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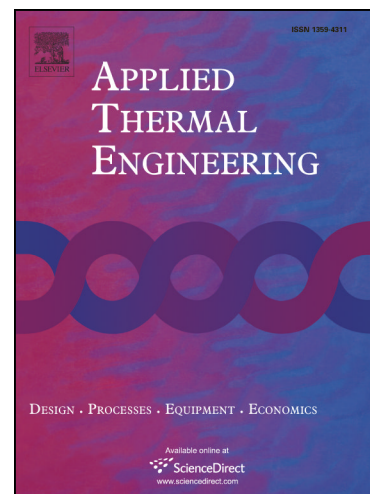
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EXPERIMENTAL INVESTIGATION ON HEAT TRANSFER ENHANCEMENT IN A CIRCULAR TUBE WITH EQUILATERAL TRIANGLE CROSS SECTIONED COILED-WIRE INSERTS

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Abstract

The thermo-hydraulic performance of coiled-wire inserted in a tube was experimentally investigated. The wire inserts have equilateral triangular cross-sections; they were coiled in a specific way to ensure that a vertex of the triangle was oriented to face the incoming air flow. The coiled-wires were installed with a 1 mm separation from the inner tube wall so that the heat transfer enhancement due to the viscous sublayer disturbance could be investigated. In total, six different coiled-wire configurations (three different pitch-to-diameter ratios: $P/D=1$, $P/D=2$ and $P/D=3$ and two different ratios of triangle side-length to tube diameter: $e/D=0.0714$ and $e/D=0.0892$) were chosen for the experiment. To determine the effect of triangle position on thermal performance, the results of present study were compared with a previous study results. The maximum thermal performance is approximately 1.67 times that for a smooth tube was observed for a wire with ratios of $e/D=0.0892$, $P/D=1$ and 11 – 18% more heat transfer enhancement was achieved than the previous work results. In conclusion, to enhance heat transfer, a coiled-wire that a vertex of the triangle is oriented to face the flow can be widely applied wherever heat exchangers with tubes are used.

Keywords: coiled wire inserts, heat transfer enhancement, heat transfer

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