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Zargartalebi, H., Ghalambaz, M., Noghrehabadi, A., Chamkha, A.J.

Natural convection of a nanofluid in an enclosure with an inclined local thermal non-equilibrium porous fin considering Buongiorno's model
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Abstract
There is growing interest in application of inclined fins to a cavity wall. As such, this paper focuses on the numerical investigation of laminar free convection flow and heat transfer in an enclosure with an inclined thin local thermal non-equilibrium porous fin and saturated by a nanofluid. The porous medium is assumed to be isotropic and homogenous, the cavity walls are assumed to be impermeable to the nanoparticles, and there is a no-slip boundary condition on the enclosure boundaries. The vertical walls are isothermal and the horizontal ones are adiabatic. Moreover, the influence of indispensable parameters regarding heat and mass transfer, such as Rayleigh number, Darcy number, Prandtl number, porosity, thermophoresis and Brownian parameters, fin length, fin position, and the fin angle on the average Nusselt number, are taken into account. Generally, it is found that the average Nusselt number is an increasing function of Ra, Pr, Da, and porosity (ε). Furthermore, increasing either fin position (Sp) or thermal conductivity ratio (η) produces corresponding decreases in average Nusselt number. Finally, heat transfer shows a different behavior for different values of fin angles and lengths. © 2016, Copyright © Taylor & Francis Group, LLC.

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