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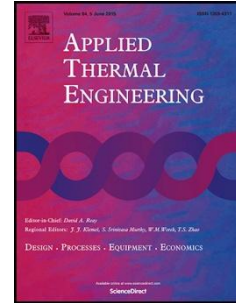
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Numerical investigation of heat transfer and fluid flow of water through a circular tube induced with divers tape inserts

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HIGHLIGHTS

- Heat transfer and flow characteristics of water through different tube designs is analysed numerically.
- Disturbance of boundary layer by twisted tape generates an enhancement of heat transfer.
- Thermo-hydraulic performance of the flow system is affected by the shape of cut on the twisted tape.
- The tube with alternate-axis triangular cut twisted tape produce the best performance, having a thermal performance factor of 1.43.
- Nusselt number of the novel correlation agrees with that of the established correlation with a variation of 2.21%.

Abstract

An investigation was carried out to analyse numerically heat transfer and flow characteristics of water through a circular tube induced with different twisted tapes. The aim is to know which of the tube designs gives the best performance when compared with a plain tube. Turbulent flow was considered, the walls of the tubes were under uniform wall heat flux, Reynolds number was between 5000 and 20000, and RNG κ - ϵ model was selected for the simulations. The shape of cuts on the tapes has effects on the performance of the induced tubes. The tube fitted with alternate-axis triangular cut twisted tape has the best performance as its Nusselt number and friction factor are 1.63 – 2.18 and 2.60 – 3.15 times respectively that of the tube fitted with plain twisted tape while its thermal performance factor is 1.35 – 1.43 times that of the tube with plain

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