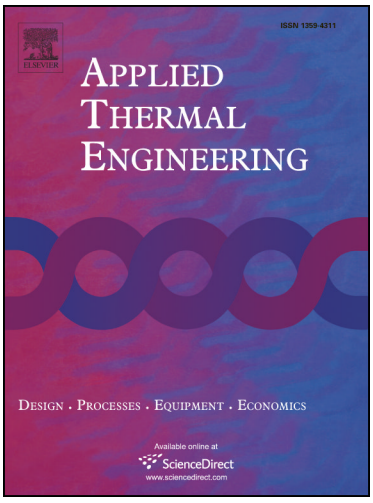

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Highlights

1. The k-ε-enhance model is employed to numerically investigate the overall performance of louver fin.

2. The effect of inlet air profiles of the louver fin is investigated.

3. The effects of geometric parameters of louver fin are investigated.

4. The optimization of the geometric parameters is obtained.

Abstract

This work aimed to investigate the effect of louver fin configurations on the thermal performance at different Reynolds numbers. The discussed ranges of these geometry parameters were 7.5-12.5 *mm* (louver length), 8°-20° (louver angle), and 2.25-3.75 *mm* (louver pitch). The three dimensional CFD simulation was performed and validated with reported experimental data and other simulation results from published articles. The flow and heat transfer characteristics in louver fin were analyzed numerically. Based on these numerical results, a detailed description of Nusselt number and pressure drop was presented and discussed. Two kinds of inlet velocity profiles including Linear-up and Linear-down were investigated. All the numerical data would be presented at different Reynolds number between 70 and 350. In addition, the Nu number correction and pressure drop correction were presented and the optimization of louver fin was obtained. Optimized result was $L = 7.5mm$, $\alpha = 8°$, and $Lp = 2.25mm$. Compared with the reference louver fin, Nu number of the optimized louver fin was decreased by about 24.2%, while the pressure drop was decreased by 36.7%, in turn leading to the increase of PEC by 19%.

Keywords: Louver fin; velocity profile; optimization

1. Introduction

Plate fin-tube heat exchangers, known as one of the best performance exchanger on heat transfer efficiency and high compactness, were widely used in power