DEPARTMENT OF APPLIED MATHEMATICS
應 用 數 學 系

The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

An immersed boundary method for simulating interfacial flows with insoluble surfactant in three dimensions

by

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Abstract

In this talk, an immersed boundary (IB) method for simulating the interfacial flows with insoluble surfactant in three dimensions is introduced. We consider a doubly periodic interface separating two fluids where the surfactant exists only along the evolving interface.
An equi-arclength parametrization is introduced in order to track the moving interface and maintain good Lagrangian meshes, so stable computations can be performed without remeshing. This surface mesh-control technique is done by adding two artificial tangential velocity components into the Lagrangian marker velocity so that the Lagrangian markers can be equi-arclength distributed during the time evolution. As a result, the surfactant equation on the interface must be modified based on the new parametrization. A conservative scheme for solving the modified surfactant equation has been developed and proved to satisfy the total surfactant mass exactly in discrete level. A series of numerical experiments consisting of the validation of Lagrangian mesh control technique, the convergence study, the study of self-healing dynamics, and the simulations of two-layer fluids under Couette flow have been conducted to test our present numerical scheme.

Date : 28 August, 2017 (Monday)
Time : 10:00a.m. – 11:00a.m.
Venue : TU801, The Hong Kong Polytechnic University

*** * * ALL ARE WELCOME * * ***