance*; Marcin Wołowicz, Jarosław Milewski, Gabriel Ziembicki
12	*Film cooling on turbine blade: an les study*; Chunhua Wang, Jingzhou Zhang, Hongke Feng, Fangsu Fan
13	*Assessment of thermodynamic consequences of hydrogen combustion within a pressurized water reactor containment by means of coupled CFD and lumped parameter approach*; Tomasz, Bury
14	*Evaluation of selected methods of heat transfer coefficient determination in tube and fin cross flow heat exchangers*; Tomasz Bury, Małgorzata Hanuszkiewicz-Drapała
15	*CFD model and experimental verification of water turbine integrated with electrical generator*; Michał Węgiel, Paweł Ocłoń, Tomasz Węgiel, Dariusz Borkowski

16	*Lattice Boltzmann modeling of the convection melt flow driven by the combined effects of buoyancy, surface tension and magnetic body forces*; Farid Mechighel, Mohammed El Ganaoui, Sadik Dost
18	*2D Numerical Modeling and Experimental Study of Electric Thermal Storage Central Heating System*; Piotr Cisek, Dawid Taler, Grzegorz Cisek
19	*The application of Fourier transform to the identification of temperature distribution in flow boiling of refrigerant in an annular gap*; Sylwia Hożejowska; Magdalena, Piasecka
20	*Coupled Electro-thermal Modeling of Surge Protection Devices*; Paweł Ludowski, Matteo Maglio, Luca Ghezzi, Charly Sigogne, Gerard Serrie, Michael Duval
21	*Combustion process design with heat and mass transfer analysis in the two-stroke opposed-piston engine* ; Tytus Tulwin;
22	*Two-stroke opposed-piston engine heat release and transfer analysis*; Paweł Karpiński, Tytus Tulwin
23	*Thermodynamic analysis of high-temperature nuclear reactor coupled with advanced gas turbine combined cycle*; Michał Dudek, Marek Jaszczur, Zygmunt Kolenda
24	*Numerical model of the steam pipeline with thermal insulation*; Karol, Kaczmarski
25	*Numerical prediction of steady-state temperature based on transient measurements*; Ewa Olko-Pelińska, Marek Lewkowicz
26	*Non-uniform Heat Analysis of Coolant in Small Scale Rectangular Cooling Passages with Fins of Single-Side Heating*; Pengyong Xie, Xiaobing Zhang
27	*Comparison of dust emissions from an individual wood-fired boiler and dust emissions in the production of the same amount of heat in a combined heat and power plant* ; Amadeusz Rak, Leszek Kulesza
28	*Flow analysis by a mixer mounted in a liquid atomizer*; Łukasz Semkło;
29	*Analysis of flow through channel with mounted blades*; Łukasz Semkło; Łukasz Gierz
30	*Flow analysis by a pressure-pneumatic liquid atomizer*; Łukasz Semkło; Łukasz Gierz
31	*Determination of aersol size distribution from angular light-scattering signals by using a SPSO-DE hybrid algorithm*; Zhenzong He, Junkui Mao, Xingsi Han
32	*Numerical modelling of supersonic gas ejector*; Kamil Śmierciew, Jerzy Gagan, Dariusz Butrymowicz
33	*The possibility of simplified modelling of radiation heat transfer within a steel porous charge*; Rafał Wyczółkowski, Tomasz Wyleciał, Marek Gała
34	*Energy saving and optimum insulation thicknesses in building upgrading*, Mateusz Orzechowski, Tadeusz Orzechowski
35	*Retrieving thermal diffusivity of an anisotropic material*, Arkadiusz Ryfa, Wojciech Adamczyk, Ziemowit Ostrowski, Zbigniew Buliński
36	*Shortwave multiple reflections effect in an urban street canyon on building's thermal energy demand:analysis for three different European cities*; Chiara Colucci, Andrea Vallati, Luca Mauri
37	*Using adsorption chillers for utylising waste heat from power plants;* K. Sztekler , W. Kalawa , S. Stefański, J. Krzywanski, K. Grabowska, M. Sosnowski, T. Wójcik, W. Nowak
38	*Wavelet-based Adaptive Partitioning in Additive Schwarz Nonlinear Preconditioning*; Ersin Yıldız; Ali Berk Kahraman; Ali Ecder
39	*Thermal Field Numerical Calculation of Motor and Correlated Factors Sensitivity Analysis using combined CFD-Taguchi method*; Xueqi Liang, Yining Wu, Huiqiang Luo, Min Zeng, Qiuwang Wang
40	*The use of waste heat in the process of combined generation of heat and electricity*, Robert Zarzycki, Marcin Panowski
41	*The use of direct carbon fuel cell in compact energy system for generation of electricity, heat and cold*, Robert Zarzycki, Andrzej Kacprzak, Zbigniw Bis

