数学与系统科学研究院

计算数学所学术报告

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报告题目：

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

邀请人： 袁礼 研究员

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上午 10:00-11:00

报告地点： 科技综合楼三层 311

计算数学所报告厅

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 volume fraction function is introduced in the VOF method and is governed by an advection equation. 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.

欢迎大家参加！