

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:

流体力学和二次偏微分方程稳定混  
合有限元法的最近进展

邀请人: 林群院士

报告时间: 2009 年 12 月 10 日(周四)

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:**

**The mixed finite element method has been a popular method for solving the partial differential equations arising in solid and fluid mechanics. Its popularity is due to the fact that in some cases a vector variable (e.g., a fluid velocity) is the primary variable in which one is interested. Then the mixed method is developed to approximate both this variable and a scalar variable (e.g., a pressure) simultaneously and to give accurate approximations of both variables. The mixed finite element formulation uses two different approximation spaces. These two spaces must be chosen carefully so they satisfy an inf-sup stability condition for the mixed method to be stable. There exist rich choices for these special spaces for the equations of solid and fluid mechanics. Much attention has recently been attracted to using the equal-order finite element pairs (e.g.,  $P_k-P_k$ ) for the fluid mechanics equations, particularly for the Stokes**

**and Navier–Stokes equations. While they do not satisfy the inf–sup stability condition, these element pairs offer simple and practical uniform data structure and adequate accuracy. Many stabilization techniques have been proposed to stabilize these element pairs such as penalty, pressure projection, and residual stabilization methods. Among these methods, the pressure projection stabilization method is a preferable choice in that it is free of stabilization parameters, does not require any calculation of high–order derivatives or edge–based data structures, and can be implemented at the element level. This talk will address the recent development and advances on the research of this method that has been carried out by the speaker’ s group on finite element methods. This research group consists of Y. He, J. Li, L. Shen, Z. Wang, L. Zhang, L. Zhu, and H.Zhong.**

**欢迎大家参加！**