# Thermal performance of High-Efficiency Vortex (HEV) variants: reversed arrays configuration



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| Résumé en anglais | Convective heat transfer in the Reversed Arrays configuration of the High-Efficiency Vortex (HEV) multifunctional heat exchanger is investigated. An experimental test section constituted of a tube equipped with inclined trapezoidal vortex generators with a constant-flux heating system is designed and constructed. In this configuration, the tab inclination is opposite to the flow direction. Interactions between the tabs and the flow generate coherent structures in the form of longitudinal counter-rotating streamwise vortices enhancing radial particle dispersion, mixing, and ultimately heat transport. The original configuration in which the tabs are inclined in the flow direction is also examined. Recent in-house hydrodynamic and thermal studies have been conducted showing the interest of these configurations in mixing and heat transfer applications. The experimental data are in good agreement with the numerical results. Local Nusselt numbers show an increasing tendency in the longitudinal direction with remarkable cross-sectional variations. Global analysis of convective heat transfer reveals the superiority of the Reversed Arrays. Energy expenditures are assessed through total pressure drop measurements. A comparative analysis based on the thermal enhancement factor and Colburn factor shows that the HEV is energetically less costly than other heat exchangers with similar heat transfer capacity. |
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