

**Stony Brook University  
The Graduate School**

Doctoral Defense Announcement

**Abstract**

Enhanced 3D Front Tracking Method with Locally Grid Based Interface Tracking

By

**Yuanhua Li**

Numerical modeling of multiphase and free-surface flows is a vast topic with a variety of applications in different disciplines in engineering, applied science and fundamental physics. Many numerical methods have been proposed and used to model complex 2D and 3D flows exhibiting topology changes.

We present a new interface tracking algorithm for 3D Front Tracking called Locally Grid Based tracking (LGB), which is demonstrated to be a significant improvement to the existing Front tracking method. It combines the best features of two previous 3D interface tracking algorithms. To be specific, it combines the robustness of Grid Based tracking with the accuracy of Grid Free tracking. We report the implementation of this algorithm and the comparison study with publicly distributed interface codes (the level set method), with published performance results (VOF and other methods) and with previous versions of front tracking. We also explore the application of this algorithm in the study of mean curvature flow and 3D chaotic fluid mixing problems.

**Date:** August 3, 2007

**Time:** 10:00 am

**Place:** Math Tower, Room 1-122

**Program:** Applied Math and Statistics

**Dissertation Advisor:** Dr. Xiaolin Li