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PERFORMANCE EVALUATION OF TUBE-IN-TUBE HEAT EXCHANGERS WITH HEAT TRANSFER ENHANCEMENT IN THE ANNULUS

ABSTRACT

Different techniques as angled spiraling tape inserts, a round tube in side a twisted square tube and spiraled tube inside the annulus have been used to enhance heat transfer in the annulus of tube-in-tube heat exchangers. The heat transfer enhancement in the shell can be supplemented by heat transfer augmentation in tubes using twisted tape inserts or micro-finned tubes. The effect of the thermal resistance of the condensing refrigerant could also be taken into consideration. To assess the benefit of using these techniques extended performance evaluation criteria have been implemented at different constraints. The decrease of the entropy generation can be combined with the relative increase of the heat transfer rate or the relative reduction of the heat transfer area to find out the geometrical parameters of the tubes for optimal thermodynamics performance. The results show that in most of the cases considered, the angled spiraling tube insert technique is the most efficient.

KEYWORDS

enhanced heat transfer in annulus, spiraling tape insert, spiraled tube, performance evaluation criteria

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