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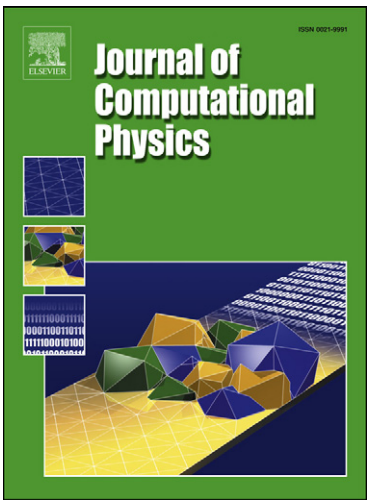

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A Three Dimensional Lattice Model for Thermal Compressible Flow on Standard Lattices

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Abstract

A three-dimensional Double Distribution Function thermal lattice Boltzmann model has been developed for simulation of thermal compressible flows in the low Mach number limit. Both the flow field and energy conservation equation are solved by LB approach. A higher order density distribution function on standard lattices is used to solve the flow field, while a energy distribution is employed to compute the temperature field. The equation of state of thermal perfect gas is recovered by higher order Hermite polynomial expansions in Navier-Stokes-Fourier equations. The equilibrium distribution functions of D3Q15, D3Q19 and D3Q27 lattices are obtained from the Hermite expansion. They exhibit slight differences originating in differences in the discrete lattice symmetries. The correction terms in LB models for third order derivation are added using an external force in orthogonal polynomials form. Present model are successfully assessed considering several test cases,

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