42	*Pulverized coal gasification with steam and flue gas*, Robert Zarzycki
43	*Cyclone furnance as a way for mercury removal from lignite; Robert Zarzycki, Michał Wichliński*
44	*Numerical modeling of the blood flow in right coronary artery unsing hybrid Euler-Lagrange multiphase approach*; Maria Gracka, Bartłomiej Melka, Wojciech Adamczyk
45	*Artificial neural network modeling and measurement of thermophyscial properties of MEPCM suspensions;* C.J. Ho, Wei-Mon Yan and Chih-Jer Lin
46	*Numerical simulation of air flow induced by corona discharge in axisymmetric geometry; Rafał Gałek, Joanna Wilk*
47	*Thermophysical properties investigation and heat transfer analysis of thermal barriers fabricated by rapid prototyping technology; Paweł Gil, Maria Tychanicz-Kwiecień, Robert Smusz*
48	*Formation of bubble chains over twin nozzles, Paweł Dzienis, Romuald Mosdorf, Daniel Tomaszuk, Witold Suchecki,*
49	*Preliminary mathematical and numerical transient models of convective heating and drying of a brick; Piotr Łapka, Michał Wasik, Piotr Furmański, Mirosław Seredyński, Łukasz Cieślikiewicz, Karol Pietrak, Michał Kubiś, Tomasz S. Wiśniewski*
50	*The environmental impact of refuse derived fuel co-combustion with lignite, Piotr Krawczyk, Aleksandra Mikołajczak, Krzysztof Badyda*

Keynote Speakers

Li-Zhi Zhang, South China University of Technology, China

BIO

Li-Zhi Zhang is a Professor at South China University of Technology (Guangzhou, China), the winner of the National Science Fund for Distinguished Young Scholars of China. He has worked with Energy recovery for building ventilation, Thermal Science, Heat and Mass Transfer, and advanced humidity control technologies since 1992. His research interests include: membrane technologies; Development of novel functional materials for built environment; self-cleaning surfaces. His researches combine fundamentals with applications.

Li-Zhi Zhang has published more than 120 SCI papers in international journals. They were cited more than 2000 times on SCI, and his current ISI H-index is 37. He has authored 5 books in advanced humidity control and heat and mass transfer. His book titled “Conjugate Heat and Mass Transfer in Heat Mass Exchanger Ducts” was published by Academic Press, Elsevier, in 2013. He was awarded 10 patents, among which two have been industrialized. He is currently the editors or the members of the editorial boards for 3 SCI international journals: Energy and Buildings (IF 4.07); Indoor and Built Environment (IF 1.7), Thermal Science (IF 0.96). He is the fellow of the Society of Indoor Environment and Health of China; and the fellows of Chinese Heat and Mass Transfer Society and Chinese Multi-phase Flow Society. He won the first grade prize for natural science of Education Ministry of China in 2011. He also won the prestigious National Science Fund for Distinguished Young Scholars of China (2014). He was nominated as the Pearl River Scholar Professor in 2015. He was also nominated as the Nation’s Youth Science and Technology Innovation Leader in 2016. He has served as the committee member for 12 international conferences, like Indoor Air 2016. He was the co-chair of ISHTEC2016, the 5th International Symposium on Heat Transfer and Energy Conservation held on Nov 11-13, in Guangzhou China. He has supervised 12 Ph.D graduates and 20 Master graduates.

Title: Membrane-based heat and mass transfer: novel built environment technologies

Abstract

Membrane-based heat and mass transfer is a novel technology for building environment control. In recent years, much progress has been made in the development of this technology: from fundamentals to applications. In this talk, the advancements in this direction are introduced: the novel membrane materials, the new findings in conjugate heat and mass transfer in membrane modules, new systems that combine air dehumidification with renewable energy use, desalination, PM2.5 purification, etc. The heat and mass transfer mechanisms in parallel-plates, plate-fin, and cross-corrugated membrane-based total heat exchangers are discussed. The heat and mass transfer properties in hollow fibers modules are described. The effects of conjugate heat and mass transfer on the surface membrane, flow mal-distribution in the membrane modules and the randomly distributed nature in tube banks are presented. The correlations for heat and mass transfer, as well as the detailed Nusselt and friction data for module design, are summarized. They provide the fundamentals for system design and optimization. Further, the system set-up and the applications of this new technology are introduced. The energy use efficiencies can be greatly improved if they are combined with solar energy use. The single-stage desiccant system can be improved by separated into multi-stage system, where the desiccant is inter-cooled after absorbing moisture. In future, to extend commercial applications of this technology, following researches should be strengthened: new low-cost membrane materials, internally cooled membrane-based modules, multi-stage membrane liquid desiccant air dehumidification systems, and real-time dynamic simulation technology.

