

عنوان مقاله:

Optimization of Convective Heat Transfer from Two Heating Generators into Horizontal Enclosure Including A Discrete Obstacle: A Lattice Boltzmann Comprehensive Investigation

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نویسندگان:

T. Naffouti - *University of Tunis El-Manar, Faculty of Sciences of Tunis, Department of Physics, Tunisia*

L. Thamri - *University of Tunis El-Manar, Faculty of Sciences of Tunis, Department of Physics, Tunisia*

A. Naffouti - *University of Tunis El-Manar, Faculty of Sciences of Tunis, Department of Physics, Tunisia*

J. Zinoubi - *Laboratory of Energizing and Thermal and Mass Transfers, El Manar ۲۰۹۲, Tunis, Tunisia*

خلاصه مقاله:

This paper is intended to address the effect of a discrete obstacle on the behavior of flow and heat transfer of laminar natural convection in horizontal enclosure heated from below and symmetrical cooled from sides. Horizontal walls of the enclosure are considered adiabatic except the obstacle. Heating generators of a rectangular form and localized symmetrically are heated at a same uniform temperature. The cold obstacle is placed between active generators that create two thermal plumes. The double population lattice Boltzmann with standard models D2Q9 and D2Q5 for flow and temperature is used to simulate the problem. Prandtl number (Pr), Grashoff number (Gr) and aspect ratio of the enclosure (A) are fixed to ۰.۷۱, ۱۰۵ and ۲, respectively. Computational results are performed for pertinent geometric parameters of the obstacle in the following ranges: height $0 \leq HO \leq 0.75$, position $0 \leq XCO \leq 0.5$ and length $0.1 \leq LO \leq 0.6$. It is found that predicted results with LBM are in line with previous investigations. Simulations show that adding the obstacle inside an enclosure conduct to change considerably the thermo-fluid characteristics. Hence, increasing the obstacle height causes a destruction of the interference between thermal plumes. On the other hand, optimum of heat transfer is discovered for a centred obstacle ($XCO = 0$) and for smaller length and greatest height of this one.

کلمات کلیدی:

Convective heat transfer, Horizontal enclosure, Lattice Boltzmann method, Discrete obstacle, Optimization of heat transfer

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