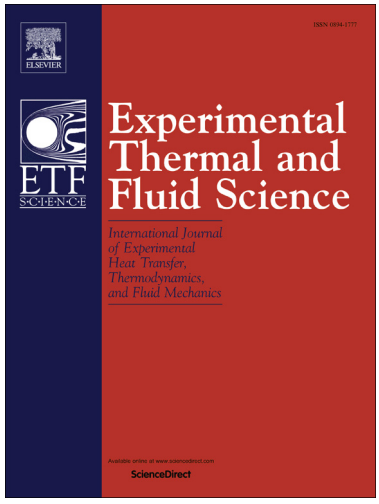

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Convective Heat Transfer Coefficient and Pressure Drop of Water-Ethylene Glycol Mixture with Graphene Nanoplatelets

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Abstract

In the present work, we report the convective heat transfer coefficient and pressure drop of water-ethylene glycol mixture seeded with graphene nanoplatelets under laminar, transition and turbulent flow regions. Sodium deoxycholate was used as the surfactant to prepare stable nanofluid dispersions. Thermophysical properties of nanofluids were measured experimentally. Experimental investigations on the convective heat transfer coefficient and pressure drop were performed in a tube-in-tube counter flow heat exchanger using nanofluid as the hot fluid and chilled water as the cold fluid. The effects of nanofluid inlet temperature on the convective heat transfer coefficient and pressure drop were investigated for different mass flow rates. The enhancement of convective heat transfer coefficient was found to increase with respect to Reynolds number, graphene loading and inlet temperature. The maximum enhancement of convective heat transfer coefficient is observed to be ~170% at 0.5 vol% in the turbulent region. The pressure drop increment of the nanofluid is predominant in the laminar region as compared to turbulent region. The enhancement of pressure drop is moderate in the turbulent region which favours these nanofluids to be used in the thermal systems for different engineering applications.

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