

Study on the Effects of Geometrical Parameters of Helical Fins on Heat Transfer Enhancement of Finned Tube Heat Exchangers

Authors : H. Asadi, H. Naderan Tahan

Abstract : The aim of this paper is to investigate the effect of geometrical properties of helical fins in double pipe heat exchangers. On the other hand, the purpose of this project is to derive the hydraulic and thermal design tables and equations of double heat exchangers with helical fins. The numerical modeling is implemented to calculate the considered parameters. Design tables and correlated equations are generated by repeating the parametric numerical procedure for different fin geometries. Friction factor coefficient and Nusselt number are calculated for different amounts of Reynolds, fluid Prandtl and fin twist angles for the range of laminar fluid flow in annular tube with helical fins. Results showed that friction factor coefficient and Nusselt number will be increased for higher Reynolds numbers and fins' twist angles in general. These two parameters follow different patterns in response to Reynolds number increment. Thermal performance factor is defined to analyze these different patterns. Temperature and velocity contours are plotted against twist angle and number of fins to describe the changes in flow patterns in different geometries of twisted finned annulus. Finally twisted finned annulus friction factor coefficient, Nusselt Number and thermal performance factor are correlated by simulating the model in different design points.

Keywords : double pipe heat exchangers, heat exchanger performance, twisted fins, computational fluid dynamics

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