HEAT EXCHANGER DESIGN HANDBOOK WEBINAR SERIES

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HIGH TEMPERATURE THERMAL ENERGY STORAGE

Prof. Kamel Hooman
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Abstract

According to IEA, in just under two years, over one-third of our electricity generation will be from renewable sources. While this can lower our carbon footprint, the industry and infrastructure need to be prepared for such a change mainly because renewable sources of energy are localized and intermittent. Hence, further growth in renewable electricity production has to coincide with storage technologies including power-to-heat; ideally high grade heat which can be materialized, for instance, through high temperature thermal energy storage. Latent heat thermal energy storage, through the use of phase change materials, is an attractive option as the PCMs rely on heat of fusion therefore offering high thermal inertia at low temperature difference during phase transition. However, the thermal conductivity of PCMs are very low which impedes the heat transfer rate to or from the circulating heat transfer fluid. That is, the charging and discharging processes (i.e. melting and solidification) are prolonged. This presentation analyses heat transfer augmentation to/from high temperature PCMs. Numerical, experimental and theoretical techniques are used for this purpose. Technical limitations, challenges and future research direction on low-cost thermal storage system for CST plants will be touched on.

Prof. Kamel Hooman, Delft University of Technology, The Netherlands

After completing his PhD at The University of Queensland, Kamel has worked there until 2022 when he moved to TU Delft as a Professor and Chair for Heat Transformation Technology. His research aims at responsibly increasing the share of renewable energy in the world. He uses a combination of theoretical, numerical, and experimental techniques to address technical challenges that hinder the development of greener renewable thermofluids devices and systems.