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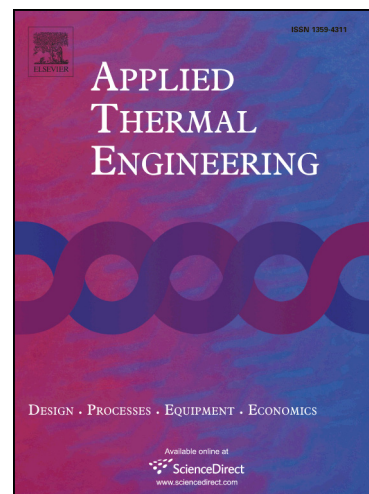
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EFFECT OF NEW TYPE OF ENHANCEMENT ON INSIDE AND OUTSIDE SURFACE OF THE TUBE SIDE IN SINGLE PASS HEAT EXCHANGER

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H I G H L I G H T S

- Comparison between plain tube, outside, and inside + outside enhancement were done.
- Different Re no. for shell and tube were tested with different twisted tape ratios.
- Combined tube enhancements provide higher thermal performance than one.
- The effectiveness became double by using twisted inserts with triangular fins.
- U and ΔP increases as Re no. increases, but f inversely.

A B S T R A C T

An experimental investigation was made to study the performance of a double pipe heat exchanger, with a triangular copper fins, which is used to extend the outside surface area of the tube. While, an external type of enhancement is used for the inside of the tube by using twisted tapes with various twisted ratio inserts inside the tube. Results for ninety experiments were indicated. These runs were done for plain tube, finned tube and finned tube with twisted tape at three different twisting ratios. Experiments were performed at various Reynolds number for the above profiles both in the inner and outer tube. The results showed that the overall heat transfer coefficient rate for only a finned pipe is (3 times) greater than plane pipe. Furthermore, as the twisted tape ratio used in the inner pipe at (7, 5, 3), the heat transfer rate was increases 4, 6, 8 times the case of plain pipe, respectively. Conversely, the pressure drop and friction factor increase across the inner tube with the decreasing of the twisted tape ratio increasing. The measured and calculated results show the most effective heat exchanger among cases studied in this which is the finned tube with twisted tape at ratio 3.

Keyword: Heat transfer enhancements, Triangular fins, twisted tape, Heat transfer coefficient, pressure drop

1. Introduction

Heat exchangers have many applications in industrial and engineering fields. One of the simplest types of heat exchanger is the double pipe heat exchanger, which is used to transfer heat from the hot fluid to the cold fluid through a cylindrical wall. One of the important types of double pipe concentric tube is Water / Air heat exchanger. This

type of heat exchanger has various applications such as

residential heating, hybrid systems, air conditioning, and dehumidification. The enhancement heat exchanger decrease the size of designed heat exchanger as well as the required

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