The Hong Kong University of Science and Technology

Department of Mathematics

MPhil THESIS EXAMINATION

High-Order Gas-kinetic Scheme with WENO-AO Reconstruction

By

Ms. Lu YANG

ABSTRACT

A high-order gas-kinetic scheme (HGKS) has been developed with weighted essentially non-oscillatory with adaptive order (WENO-AO) reconstruction, which is simpler and more accurate than the HGKS with the conventional WENO type reconstruction. However, there is still room for the scheme to improve in the aspect of algorithm and computational cost. In order to make the scheme simpler and faster, in this thesis, an improved reconstruction strategy is proposed, where the same non-linear weights are used in one direction for both point values and derivatives. As a result, the new scheme has better computational efficiency while keeping the same order of accuracy and robustness. Many benchmark cases are conducted to validate the capability of the HGKS, especially for the compressible flow with shocks. Moreover, an implicit large eddy simulation for a supersonic planar jet is presented. Rich flow structures including shock-vortex interactions are obtained by the current HGKS.

Date: **09 August 2021, Monday**

Time: **2:00 p.m.**

Venue: **Online via Zoom**
https://hkust.zoom.com.cn/j/95471088522
(Passcode: 589790)

Thesis Examination Committee

Chairman	**:**	**Prof. Yang XIANG, MATH /HKUST**
Thesis Supervisor	**:**	**Prof. Kun XU, MATH/HKUST**
Member	**:**	**Prof. Shing Yu LEUNG, MATH/HKUST**

(Open to all faculty and students)

The student's thesis is now being displayed on the reception counter in the General Administration Office (Room 3461).