

عنوان مقاله:

Multi-Objective Optimization of TiO₂-Water Nanofluid Flow in Tubes Fitted With Multiple Twisted Tape Inserts in Different Arrangement

محل انتشار:

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خلاصه مقاله:

In this paper, experimentally derived correlations of heat transfer and pressure drop are used in a Pareto based Multi-Objective Optimization (MOO) approach to find the best possible combinations of heat transfer and pressure drop of TiO₂-water nanofluid flow in tubes fitted with multiple twisted tape inserts in different arrangement. In this study there are four independent design variables: the number and arrangement of twisted tape inserts (N), TiO₂ volume fraction (ϕ), Reynolds number (Re) and Prandtl number (Pr). Seven twisted tape arrangement in three different categories are investigated. The objectives are maximizing the non-dimensional heat transfer coefficient (Nu) and minimizing the non-dimensional pressure drop ($f Re$). It is shown that some interesting and important relationships as useful optimal design principles involved in the thermal performance of nanofluid flow in tubes fitted with multiple twisted tape inserts in different arrangement can be discovered by Pareto based multi-objective optimization approach.

کلمات کلیدی:

Dual/triple/quadruple twisted tapes, Heat transfer enhancement, Multi-objective optimization, NSGA II, TiO₂/water nanofluid

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