

Energy Conservation and H-Theorem for the Enskog-Vlasov Equation

Authors : Eugene Benilov, Mikhail Benilov

Abstract : The Enskog-Vlasov (EV) equation is a widely used semi-phenomenological model of gas/liquid phase transitions. We show that it does not generally conserve energy, although there exists a restriction on its coefficients for which it does. Furthermore, if an energy-preserving version of the EV equation satisfies an H-theorem as well, it can be used to rigorously derive the so-called Maxwell construction which determines the parameters of liquid-vapor equilibria. Finally, we show that the EV model provides an accurate description of the thermodynamics of noble fluids, and there exists a version simple enough for use in applications.

Keywords : Enskog collision integral, hard spheres, kinetic equation, phase transition

Conference Title : ICSP 2019 : International Conference on Statistical Physics

Conference Location : Lisbon, Portugal

Conference Dates : April 16-17, 2019