

The Effects of Geometrical Parameters on Heat Transfer and Pressure Drop in Plate Fin and Tube Heat Exchangers

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Abstract

Plate fin and tube heat exchangers have many applications in air conditioning and radiators of internal combustion motors. The geometrical parameters have had considerable effects on heat transfer and pressure drop of these heat exchangers. Previously, the effects of geometrical parameters on heat exchangers with one row tube have been investigated. The present study has been investigated to develop the results of the previously study. The purpose was to investigate the effects of geometrical parameters on heat exchangers of both one row tube and two row tubes in flowing gas direction. The current study was conducted in two stages by Computational Fluid Dynamics (CFD) software. In the first stage, the previous study was duplicated on one row tube heat exchangers. The distance between the fins was found to have a considerable effect on pressure drop. The decrease in the distance between fins, increases pressure drop. It is also observed that placing the fin tube at downstream region and increasing ellipticity of the fin tube affect heat transfer positively. In second stage, in addition to previous parameters, the effects of distance changes between the tubes in horizontal and vertical directions on heat transfer and pressure drop in two row tube heat exchangers have been conducted. The distance between tubes in horizontal direction has a remarkable effect on pressure drop. The increase in the distance between tubes in vertical direction fortifies heat transfer.

Keywords: Plate Fin, Heat Exchanger, Heat Transfer, Pressure Drop, CFD.