

## Numerical Studies on the Performance of the Finned-Tube Heat Exchanger

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**Abstract :** Finned-tube heat exchangers are predominantly used in space conditioning systems, as well as other applications requiring heat exchange between two fluids. The design of finned-tube heat exchangers requires the selection of over a dozen design parameters by the designer such as tube pitch, tube diameter, tube thickness, etc. Finned-tube heat exchangers are common devices; however, their performance characteristics are complicated. In this paper, numerical studies have been carried out to analyze the performances of finned tube heat exchanger (without fins considered for experimental purpose) by predicting the characteristics of temperature difference and pressure drop. In this study, a design considering 5 design variables, maximizing the temperature difference and minimizing the pressure drop was suggested by applying DOE. In this process, L18 orthogonal array was adopted. Parametric analytical studies have been carried out using Analysis of Variance (ANOVA) to determine the relative importance of each variable with respect to the temperature difference and the pressure drop. Following the results, the final design was suggested by predicting the optimum design therefore confirming the optimized condition.

**Keywords :** heat exchanger, fluid analysis, heat transfer, design of experiment, analysis of variance

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