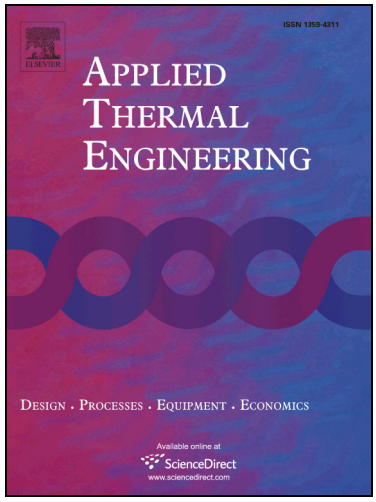

Parametric study and optimization of H-type finned tube heat exchangers using Taguchi method

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Abstract

In this paper, a three-dimensional numerical model of H-type finned tube heat exchangers has been built. In order to optimize its structure and improve its performance, Taguchi method is applied to investigate the influence of seven geometric parameters including slit width, row number, fin height, spanwise tube pitch, longitudinal tube pitch, fin thickness and fin pitch. Numerical simulations are performed on eighteen cases with different combinations of seven geometric parameters and the overall thermal-hydraulic performance and its characteristics of heat transfer and flow friction are discussed in detail. The results show that fin pitch and fin height play a significant role on the heat transfer characteristics while the flow friction characteristics are mainly affected by fin height, spanwise tube pitch and fin pitch. The intuitive analysis and analysis of variance show that fin pitch, fin height and fin thickness have much stronger influence on its overall thermal-hydraulic performance than the rest four parameters. Finally, the optimal parametric combination of the H-type finned tube is obtained with an improvement of overall thermal-hydraulic performance by 11.4% to 16% for *Re* in range from 9000 to 24000.

Keywords: H-type finned tube, Taguchi method, numerical optimization, thermal-hydraulic performance

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