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Entropy generation and MHD natural convection of a nanofluid in an inclined square porous cavity: Effects of a heat sink and source size and location
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Abstract
The effects of a heat sink and the source size and location on the entropy generation, MHD natural convection flow and heat transfer in an inclined porous enclosure filled with a Cu-water nanofluid are investigated numerically. A uniform heat source is located in a part of the bottom wall, and a part of the upper wall of the enclosure is maintained at a cooled temperature, while the remaining parts of these two walls are thermally insulated. Both the left and right walls of the enclosure are considered to be adiabatic. The thermal conductivity and the dynamic viscosity of the nanofluid are represented by different verified experimental correlations that are suitable for each type of nanoparticle. The finite difference methodology is used to solve the dimensionless partial differential equations governing the problem. A comparison with previously published works is performed, and the results show a very good agreement. The results indicate that the Nusselt number decreases via increasing the nanofluid volume fraction as well as the Hartmann number. The best location and size of the heat sink and the heat source considering the thermal performance criteria and magnetic effects are found to be D = 0.7 and B = 0.2. The entropy generation, thermal performance criteria and the natural heat transfer of the nanofluid for different sizes and locations of the heat sink and source and for various volume fractions of nanoparticles are also investigated and discussed. © 2017 The Physical Society of the Republic of China (Taiwan)

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