Zhiguo Qu, Xi'an Jiaotong University, China

BIO

Professor Qu is a full professor in the School of Energy & Power Engineering at Xi'an Jiaotong University. He obtained his PhD degrees in engineering thermo physics from Xi'an Jiaotong University in 2005. He joined School of Energy & Power Engineering in 2005 and became full professor in 2012. Form Feb.2006 to Jun.2006, he worked as visiting scholar at Advanced Heat Transfer, LLC USA. And from Sep.2013 to Mar. 2014, he worked as visiting scholar at Pennsylvania State University. His main research interests include thermal management of energy system, phase change heat transfer, transport phenomena in porous media, mass transfer for CO2 absorption. He has published 122 ISI indexed papers in peer-reviewed journals and has been serving as the editorial board member for several journals. Prof. Qu has been awarded Second Class National Award for the State Scientific and Technological Progress (Rank 2) and Second Class National Award for Technological Invention (Rank 3). He is a recipient of Young

scholars of the Yangtze River, National Young Top-notch Talent Support Program, China National Funds for Excellent Young Scientists, Young Scholar Fund from Fok Ying Tung Education Foundation of China and the Ministry of education program for New Century Excellent Talents.

Title: Numerical study on multi-scale problem for adsorption process in porous media

Abstract

The multiscale heat and mass transfer process in porous media is a widespread phenomenon that exists pervasively in multiscale gas adsorption for shale gas matrix and adsorbent bed. In this keynote lecture, a modified lattice Boltzmann model is developed on the pore-scale to accurately predict the effective diffusivity of heterogeneous shale matrix, where the multicomponent and irregular morphological features are fully considered. The effects of shale porosity, average gain diameter, orangic matrix volume fraction and diffusivity, and irregular structures on the matrix diffusion ability are investigated. A modified empirical formula is proposed to effectively capture the heterogeneous shale matrix diffusion ability. The gas adsorption and separation on porous surface of the absorbent at different scales are solved by a multiscale method that couples LBM with grand canonical Monte Carlo (GCMC). In interfacial boundary, saturation adsorption capacities are obtained by GCMC method to replace empirical values. Langmuir–Freundlich model and linear fitting formula are used to calculate the saturation adsorption capacities in Langmuir adsorption kinetics model and the adsorption heat in heat transfer in LBM model at mesoscopic level. Then, the mass transfer process of CO2/CH4 mixture gases in Cu-BTC membranes is investigated by the above multi-scale method. The proposed coupled method can be helpful in the design of efficient membranes.

Sang-Ho Suh, Soongsil University, South Korea

BIO

Career

1990.09~Present	: Professor, Dept. Mech. Engrg., Soongsil University,
2006.01~2007.12	: President of Korean Society for Fluid Machinery (KSFM)
2009.01~2009.12	: Division Chair of Fluid Engineering of Korean Society for Mechanical Engineer (KSME)
2010.01~2013.12	: Board of Director and President of Biomedical Engineering Society for Circulatory Disorders (BESCO)
2012.01~2013.12	: Committee Chair of National Congress on Fluid Engineering (NCFE)
2016.05~	: Local Chair of International Conference on Computational Heat and Mass Transfer (ICCHM2T), 2017, Seoul)

Research Field

Biomedical Engineering

- Biofluid Circulations(Blood, Urine and Air flows in arteries, ureter, upper airway)
- Developments of Biomedical Devices.
- Industrial applications researches
- Performance evaluation of pumps and hydraulic turbines
- Development of automatic waste collecting system
- Pneumatic Capsule Pipeline (PCP)

Awards:

