



Cairo University

NUMERICAL INVESTIGATION OF THERMAL-HYDRAULICS CHARACTERISTICS IN ENHANCED TUBES

By

Eng. Amr Kaood Ismail Mohamed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy
in
Mechanical Power Engineering

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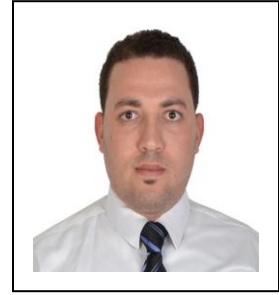
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Key Words:

Friction factor; Nusselt number; Heat transfer
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Summary:

Thermal and hydraulic characteristics of turbulent water flow in a transverse corrugated tube with various corrugation directions (inward/outward/oscillating), and corrugation shapes (triangle, curve, rectangle and trapezoid) are numerically investigated. The influence of combination between the corrugated tube with twisted tape insert and wire-coiled insert is also conducted in the current study. The model of corrugated tubes with 10 mm inner diameter was investigated by changing the geometrical parameters for within a range of Reynolds number from 5,000 to 61,000 and constant heat flux boundary condition. Structured, non-uniform grid system is applied. Momentum, continuity and energy equations were treated by means of a finite volume method using the SIMPLE scheme with the $k-\epsilon$ turbulence model and enhanced wall treatment. The effect of a combination between the various corrugated tubes and twisted tape insert (TT) and corrugated tubes and wire-coiled insert (WCI) on the thermal-hydraulic characteristics were also studied in the current study.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.
I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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