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Global weak solutions for a Vlasov-Fokker-Planck/Navier-Stokes system with nonhomogeneous boundary data. (English) Zbl 07349807

Summary: In this paper, we consider a kinetic-fluid model with nonhomogeneous Dirichlet boundary data in a 3D bounded domain. This model consists of a Vlasov-Fokker-Planck equation coupled with the compressible Navier-Stokes equations via a friction force. We establish the global existence of weak solutions to it for the isentropic fluid (adiabatic coefficient $\gamma > \frac{3}{2}$) with large initial data, and large velocity and density at the inflow boundary.

MSC:
35Q35 PDEs in connection with fluid mechanics
35Q83 Vlasov equations
35Q84 Fokker-Planck equations
82C22 Interacting particle systems in time-dependent statistical mechanics
35D30 Weak solutions to PDEs
76N10 Existence, uniqueness, and regularity theory for compressible fluids and gas dynamics

Keywords:
Vlasov-Fokker-Planck equation; compressible Navier-Stokes equations; nonhomogeneous boundary conditions; weak solutions

Full Text: DOI