2014 KSME best paper award
2008 and 2014 BESCO best scientific research award
2015 KSFM best scientific research award

Title: In vivo and In vitro Studies for Biofluid Circulations

Abstract

The biofluid (blood, air, and urine) circulations are related to diseases such as arterial disorders, OSA (Obstructive Sleep Apnea), and hydronephrosis. Atherosclerosis and aneurysm are progressive diseases characterized by inflammation and lipid accumulation in the vascular wall and abnormal dilations of arteries and veins. OSA is a syndrome characterized by the repetitive episodic collapse of the upper airway. Hydronephrosis is caused by cancer and tumor when the ureteral stenosis or occlusion by intrinsic or extrinsic lesions, - disturbance of normal urinary drainage. Computational fluid Dynamics includes fluid-structure interaction (FSI) analysis and flow visualization technique are excellent tools to understand, analyze, and estimate the flow characteristics and investigate the pathogenesis of the generation and progression of the development of diseases such as atherosclerosis, OSA, and hydronephrosis. Computational fluid dynamics, the fluid-structure interaction, and in vitro experiment are helpful for understanding the biofluid circulation problems and also can be applied to predict clinical diagnostics and conduct treatments. The outlines of this speech are to show various biofluid circulations, review of recent biofluid studies what we have done and introduce the biofluid circulation problems what people should study. The fluid-structure interaction is used to solve complicated rupture problems in the vessels. Further, we investigated the effects of setback surgery and the flow phenomena of inspiration and expiration to evaluate the effects of anatomical airway change after maxillomandibular advancement in the upper airway. The numerical analyses were performed, and it compared the changes in the negative airway pressure in the section of the minimum area before and after. In addition, the effect of ureter wall compliance and inlet/outlet pressure on the peristalsis motion was analyzed. Also, the flow rate and pattern around the side holes of a double J stent (DJS) were evaluated in curved models of a stented ureter based on the human anatomy and straight models for comparison. To validate the numerical results, a flow visualized rapid prototype ureter model was made using clinical data. It was evaluated the performance of DJS with this model. As a result of the experiment, it was in good agreement with the computer simulation result. In conclusion, a comprehensive study of biofluid circulation was conducted to use the possibility of clinical approach.

	24 May
8:00 – 9:00	**REGISTRATION**
9:00-11:00	**KEYNOTE SESSION 4 (Rooms A-F)** **Session Chairman: Božidar Šarler, Rachid Bennacer, Pradeep Bansal**
9:00-9:40	*Membrane-based heat and mass transfer: novel built environment technologies;* **Li-Zhi Zhang**
9:40-10:20	*Numerical study on multi-scale problem for adsorption process in porous media;* **Zhiguo Qu**, H. Wang, Y. Ying and L. Zhou
10:20-11:00	*In vivo and In vitro Studies for Biofluid Circulations,* **Sang-Ho Suh**
11:00-11:20	**COFFEE BREAK**
11:20-13:20	**POSTER SESSION 3**
13:30-14:20	**LUNCH**
14:20 - 16:20	**SCIENTIFIC COMMITEE MEETING FOR PAPER SELECTION**

POSTER SESSION 3 **Zhiguo Qu, Kamel Hooman**	
1	*Cfd modelling and validation of the rotary lobe compressed air expander*; Piotr Krawczyk, Michalina Kurkus-Gruszecka, Aleksandra Mikołajczak, Piotr Łapka, Krzysztof Badyda
2	*Review of audit calculation activities on the applicability of CFD software to nuclear safety problems*; Gong-Hee Lee
3	*Viscous dissipation effect on laminar forced convection in circular duct with heated and adiabatic walls at constant axial heat flux*; Tyomasz Janusz Teleszewski
4	*The Optimization of the High Temperature Fin And Tube Heat Exchanger using the CGA and PSO algorithms*; Paweł Ocłoń, Stanisław Łopata, Wen-Quan Tao, Jian Fei Zhang, Hocine Mzad
5	*Optimization of underground power cable system using a modified Jaya algorithm;* Paweł Ocłoń, Monika Rerak, Eva Kroener, Andrea Vallati, Massimo Corcione
6	*Numerical and experimental determination of heat transfer coefficients in elliptical tube for transitional flow regime*; Paweł Ocłoń, Stanisław Łopata, Tomasz Stelmach
7	*Computational modelling of retrofitting a coal fired boiler type op-230 for predicting NOx reduction*; Przemysław Motyl; Jan Łach
8	*Energy and thermodynamical analisys of a thermal system with a heat pump coupled with a photovoltaic thermal hybrid solar collectors: differences with a traditional system with a heat pump cooled with air*; A. Vallati, C. Colucci, L. Mauri, C. Capasso, P. Ocłoń
9	*Numerical investigation of sudden expansion flow with and without splitter plate;* P. Maheandera Prabu, P. Rajesh Kanna, Jan Taler, Dawid Taler, Paweł Ocłoń
10	*Investigation of forced convection heat transfer from a block located staggered cavity with parellel and anti parellel wall motion*; K. Meenakshi Sundar, P.Rajesh Kanna, Jan Taler, Dawid Taler, Paweł Ocłoń
11	*Effect of baffle shape in heat transfer for jet impingement on a solid block;* Muthukannan M, Uthayakumar M, Rajesh Kanna P, Paweł Ocłoń, Jan Taler, Dawid Taler
12	*Predictions of air impingement heat transfer at cirindrical surface with crossflow*; Artur Cebula, Jan Taler
13	*Experimental and numerical analysis of heat transfer in helically coiled heat exchanger*, Tomasz Sobota
14	*Energy efficiency of 10 kW polymer membrane fuel cell stack*; Magdalena Dudek, Maciej Rosół, Andrzej Raźniak, Piotr Dudek, Piotr Wygonik

