Simulate the thermal Navier Stokes equations with single particle distribution: theoretical results*

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In this contribution, we follow the initial framework of multiple relaxation schemes [1] of the lattice Boltzmann method [2].
With the extension "ABCD" of the Taylor expansion method [3] we are able to write in a direct and straightforward way the equivalent partial differential equations of any nonlinear lattice Boltzmann scheme. In particular fluid systems including conservation of mass, momentum and energy.
As a continuation of our ICMMES-2018 communication [4], we have studied the formal approximation of the thermal Navier-Stokes equations at second order accuracy relative to the space-time discretization parameter when using a single particle distribution.
During the conference, we will present our results for various lattice Boltzmann schemes in two and three space dimensions, in particular the D2V17 scheme of Philippi and Hegele [5], and the D2W17 and D3Q27-2 models proposed by one of us [6].

References

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