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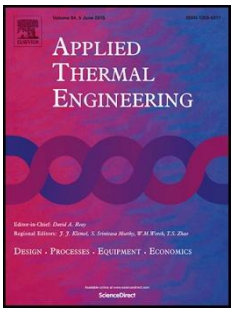

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Numerical investigation on flow and thermal features of a rotating heat pipe

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Research Highlights

- A comprehensive model of flow and thermal features of rotating heat pipes is established.
- Numerical simulation of two-phase flow and heat transfer in a rotating heat pipe is conducted.
- Evaporation and condensation processes are included using a modified phase-change model.
- The computational results coincide well with the experimental data.

Abstract

A numerical model was developed for the simulation of the two-phase flow and heat transfer phenomena during the operation of a rotating heat pipe (RHP). A new phase-change model was introduced to predict the evaporation and condensation processes in the RHP while the balance between the evaporative and condensing masses was considered. Numerical simulations were carried out using a two-dimensional axially-symmetric model of a RHP. The impact of parameters such as the heat transfer rate, rotational speed, and the fluid loading on the performance of the RHP were examined. The simulation results were compared with experimental data and a satisfactory agreement was observed, which indicated that the model is feasible to simulate the heat and mass transfer processes in a rotating heat pipe.