

# 数学与系统科学研究院

## 计算数学所学术报告

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报告题目:

Convergence analysis of the Adini element on a Shishkin mesh for a singularly perturbed fourth-order problem in two dimensions

邀请人: 张硕 副研究员

报告时间: 2017 年 12 月 20 日(周三)

上午 10:00--11:00

报告地点: 数学院科技综合楼

三层 305 会议室

## 报告摘要:

We consider the singularly perturbed fourth-order boundary value problem  $\varepsilon^2 \Delta^2 u - \Delta u = f$  on the unit square  $\Omega \subset \mathbb{R}^2$ , with boundary conditions  $u = \partial u / \partial n = 0$  on  $\partial\Omega$ . Here  $\varepsilon \in (0, 1)$  is a small parameter. The problem is solved numerically using Adini finite elements—a simple nonconforming finite element method for this problem. Under reasonable assumptions on the structure of the boundary layers that appear in the solution, a family of suitable Shishkin meshes with  $N^2$  elements is constructed and convergence of the method is proved in a “broken” version of the Sobolev norm  $v \rightarrow$

$$\|v\|_{1,h}^{1/2}$$

$(\varepsilon^2 |v|_2^2 + |v|_1^2)$ . For a particular choice of the mesh, the error in the computed solution is bounded by  $C(\varepsilon^{1/2} N^{-1} \ln N + \min\{\varepsilon^{1/2}, \varepsilon^{-1/2}\} N^{-1} + N^2)$ , where the constant  $C$  is independent of  $\varepsilon$  and  $N$ . In the realistic regime  $\varepsilon < N^{-1}$ , this convergence is of a higher order than has been attained by nonconforming elements in previous work on this problem.

欢迎大家参加！