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Staff Researches

Numerical investigation for natural convection of a nanofluid in an inclined L-shaped cavity in the presence of an inclined magnetic field

Hillal M. Elshehabeya, b, , , F.M. Hadyc, Sameh E. Ahmeda, R.A. Mohameda

Abstract:

The problem of natural convection in an inclined L-shaped enclosure filled with Cu/water nanofluid that operates under differentially heated walls in the presence of an inclined magnetic field is presented in this paper. The fully implicit finite difference method is used to solve the governing equations. A comparison with previously published results in special case of the present study is performed and a very good agreement is found. Heat transfer and fluid flow are examined for parameters of the Hartmann number (0 □ Ha □ 100), the nanoparticles volume fraction (0% □ □ □ 20%), the cavity inclination angle (0° □ □ □ 300°), the magnetic field inclination angle (0° □ □ □ 270°), the cavity aspect ratio (0.25 □ AR □ 0.6) and the Rayleigh number (103 □ Ra □ 106). It is found that, the presence of the magnetic field in the fluid region causes a significant reduction in the fluid flow and heat transfer characteristics. Also, a good enhancement in the heat transfer rate can be obtained by adding the copper nanoparticles to the base fluid.

Keywords:

Inclined magnetic field; Nanofluid; Natural convection; Finite difference method; Inclined L-shaped

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