Remarks on the Chapman-Enskog Expansion

M. Slemrod

Dept. of Mathematics University of Wisconsin Madison,
WI 53706 USA

The purpose of this talk is discuss recent work of Jin & Slemrod and Jin, Pareschi & Slemrod on issues relating to the Chapman-Enskog expansion. As is well known the Chapman-Enskog expansion is the classical method for linking evolution of rarefied gases between kinetic and continuum scales. As is also well known truncation of the Chapman-Enskog expansion at any order beyond first order in the expansion parameter, i.e. beyond Navier-Stokes order yields a system of evolution equations for which the rest state is unstable. In this talk I will review the ideas of my co-workers and myself as how to approximately "sum" the Chapman-Enskog expansion by introduction of relaxation equations in the spirit of H. Grad and I. Muller. Also a comparion of the numerical simulations for various approaches to the resolution of rarefied gas dynamics will be given.