

Abstract Submitted
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A thermal lattice-Boltzmann model for polyatomic gases XIAOBO NIE, XIAOWEN SHAN, HUDONG CHEN, Exa Corporation, 3 Burlington Woods Drive, Burlington, MA 01803 — Kinetic theory based methods in fluid mechanics have recently shed new light to both the theoretical research of the subject and its practical applications. Much progress has also been made to the methods itself, especially in handling of compressible fluid dynamics. Here, using well-established results, we rigorously derive a kinetic model for polyatomic gases. The macroscopic recovery of correct hydrodynamics from the corresponding lattice-Boltzmann model is theoretically proved by a Chapman-Enskog expansion and numerically validated by simulating sound waves, heat transfer and the Sod-Riemann problem.

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