THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF APPLIED MATHEMATICS
應 用 數 學 系

The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

MARS: A Theoretical and Computational Framework for Fluid Modeling, Interface Tracking, and Multiphase-Flow Simulations

By

Prof. Qinghai Zhang
Zhejiang University

Abstract

Traditional methods for fluids with moving boundaries avoid geometric and topological problems by converting them into numerical PDEs. In contrast, we tackle geometric and topological problems with tools in geometry and topology. Following this central principle, we have proposed a mathematical model (the Yin space) for 2D/3D moving continua with arbitrarily complex geometry and topology, equipped the Yin space with a Boolean algebra, designed a theoretical framework for analyzing interface-tracking methods, and developed fourth- and higher-order algorithms for interface tracking, curvature estimation, and solving geometric PDEs such as mean curvature flows. This talk is a survey of our work in the past decades as well as our recent advancements.

Bibliography

Professor Qinghai Zhang obtained his PhD from Cornell University in 2008. He was a postdoctoral fellow at Lawrence Berkeley National Laboratory and University of California, Davis, and a Research Assistant Professor at University of Utah. He joined Zhejiang University in 2016 as full professor and was selected into The Thousand Young Talents Plan (千人计划青年项目). Professor Zhang's research is mainly concerned with the mathematics of computation in complex multiphase flows, including free-surface flows, fluid-structure interaction, and biological flows. The distinguishing features of his research are the interdisciplinary nature, rigorous treatments of complex geometries, and highly accurate and efficient algorithms.

Date: 18 November 2021 (Thursday)
Time: 15:00-16:00 (Hong Kong Standard Time GMT +8)
Venue: Online Talk via Zoom (Meeting ID: 974 9085 7948)
Speaker: Prof. Qinghai Zhang, Zhejiang University
Host: Dr. Buyang Li, The Hong Kong Polytechnic University
Click to join:
https://polyu.zoom.us/j/97490857948?pwd=YnZjQVhXMHQ0d29XK1VIUlZabVZiQT09

Click to join (Zoom)

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