Center for Quantum Science and Engineering (CQSE)

Weekly Seminar
Apr. 29, 2011 (Friday)

TIME   Apr.29, 14:30 ~ 15:30
TITLE   A fractional step immersed boundary method for Stokes flow
            with an inextensible interface
SPEAKER   Dr. Ming-Chih Lai 賴明治博士
            Department of Applied Mathematics, NCTU
PLACE   Rm716, CCMS & New Physics Building, NTU

Abstract

In this talk, we develop a fractional step method based on the immersed boundary (IB) formulation for Stokes flow with an inextensible (incompressible) interface. In addition to solving the fluid variables such as the velocity and pressure, the present problem involves finding extra unknown elastic tension such that the surface divergence of the velocity is zero along the interface. The resulting linear system of equations is symmetric and can be solved by fractional steps so that only fast Poisson solvers are involved. The present method can be extended to Navier-Stokes flow without any difficulty by treating the nonlinear advection terms explicitly during the time evolution. The tank-treading motion for an inextensible interface under a simple shear flow has been studied extensively and the results are in good agreement with those obtained in literature.