15	*Determination of heat transfer coefficient in T-shaped cavity by means of solving the inverse heat conduction problem*; A. Frąckowiak, D. Spura, U. Gampe, M. Ciałkowski
16	*Thermal flow analysis of vertical combustion chamber waterwall tubes operation* ; Marek Majdak, Sławomir Grądziel
17	*Influence of surface roughness elements on heat transfer in transitional flows: a cfd numerical investigation* ; Hatim Belkhou
18	*Identifying synchronization between flow boiling inside two parallel minichannels using joint recurrence plots*; Hubert Grzybowski, Iwona Gruszczyńska, Romuald Mosdorf
19	*Spring inserts for the intensification of the heat exchange process during boiling in vertical tubes - optimization of geometric parameters*; Beata Niezgoda-Żelasko
20	*Impact of dust and temperature on energy conversion process in photovoltaic module*; Qusay Hassan, Marek Jaszczur, Janusz Teneta, Katarzyna Styszko
21	*Efficiency of pre-treatment for anaerobic digestion of lignocellulosic and municipal solid waste*; Yee Van Fan, Jiří Klemeš
22	*Investigation of Chlorella vulgaris microalgae sedimentation process* ; Małgorzata Płaczek, Agnieszka Patyna, Stanisław Witczak
23	*Assessment of gas permeability through porous skeletal media with anisotropic internal structure;* Grzegorz Wałowski, Gabriel Filipczak
24	*Gas – powder mixture flow in hartman tube*; Paweł Dzienis, Marcin Pianka
25	*Influence of flow conditions and foam parameters on pressure drop and heat transfer in flow of fluids through channels filled with metal foams*; Roman, Dyga; Małgorzata, Płaczek; Stanisław, Witczak
26	T*he impact of the use of antifreeze substances on the heating installation thermohydraulic parameters and energy use*; Damian Muniak
27	*Control valve with a constant inner authority value; Damian Muniak*
28	Research on Cooling in Coal Mines by using Liquid Phase Transitions of CO2; ZHAI Xiaowei, XU Yu, WANG Kai
29	*The fem with trefftz-type basis functions based on the hermite interpolation used to calculate the flow boiling heat transfer coefficient in a minichannel*; Piasecka Magdalena, Maciejewska Beata, Strąk Kinga
30	*The application of the FEM with time-dependent Trefftz-Type basis functions for determining the flow boiling heat transfer coefficient in a minichannel;* Beata Maciejewska, Magdalena Piasecka
31	*Determination and validation of transient temperature fields within the cylindrical element using the inverse heat conduction method*; Marcin Pilarczyk, Bohdan Węglowski
32	*Experimental verification of the algorithm for determining thermal stresses on the external surface of a thick-walled pressure component*; Bohdan Węglowski, Marcin Pilarczyk
33	*Parametric study of non-evaporative spray cooling on aluminum plate: simulation and analysis*; Hocine Mzad, Abdessalam Otmani, Stanisław Łopata
34	*Water-spray cooling effects on a continuous casting process: modelisation and simulation*; Abdessalam Otmani, Hocine Mzad, Kamel Bey
35	*Determination of distribution of heat-conducting material concentration in protective layer of TPS panel,* Andrzej Frąckowiak, Łukasz Brodzik
36	*Meshing strategy for hybrid hex-tet phes layered bed heat storage;* Jędrzej Mosiężny, Bartosz Ziegler
37	*Modeling of propane emissions from a tank containing a liquefied phase*; Zdzisław Salamonowicz, Radosław Makowski