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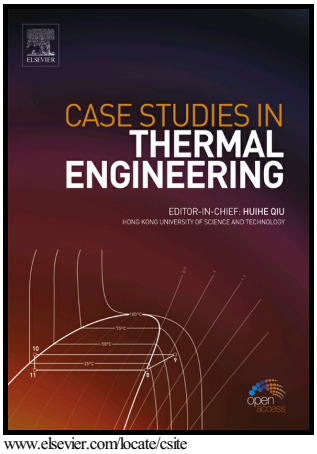

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Assessment of heat transfer and fluid flow characteristics within finned flat tube

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Abstract

In this paper, the heat transfer and flow characteristic of air over flat finned tube with perforated and non-perforated fin have been carried out numerically. The mesh generation and finite volume analyses have been conducted using Ansys 15 with a RNG k–e turbulent model to estimate heat transfer coefficient and pressure drop. The free stream velocity ranging between 3,4,5,6, and 7 m/s have been applied for all cases in the simulation and verified with the available data. A satisfactory agreement was found between the percent results and the references with a maximum deviation of 7% for the finned circular tube with solid fin. The results present a considerable enhancement in Nusselt number with using perforation technique, where the perforation provide 8.5%, 13.6% and 18.4% enhancement using circular, square and triangular perforation respectively. Triangular perforation model offers a considerable finding due to the increment in the Nusselt number comparing to the pressure drop.

Keywords; Annular flat finned tube; Perforated fins; Heat transfer; Turbulent flow

1.0 Introduction

The heat exchangers with finned tube have been widely used in industries and automotive application. The thermal resistance is the most effective factor in the heat exchanger performance. Furthermore, the extended surface geometry plays a vital role in the heat exchanger design. However, the passive methods such as rough and extended surfaces with