Analysis of the inclination angle on the phase change heat transfer in an enclosure using the enthalpy-porosity formulation

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Abstract

This paper present a numerical study aimed at understanding the impact of the inclination angle on simulated phase change heat transfer. A heater was on the left wall. The right wall and horizontal walls are assumed at temperature lower than the melting temperature and thermal insulation, respectively. The governing equations of the problem, at first are coupled with each other, then transferred to the non-dimensional form, finally are solved by the aid of a finite element code written in MATLAB programing language associated with computer solution subroutines. In the present solution approach, computational grid is considered to be fixed and the enthalpy-porosity model is employed for modeling phase change process. This approach models fluid flow within the mushy region as flow through a porous medium. In this problem the angles 0 to 60 to evaluate the effect of melting behavior the phase change material have been investigated. Numerical results show that increasing inclination angle from 0° to 60° degrees, due to melting behavior uniform and thus increase the inclination angle could have a significant impact on the melting control in the production processes.

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