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Heat transfer managements in thermal systems

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Many techniques have been used to manage and enhance the rate of heat transfer in thermal energy systems. One of those techniques is to use porous materials. Physical and chemical properties of porous media can be engineered which candidates porous medium is an ideal material for heat transfer management by different modes of heat transfer, conduction, convection and radiation. For instance, it is possible to manufacture porous mediums with high or low thermal conductivity. Also, porous media can be found or engineered with different porosity, permeability, etc. High porous materials have a large surface area per unit volume, which makes porous medium a suitable candidate for enhancing heat, mass and chemical reactions, provided that it has high permeability, to insure low pressure drop for fluid flow. Work was done mainly using porous materials for heat transfer managements in heat exchanger and combustors. In this presentation, the author will discuss a few techniques which have been explored in our lab to enhance the rate of heat transfer and temperature distribution management in heat exchangers and combustors, with and without porous media. The mentioned systems either operate on forced or natural convection modes. The research resulted in developing high efficient solar air heat, enhanced heat exchanger and low NO_x combustor. Numerical and experimental results will be introduced and discussed. Also, challenging issues will be outlined.

Biography

A A Mohamad obtained PhD from the School of Mechanical Engineering, Purdue University. Since 2000, he is on the faculty of the Department of Mechanical Engineering, University of Calgary, Canada. From 2010 to 2012 he was on sabbatical leave from the University of Calgary, while he served as Dean of Engineering in Alfaisal University, Saudi Arabia. He has been invited by many institutions around the world as a keynote speaker and visiting Professor. He has organized and chaired/co-chaired several conferences on transport phenomena in porous media and CFD. He has authored and co-authored more than 200 papers and graduated more than 40 PhD and MSc students. He is a Fellow of the American Society of Mechanical Engineer and a member of the scientific council of the ICHMT.

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