The Hong Kong University of Science and Technology

Department of Mathematics

Seminar on Applied Mathematics

Simulation of rarefied gases using filtered hyperbolic moment equations

by

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Abstract

Rarefied gases occur in many applications such as during atmospheric reentry or within micro devices. The simulation of rarefied gases requires the use of extended fluid dynamic models to accurately resolve non-equilibrium effects because standard continuum models like the Euler or Navier-Stokes equations are not valid in the rarefied regime. In addition to the conservation laws of mass, momentum, and energy, it is necessary to take into acount so-called higher order equations. In this talk I will present hyperbolic moment models that are hierarchical models derived from the Boltzmann equation. The hyperbolic moment models lead to fast and accurate solutions of standard flow problems as I will exemplify using several 1D and 2D test cases. Furthermore, I will discuss a technique to reduce the model error even further by means of a filter that is applied to a subset of the additional equations. I will motivate the choice of the filter and demonstrate the improved convergence of the method using standard 1D test cases of rarefied gases.

Date: **Monday, 20 May 2019**
Time: **4:00p.m. – 5:00p.m.**
Venue: **Room 1409 Academic Building, (Lifts 25-26), HKUST**

All are welcome!