

**THREE-DIMENSIONAL LATTICE BOLTZMANN BGK MODEL AND ITS APPLICATION
TO FLOWS WITH HEAT TRANSFER IN A RECTANGULAR MICROCHANNEL**

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ABSTRACT In this paper, we present a 3D lattice Boltzmann BGK mode for simulation of micro flows with heat transfer. This model is an extension of the two-dimensional model that is based on the kinetic theory and the thermal lattice Boltzmann method. The kinetic relations of the relaxation times in this model were linked with the Knudsen number, and a diffuse scattering boundary condition for the velocity and thermal fields was presented for the 3D lattice Boltzmann method. The present 3D lattice Boltzmann mode was successfully applied to simulate the flow and heat transfer in rectangular channels using our 3D TLLBM. Numerical results obtained by the present method show that the LBM can give a good prediction of the micro fluidic behaviors with thermal effects, and clearly indicate the inadequacy of the continuum assumption in Navier-Stokes solvers for micro-channel flows.