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Numerical simulation of nanofluids for improved cooling efficiency in a 3D copper microchannel heat sink (MCHS)
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Abstract
In this paper, laminar nanofluid flow in 3D copper microchannel heat sink (MCHS) with rectangular cross section, and a constant heat flux, has been treated numerically using the computational fluid dynamics software (FLUENT). Results for the temperature and velocity distributions in the investigated MCHS are presented. In addition, experimental and numerical values are compared in terms of friction factors, convective heat transfer coefficients, wall temperature and pressure drops, for various particle volume concentrations and Reynolds numbers. The numerical results show that enhancing the heat flux has a very weak effect on the heat transfer coefficient for pure water, but an appreciable effect for the case of a nanofluid. For all considered volume fractions, the sink friction factor decreases by increasing the Reynolds number and slightly increases by increasing the volume fractions, and, with increasing the volume fractions and the Reynolds number, the pressure drop increases. © 2017 Informa UK Limited, trading as Taylor & Francis Group.

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