

عنوان مقاله:

Lattice Boltzmann Simulation of Conjugate Heat Transfer in a Rectangular Channel with Wall-mounted Obstacles

محل انتشار:

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نویسندگان:

Mohammad Mohammadi Pirouz - *M.Sc. student, Babol Noshirvani University of Technology*

Mousa Farhadi - *Assistant professor, Babol Noshirvani University of Technology*

Kourosh Sedighi - *Assistant professor, Babol Noshirvani University of Technology*

Hasan Nematif - *M.Sc. student, Babol Noshirvani University of Technology*

خلاصه مقاله:

A numerical study of an incompressible fluid flow and heat transfer in a channel with two wall-mounted obstacles placed in lower and upper walls is carried out. A two-dimensional lattice Boltzmann method (LBM) is developed for the study of conjugate heat transfer problems. The simulations are performed at $Pr = 0.72$. Studies are carried out for the flow with Reynolds number ranging from 200 to 1000, thermal diffusivity ratios (10, 100 and 1000) and distance between obstacles based on the obstacle width (w) ranging from $1w$ to $4w$. A uniform heat flux through the base of obstacles is assumed. To validate the computational results, data is compared with experimental and numerical results of previous studies for the case of single obstacle mounted at the channel wall. Results show that LBM is suitable for heat transfer study in the conjugate problems. Results indicated that increase of thermal diffusivity yields to a removal of higher quantity of energy from the obstacle faces. Results also shows reducing distance between obstacles makes the flow to deviate and accelerate in vicinity of faces and causes to increase in rate of convective heat transfer from obstacles.

کلمات کلیدی:

Conjugate Heat Transfer, Lattice Boltzmann Method, Heated Obstacles

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