

# 数学与系统科学研究院

## 计算数学所学术报告

报告人: **Prof. Zhenquan Li**

*( School of Computing and Mathematics, Charles Sturt University,  
Albury-Wodonga Campus, NSW2640, Australia )*

报告题目:

**A NEW COMPUTATIONAL  
TECHNIQUE FOR FLUID FLOWS**

邀请人: 袁礼 研究员

报告时间: 2014 年 11 月 21 日 (周 五)

上午 10:00-11:00

报告地点: 数学院南楼二层 202  
会议室

## **Abstract:**

Mathematicians and physicists believe that explanation and prediction of flows can be made through an understanding of solutions to the Navier-Stokes equations. The analytical solutions of the Navier-Stokes(NS) equations in general are not available. The meshing is one of the important issues in finding accurate numerical solutions of differential equations. I have proposed two mesh refinement methods (one for each of 2D and 3D) and two streamline tracking methods for computed velocity fields based on the qualitative theory of differential equations. Positive results are obtained results when verifying the computational accuracy of these proposed methods with analytical velocity fields. I have also conducted a sensitivity analysis to exam if the same results for analytical velocity fields are kept by numerical solutions of the NS equations. The comparisons of the numerical solutions using the proposed methods and finite volume methods with the numerical benchmarks such as lid-driven cavity flow show that proposed methods can identify singular point, asymptote lines (planes) and separation curves. After further verification of the accuracy against experimental results and development of the computer programs, the proposed methods can be widely applied to other fluid flow problems and other relevant disciplines.

**欢迎大家参加！**