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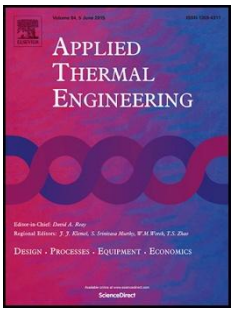

Title: Investigating the potential impact of nanofluids on the performance of condensers and evaporators- a general approach

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Investigating the potential impact of nanofluids on the performance of condensers and evaporators- A general approach

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Highlights

- A modified ε-NTU model is developed.
- The presence of nanoparticles enhances the heat exchanger effectiveness.
- The effectiveness is higher under laminar flow.
- The effectiveness enhancement depends on the quantity of nanoparticles.

Abstract

In this paper, the impact of nanofluids, when used as heat transfer fluids, on heat exchangers effectiveness is examined. The method used for the analysis is a modified ε-NTU. As it is already known from literature, any heat exchanger exhibits minimum and maximum values of effectiveness when the ratio of heat capacities Cr is one and zero, respectively. In this work, the improvement of effectiveness due to nanoparticles presence is investigated in heat exchangers in which Cr is zero (evaporators and condensers). The conducted analysis is performed for both laminar and turbulent flow conditions and it adopts specific assumptions so as the extracted results and conclusions to be generalized for most of the commonly used nanoparticles. Moreover, the effect of specific capacity drop and pressure drop as nanoparticles volume concentrations increase is explored. Finally, the potential benefit of nanofluids on minimizing heat exchangers size is investigated.

Keywords: Nanofluids, Nanoparticles, Effectiveness, Heat Exchangers, ε-NTU Method, Pressure Drop, Heat Transfer Coefficient

1. Introduction

Considering the performance of heat exchangers, in order to increase their effectiveness and at the same time reduce their size, nanofluids can be used as heat transfer fluids. Nanofluids is a term introduced by Choi to describe fluids (commonly water or ethylene glycol) engineered by dispersing nanometer scale structures such as

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