

数学与系统科学研究院

计算数学所学术报告

报告人: **Dr. N. Madden**

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报告题目:

**Layer resolving methods for  
singularly perturbed problem**

邀请人: 周爱辉研究员

报告时间: **2011 年 3 月 22 日 (周二)**

**上午 10: 00-11: 00**

报告地点: **科技综合楼三层 311**

**计算数学所报告厅**

## **Abstract:**

Singularly perturbed differential equations are characterised by the presence of a small (perturbation) parameter multiplying the highest derivative, and by the presence of boundary and/or interior layers in the solution. Since derivatives of the solution may be very large, many standard techniques are unsuitable for these problems. In recent years, there has been much interest in the development of so-called "parameter robust" methods, which have the following features:

1. their accuracy is independent of the small parameter;
2. important phenomena, such as boundary layers, are resolved.

In this talk I will survey some of these methods, and the mathematics behind them, with particular emphasis on finite difference methods for coupled systems of reaction-diffusion type.

I will begin by giving some motivating examples from computational fluid dynamics, and then explain why some standard methods yield unsatisfactory solutions.

The design of more suitable methods is not very difficult, but more interesting are the mathematical techniques to prove that they are robust.

The talk will conclude with a look at domain decomposition methods where the special structure of singularly perturbed problems can be exploited to obtain accurate solutions very efficiently.

**欢迎大家参加!**