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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

By

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Talk 1	***Discrete unified gas kinetic scheme for multiscale electron transport*** **Abstract:** Electrons are the main carriers of heat and electricity in metals, and exhibit rich transport phenomena such as ballistic, diffusive, and hydrodynamic behaviors in devices with different sizes. It is a challenging problem to develop efficient numerical methods for simulating electron transports in systems involving multiple temporal and spatial scales. In this talk, we will report a discrete unified gas kinetic scheme (DUGKS) for electrical and thermal transport based on the electron Boltzmann transport equation (eBTE) under relaxation approximations. Some electron transport problems, including cross-plane electron heat conduction, in-plane electrical and thermal transport, thermoelectric transport in metals and semiconductors, and vortex currents in hydrodynamic regions, are simulated. The results demonstrate that the DUGKS can accurately capture the transport behaviors of electrons in different transport regimes.
Talk 2	***Discrete unified gas kinetic scheme for steady radiation of non-gray gas-particle mixture*** **Abstract:** A discrete unified gas kinetic scheme (DUGKS) is developed for steady radiation of non-gray gas mixture containing solid particles. To account for the wide range of the absorption coefficient of non-gray gases, the weighted-sum-of-gray-gases (WSGG) model is adopted to predict the absorption properties of the gas phase, and the absorption and scattering coefficients of solid particles are determined based on the Mie theory. With the coupling of the scattering, absorbing and emitting along the characteristic line, the DUGKS can give more accurate predictions with a coarse mesh. Several numerical tests with non-gray gases and gas-particles are performed to validate the method. Comparisons with the results of other methods demonstrate that the DUGKS is a reliable and efficient tool for simulating radiation of non-gray gas-particle mixtures.

Date : 11 April 2024 (Thursday)

Time : 10:00am – 12:00noon

Venue : Room 2408 (Lifts 17/18)

All are Welcome!