

## Lattice Bhatnagar-Gross-Krook Simulations in 2-D Incompressible Magnetohydrodynamics

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**Abstract:** Lattice Boltzmann Method is recently developed within numerical schemes for simulating a variety of physical systems. In this paper a new lattice Bhatnagar-Gross-Krook (LBGK) model for two-dimensional incompressible magnetohydrodynamics (IMHD) is presented. The model is an extension of a hydrodynamics lattice BGK model with 9 velocities on a square lattice, resulting in a model with 17 velocities. Most of the existing LBGK models for MHD can be viewed as compressible schemes to simulate incompressible flows. The compressible effect might lead to some undesirable errors in numerical simulations. In our model the compressible effect has been overcome successfully. The model is then applied to the Hartmann flow, giving reasonable results.

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Key words: lattice BGK model, incompressible magnetohydrodynamics

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