Proceedings of CHT-15
ICHMT International Symposium on Advances in Computational Heat Transfer

May 25-29, 2015, Rutgers University, Piscataway, USA

CHT-15-034

COMPUTATIONAL OF STUDIES OF HEAT TRANSFER ENHANCEMENT IN TURBULENT CHANNEL FLOW WITH TWISTED STRIP INSERTS

Suvanjan Bhattacharyya[1*], Himadri Chattopadhyay[2]
[1*] Department of Mechanical Engineering, MCKV Institute of Engineering, Howrah, West Bengal, India.
[2] Department of Mechanical Engineering, Jadavpur University, Kolkata, West Bengal, India.
[1*]Correspondence author: Mobile: +91 9477410056, Fax: 0091-33-24146495.
Email: suvanjanr@gmail.com, chimadri@gmail.com

ABSTRACT - Heat transfer behaviour in twisted strips swirl generator inserted tube are investigated numerically. This work presents the configuration optimization of a typical single-twist twisted strip in a circular tube for turbulent heat transfer in air using computational fluid dynamics (CFD) modelling. In the present paper, transition - SST model which can predict the change of flow regime from laminar through intermittent to turbulent has been used for numerical simulations. The twisted strips are inserted separately from the tube wall. The configuration parameters include the, entrance angle (α) and pitch (H). The computational results are in good agreement with experimental data. The results indicate that the larger rotated angle yields a higher heat transfer value and a greater flow resistance of Reynolds number. The optimal design of typical twisted strips in a circular tube for turbulent air flow is, $\alpha = 180^o$, 160^o and 140^o with a Reynolds number that varies from 100 to 20000. The using of single twist twisted strips supplies considerable increase on heat transfer and pressure drop when compared with the literature. The Nusselt number increases with the increase of Reynolds number. This result is useful for the design of solar thermal heaters and heat exchangers.