

國家理論科學研究中心數學組（臺北辦公室）

IAMS / NCTS-TPE Applied Math Seminar

Speaker: San-Yih Lin (Department of Aeronautics and Astronautics, NCKU)

Title: Pressure Correction Method for Fluid-Particle Interaction and Two-Phase Flow Problems

Abstract:

A pressure correction method coupled with a direct-forcing immersed boundary (IB) method and the volume of fluid (VOF) method is developed to simulate fluid-particle interaction and two-phase flows. This method uses a pressure correction method to solve incompressible flow fields, an IB method to handle fluid-particle interactions, and the VOF method to solve the two-phase flow. A direct forcing method is introduced in the IB method to capture particle motions. A third-order modified monotone upwind scheme for conservation law (modified MUSCL) is used to solve the solutions of the advection equation. Moreover, by applying the Gauss theorem, the formulas for computing the hydrodynamic force and torque acting on the particle from flows are derived from the volume integral of the particle instead of the particle surface. For demonstrating the efficiency and capability of the present method, sedimentations of many spherical particles in an enclosure, three-dimensional broken dam problem, three-dimensional rising bubble, and three-dimensional wave impact on a tall structure are performed. Finally, the numerical method is applied to investigate the granular flow impact on a tall structure and the bubble generation and the flow of a falling ellipse.

Keywords: Pressure correction method, Volume of fluid, Immersed boundary method, Fluid-particle interaction, Two-phase flow, falling ellipse.

Time: Oct. 3 (Fri.) 13:20 – 14:20

Venue: R440, Astro-Math Building (NTU Campus)

Organizer: Jenn-Nan Wang (NTU)

For more information, please refer to <http://www.cts.ntu.edu.tw/>, or contact “cts_tpe@math.cts.ntu.edu.tw”