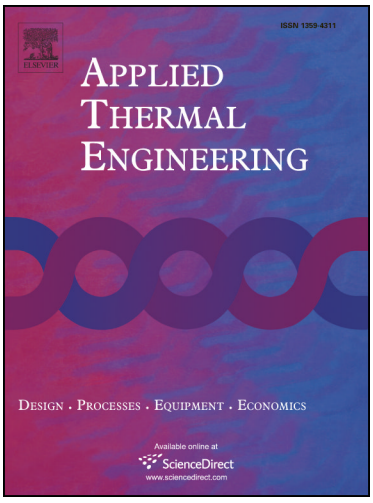

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Thermophysical properties and convection heat transfer behavior of ionic liquid [C_4mim][NTf_2] at medium temperature in helically corrugated tubes

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Abstract

The thermophysical properties of the ionic liquid, 1-butyl-3-methylimidazolium bis{(trifluoromethyl)sulfonyl}imide, [C_4mim][NTf_2], at medium temperature, were predicted based on a summary of previous literature data. Furthermore, the heat transfer behavior in smooth and corrugated tubes was numerically studied, using different fluid temperatures and corrugation heights. A multi-objective optimization method was used to obtain the optimal solutions from a set of feasible solutions. The result show that the empirical formulas can well predict the density, heat capacity, and thermal conductivity conditions, yet show small errors on different viscosity conditions. The heat transfer performance for high-temperature fluids is quite superior to that in the low temperature condition, as well as on pressure drop. The growth rate of the heat transfer performance is significant for the cases of corrugation height to diameter ratio equal to 0.025 and 0.05. In addition, the overall heat transfer performance presents an interval optimum principle, where the Reynolds number is inversely proportional to the corrugation height, except for the case of corrugation

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