

UNIVERSITY OF MACAU
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT of MATHEMATICS

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**“The Immersed Interface Method and Applications
for Free Boundary and Moving Immersed Problems”**

by

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Date : 24/02/2010 (WEDNESDAY)
Time : 10:30am ~ 11:30am
Venue : Room J308

Abstract

Moving boundary/interface problems, and problems defined on irregular domains are challenging both theoretically and numerically. In this talk, I will introduce couple of examples in elasticity and heat transfer to summarize the challenges in the theory and the numerics of these problems. Then I will explain the numerical methods that I have employed to solve those problems that have many applications in PDEs, mathematical biology, and computational fluid dynamics (CFD).

The Immersed Interface Method (IIM, LeVeque/Li) was motivated by Peskin's Immersed Boundary (IB) Method. The IIM shares many characteristics of the IB method. Both methods use simple grid structure. The original motivation of the IIM is to improve the accuracy of the IB method from first order to second order. This has been achieved by incorporating the jump conditions into numerical schemes near or on the interface. In this talk, I will summarize some recent advances of the IIM, particularly, the applications to incompressible Stokes and Navier Stokes equations with singular sources, discontinuous viscosity, irregular domains, and free boundary and moving interfaces using the augmented IIM. Applications include flow pass cylinders, moving contact line problems, deformable moving interfaces, and incompressible interfaces in incompressible flows. The new numerical methods are also of interests in other research areas, for example, the numerical linear algebra.

ALL ARE WELCOME!