Heat transfer and Pressure Drop Comparison for Corrugated Tube and Different Numbers of Copper Foam Cylindrical Inserts in laminar flow

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Abstract

The chief objective of the present investigation is to study experimentally the hydraulic and thermal performance of a corrugated tube with copper foam cylindrical inserts (MFCI) containing a new types of inserts with the purpose to improve the procedure of heat transfer, which gives an elevated thermal enhancement factor (PEF) more than that of smooth tube beneath the similar operating circumstances. Also, in this paper, the study of the effect on the number of cylindrical insert was made from metal foam (10 PPI and porosity 0.9) on the Nusselt no. and Nusselt no. ratio as a double heat exchanger furnished with the suggested MFCI with various values of Reynolds numbers ranges from (1600) to (4000) via using water as the test fluid. The investigational outcomes revealed an enhancement in heat transfer as well as thermal performance of the corrugated tube with MFCI which being significantly augmented in comparison to those for smooth tube. Additionally, the average rise into the value of heat transfer is within (74%) and (90%) at the test range, relying upon the number of cylindrical inserts as well as Reynolds no., whereas the max. thermal performance is obtained to be around (2.4) for utilizing the corrugated tube having (4) cylindrical inserts at low Reynolds no. Furthermore, the outcome of the loss of pressure manifested that the corrugated tube's mean friction factor is within 96% and 97% more than the smooth tube.

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