

Abstract Submitted  
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**Implementation of a Spectral Decomposition of the Boltzmann Equation with the Streaming in the Lattice-Boltzmann Method<sup>1</sup>**

JACQUES RICHARD, Texas A&M University, TERRY MCCULLUM<sup>2</sup>, Southern University, Baton Rouge, Louisiana, ROBERT FIEVISOHN, Clarkson University — Recent developments in mathematics have allowed for the collision process of the Boltzmann equation to be discretized using spectral methods. This new method has the potential for replacing the Bhatnagar-Gross-Krook (BGK) approximation used in approaches such as the lattice-Boltzmann method (LBM). This would end the need for a low Mach approximation to the linearized Boltzmann equation in LBM. This allows solving the full Boltzmann equation and should therefore avoid many of the limitations of current approximations. This paper shows a derivation for the spectral method as well as an implementation for a 2-D and 3-D test cases with results. A simulation of decaying isotropic turbulence is also presented.

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