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MHD free convection and entropy generation in a corrugated cavity filled with a porous medium saturated with nanofluids
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Abstract

MHD free convection inside a triangular-wave-shaped corrugated porous cavity with Cu-water nanofluid is numerically studied with the finite element method. The influences of the Grashof number ($104 \leq Gr \leq 106$), Hartmann number ($0 \leq Ha \leq 50$), Darcy number ($10^{-4} \leq Da \leq 10^{-1}$) and solid volume fraction of the nanoparticle ($0 \leq \phi \leq 0.05$) on the convective flow features are examined. It is observed that increasing the Grashof number and Darcy number enhances the heat transfer, while the effect is opposite for the Hartmann number. As the corrugation frequency of the triangular wave increases, the local and averaged heat transfer rates decrease, which is more effective for higher values of Grashof and Darcy numbers. Normalized total entropy generation increases as the Darcy number and solid volume fraction of the nanoparticles increase and decreases as the Hartmann number increases both for flat and corrugated wall configurations. © 2018 by the authors.

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