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Aly, A.M., Chamkha, A.J., Lee, S.-W., Al-Mudhaf, A.F.

Onmixed convection in an inclined lid-driven cavity with sinusoidal heated walls using the ISPH method

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Abstract

Simulation of mixed convection in an inclined lid-driven square cavity has been investigated using an incompressible smoothed particle hydrodynamics (ISPH) method. In this study, the boundary conditions on the inclined lid-driven square cavity have been introduced for two different cases of sinusoidal heated and isothermal walls. The governing equations are discretized and solved using the ISPH method. In the ISPH method, the evaluated pressure is stabilized by relaxed density invariance in solving the pressure Poisson equation. The solutions represented in isothermal lines and flow profiles have been studied with different values of Richardson number, phase deviation of sinusoidal heating, and cavity inclination angle. It is found that the shear force induced by lid-movement plays a more dominant role than cavity inclination angle. A set of graphical results is presented and discussed to illustrate the effects of the presence of current parameters on the flow and heat transfer characteristics. The efficiency of the current ISPH method is tested by comparison with reference results. © 2016 by Begell House, Inc.

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