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Analyzing the Effect of Magnetic Field on the Performance of Heat Exchanger

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Abstract: *In contemporary engineering practices, optimizing heat transfer efficiency in heat exchangers stands as a pivotal pursuit across numerous industrial sectors. This pursuit is underscored by the need to bolster performance metrics while maintaining or even reducing energy consumption. The study herein delves into a comprehensive analysis of the influence of magnetic fields on heat exchanger performance, a topic of growing interest due to its potential to revolutionize heat transfer methodologies.*

In the realm of heat exchanger optimization, active techniques play a crucial role in enhancing heat transfer efficiency. Unlike passive methods, which rely solely on flow obstructions, active techniques harness external power sources to induce surface vibrations or generate electrical fields within the heat exchanger system. This study focuses exclusively on the analysis of active techniques, particularly the utilization of magnetic fields, to augment heat transfer performance. A number of researches are being carried out to improve the heat transfer rate of the heat exchanger. The investigation involves the integration of an electro-magnet and nano-particles into the heat exchanger setup, allowing for the precise modulation of magnetic fields within the fluid medium. Through systematic experimentation across varying Reynolds numbers, the impact of magnetic fields on heat transfer rates is meticulously examined and quantified.

Key findings from this study elucidate the efficacy of employing magnetic fields as an active technique to enhance heat transfer efficiency. Over here the readings are recorded for a predefined Reynolds number for the ease of comparison and study. Thus, the effect of nanofluid at varied concentrations at different Reynolds numbers was being recorded and analyzed.

Keywords: Active techniques, magnetic field, Nanoparticles, heat exchanger, electro-magnet, Reynolds Number

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