THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

An unstructured high-order compact gas-kinetic scheme in arbitrary Lagrangian-Eulerian formulation

By

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Abstract

This study proposes an extension of the high-order compact gas-kinetic scheme (CGKS) to compressible flow simulation in an arbitrary Lagrangian-Eulerian (ALE) formulation in unstructured mesh. Based on the time-accuracy gas distribution function given by gas-kinetic scheme, the numerical fluxes and the time-dependent flow variables at a cell interface can be calculated. As a result, both cell-averaged flow variables and their gradients can be updated. Therefore, the compact gas-kinetic scheme can be constructed with the HWENO-type reconstruction and the two-stage fourth-order time-stepping method. To further improve the robustness of the CGKS, a gradient compression factor is designed. The ALE method is achieved by subdividing arbitrary mesh into tetrahedrons and integrating flux function in a local coordinate system at the cell interface to ensure geometric conservation law. The numerical experiments demonstrate the effectiveness of the scheme in capturing the accurate solutions of both low-speed smooth flow and highly compressible ones with strong shock waves.

Date : **8 May 2024 (Wednesday)**

Time : **4:30pm**

Venue : **Room 3598 (Lifts 27-28)**

All are Welcome!