Book of Abstracts from 9th International Scientific Conference on Advances in Mechanical Engineering

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Welcome Message

On behalf of the ISCAME Scientific and Organizing Committee I am pleased to welcome you to Debrecen for the 9th International Scientific Conference on Advances in Mechanical Engineering organized by the Department of Mechanical Engineering, Faculty of Engineering of the University of Debrecen.

The main goal of ISCAME is to yearly bring together engineers working on research, development and practical application in the field of mechanical engineering. Furthermore, the purpose of this Conference is to provide opportunities for scientists and engineers to meet and to discuss current research, new concepts and ideas and establish possibilities for future collaborations in all aspects of mechanical engineering.

I am pleased to inform you that 202 experts from higher education have registered for this year's conference from altogether 12 countries. In the framework of ISCAME 110 presentations were given and 49 posters were exhibited.

This year, the theme of the plenary lectures was artificial intelligence (AI) and material testing. Accordingly, the head of the Material and Process Analysis Laboratory of the BMW Group Plant Debrecen gave lecture about their activities and the representatives of Mathworks introduced the AI solutions of Matlab. Furthermore, the researcher of the host Department of Mechanical Engineering presented the application of artificial intelligence and the related material testing in the context of a case study. Accompanying programs of ISCAME was a Matlab Workshop and the Exhibition of Creative Mechanical Engineers.

We invite you to be an active participant in this Conference and to contribute to any topic of your scientific interest. We hope that the 9th International Scientific Conference on Advances in Mechanical Engineering will have an important impact on the research in all topics included in its program.

It is also an honour for us to have a privilege to give a report about the 9th Mechanical Engineering Industrial Exhibition and Job Fair. The Department of Mechanical Engineering of the University of Debrecen hosted – parallel to ISCAME – the event, called "Mechanical Engineering Industrial Exhibition and Job Fair" where 27 companies were exhibited. This professional program benefited the visitors who wanted to get up-to-date knowledge with the latest technology.

We want to express our appreciation to all members of the committees involved in the preparation of this Conference and to all the staff who were managing the different aspects of the Conference and to all the contributing authors and participants who created the real Conference. We hope that all of you feel awarded for your participation and contribution.

Website of the Department of Mechanical Engineering, Faculty of Engineering, University of Debrecen:
www.mecheng.unideb.hu
Website of ISCAME:
https://konferencia.unideb.hu/en/iscame-home-page

Yours Sincerely,

Tamás Mankovits
Chair of ISCAME, Head of Department
Department of Mechanical Engineering
Faculty of Engineering, University of Debrecen

Chair of ISCAME 2023

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Szandra KALMÁRNÉ SITKU, University of Debrecen, Hungary
Lilla CSONKÁNÉ DÓRÓ, University of Debrecen, Hungary
Mihály CSÜLLÖG, University of Debrecen, Hungary

Scientific Books of Abstracts
Vol. 2, pp 112-112

Online: 2023-11-21

Innovations in Water Treatment

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Keywords: Water Treatment, Filtration, Nitrification, Denitrification, Sorption

Abstract. The widespread use of chlorine synthesis devices, such as HIPOGEN P, has revolutionized water disinfection by generating active chlorine from common salt directly at the point of use. Employing electrolysis with table salt, water, and electricity, the HIPOGEN system ensures efficient and affordable water treatment in various settings, including individual households, urban and rural water systems, and industrial applications [1-2].

Filtration and sorption are vital techniques in water purification, effectively eliminating impurities and microorganisms from the water. This process involves various technologies like sedimentation, sand filtration, lime softening, and activated carbon filtration, ensuring the removal of a wide array of impurities. Biological filtration facilitates the conversion of organic and inorganic matter, resulting in the production of clean water, carbon dioxide, and an increase in microorganism mass.

Figure 1.

Nitrification and denitrification play crucial roles in the oxidation and reduction of ammonia, respectively, contributing to the removal of nitrogen compounds from water. Ion exchange processes aid in water softening and demineralization, effectively eliminating undesirable dissolved substances through the exchange of ions between the solution and ionic mass. Nanofiltration and reverse osmosis employ semi-permeable membranes to effectively remove dissolved substances, making them valuable in water treatment and environmental protection within the chemical engineering sector. Dosing device for the administration of liquid chlorine compounds, including amperometric monitoring of residual chlorine and measurement history, complete with remote control and monitoring is illustrated in Figure 1.

Acknowledgements

This article/publication is based upon work from COST Action CA21112 - Offshore freshened groundwater: An unconventional water resource in coastal regions? (OFF-SOURCE), supported by COST (European Cooperation in Science and Technology).

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