Effect of moving stretching sheets on natural convection in partially heated square cavity filled with nanofluid. (English)  Zbl 07533170  

Summary: This article deals with the heat transfer enhancement due to buoyancy force in a partially heated square enclosure filled with nanofluids. The model is developed to analyse the behaviour of nanofluids taking into account of volume fraction and stretching parameter, when square horizontal walls are moving in opposite directions to each other. Implicit alternate direct finite difference method has been used to solve the governing equations of vorticity, energy, and kinematics. Graphically investigated the effect of physical pertinent controlling parameters on the dimensionless velocity, streamlines, isothermal, and Nusselt number. The obtained numerical solution achieves the best configuration for Rayleigh number $10^3 \leq Ra \leq 10^5$, stretching parameter $0 \leq \tau \leq 2.5$, and volume fraction $0 \leq \varphi \leq 0.2$. It is found that the stretching parameter and direction of moving walls affect the fluid flow, flow strength, and heat transfer in the cavity.

MSC:  
65N06  Finite difference methods for boundary value problems involving PDEs  
65N22  Numerical solution of discretized equations for boundary value problems involving PDEs  
76D07  Stokes and related (Oseen, etc.) flows  
34B08  Parameter dependent boundary value problems for ordinary differential equations  
76E06  Convection in hydrodynamic stability  
80A20  Heat and mass transfer, heat flow (MSC2010)

Keywords: heat transfer; moving boundary; nanofluid; natural convection; stretching sheet

Full Text: DOI

References:  


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