

Department of Physics and Astronomy

Seminar

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Title:
Monte Carlo Methods for Nanoscale Flows

Abstract:

Rarefied gas flows occur in a wide range of physical circumstances, from the hypersonic flow around a re-entry vehicle in the upper atmosphere, to the tiny disturbances generated by a NEMS device operating in a lab. The Direct Simulation Monte Carlo method (DSMC) has long been the approach of choice for simulating these flows. However, while it performs excellently for macroscale cases, it suffers from poor efficiency when dealing with the low Mach number flows often associated with nanoscale devices.

In this talk we will begin with a brief introduction to rarefied gas flows, including discussion of the governing Boltzmann equation, and an outline of the DSMC method. We then discuss several ways in which the basic DSMC approach may be modified, to obtain Monte Carlo methods suited to the simulation of nanoscale gas flows. These include techniques for the reduction of noise, parallelization, and an approach for performing frequency-domain simulations.

Thursday, November 8, 2018
4:30 PM in SCI 242

Refreshments will be served at 4:20 in SCI 242