

Simulation of natural convection using lattice Boltzmann Method

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Recently the lattice Boltzmann equation(LBE) method has been developed as a computational fluid dynamics(CFD) method. Traditionally, mass and momentum transfer are modeled using the continuum assumption. However, as the Knudsen number Kn increases and the characteristic hydrodynamic length becomes comparable to the mean free path of the gases, the continuum assumption breaks down and the use of kinetic theory is required.

In most LBE models so far, only mass and momentum conservation is implemented.

However it is important and sometimes critical to have the capability of simulating thermal effects simultaneously with the fluid flows. Obviously the temperature distribution in a flow field is of central interest in heat transfer problems.

In this paper, we studied the natural convection using the two-dimensional nine velocity lattice Boltzmann method.