

عنوان مقاله:

Non-orthogonal Multiple-Relaxation-Time Lattice Boltzmann Simulation of Mixed Convection in Lid-Driven Porous Cavity with an Isothermally Heated Block

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خلاصه مقاله:

Laminar mixed convection in porous cavity with an isothermally heated block had been investigated numerically by using Non-orthogonal multiple-relaxation time lattice Boltzmann method (MRT-LBM). The effects of six different arrangements of the cold sources on the characteristics of fluid flow and heat transfer had been studied. Another important influencing factor was the direction of lid-driven. We investigated the effects of four different lid-driven directions on fluid flow and heat transfer when the top and bottom walls of the cavity maintained constant cold temperature. The results show that different arrangements of the cold sources produce different numbers of vortices with the Richardson number increases. As for Top-Left, Top-Right and Top-Bottom arrangements, these three arrangements always show high heat transfer level. Additionally, the right-moving top and bottom walls exhibits best heat transfer characteristic than other three cases when $Ri \leq 1$, and the case of top and bottom walls moves in the opposite directions has best heat transfer performance than other three cases when $Ri > 1$. When the cold sources are arranged on the upper wall of the cavity, it shows better heat transfer performance.

کلمات کلیدی:

Isothermally heated block, Lattice Boltzmann method, Mixed convection, Lid, driven cavity, Porous media

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