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A new hybrid Boltzmann-BGK model: consistency, hydrodynamic limits and applications.

Abstract

The evolution of a gas is classically described by the Boltzmann equation and the contribution of interactions is modeled by proper integral nonlinear operators. Unfortunately this approach requires a high computational cost in simulations for gas mixtures due to a larger number of collision operators (one for each type of interaction) [1].

For such reason, alternative formulations have been proposed since the



This model is very useful to describe different hydrodynamic regimes, like the one dominated by intraspecies collisions, typical for mixture whose components have very disparate masses (e.g. ions and electrons) [4]. For such regime, we derive macroscopic equations of Euler and Navier-Stokes type and we test them on the classical shock wave problem.

This work is in collaboration with M. Bisi, M. Groppi, E. Lucchin and A. Macaluso (University of Parma).

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