Department of Mathematics
The Chinese University of Hong Kong

數學系
香港中文大學

M.Phil Oral Defense

Nonlinear Stability for the Shock Profile of a Single-Ions Viscous Flow

Mr. Zhu Zhang

Department of Mathematics
The Chinese University of Hong Kong

Abstract: The motion of charged particles in plasma under the influence of self-consistent electrostatic potential force can be described by the Navier-Stokes-Poisson system. Here we study the shock profile solution of one simpler model which only takes into account the ions flow under the Boltzmann relation. The key observation is that the specific volume and velocity of ions are conserved quantities so that the system we concerned about admits a shock profile solution. By the aid of centre manifold theorem, we construct smooth monotone shock profile solutions which are exponentially asymptotic to far fields determined by the Rankine-Hugoniot's type condition as long as the wave strength is small. And then we study the asymptotic stability of such shock profiles. It is proved that all nearby solutions which satisfy the certain conditions tend to the shock profile when time goes to infinity. Here the smallness assumption for the wave strength is essential, both for construction of shock profile and stability analysis.

Date: 22 June 2016 (Wednesday)
Venue: Rm 222, Lady Shaw Building,
         The Chinese University of Hong Kong, Shatin
Time: 11:00 a.m. – 12:00 noon

All are Welcome!