

数学与系统科学研究院

计算数学所学术报告

报告人: **Associate Prof. Long Chen**

(*the University of California, Irvine*)

报告题目:

**A Posterior Error Estimator and
Multigrid Methods for Weak
Galerkin Methods**

邀请人: 张晨松 副研究员

报告时间: **2014年7月8日 (周二)**

下午 15:00

报告地点: **科技综合楼三层 301**

计算数学所小报告厅

Abstract:

The Weak Galerkin (WG) method was introduced by Ye and Wang for second order elliptic equations. It is an extension of the standard Galerkin finite element method where classical derivatives were substituted by weakly defined derivatives on functions with discontinuity.

In the first part of this talk we will present a residual type a posteriori error estimator for WG methods, which is a combination of error estimator of conforming Galerkin methods and mixed finite element methods. The error estimator is proved to be efficient and reliable. The key is a Helmholtz type decomposition of the error and the partial orthogonality of the error to the conforming subspace.

In the second part of this talk, we construct an auxiliary space multigrid preconditioner for the weak Galerkin method for second-order diffusion equations. The idea of the auxiliary space multigrid preconditioner is to use an auxiliary space as a “coarse” space in the multigrid algorithm, where the discrete problem in the auxiliary space can be easily solved by an existing solver. In our construction, we conveniently use the conforming piecewise linear finite element space as an auxiliary space. We successfully constructed such an auxiliary space multigrid preconditioner for the weak Galerkin method, as well as a reduced system of the weak Galerkin method involving only the degrees of freedom on edges/faces. The preconditioned systems are proved to have condition numbers independent of the mesh size, for the reduced system the current theoretical proof only works when the diffusion coefficient matrix is piecewise constant.

欢迎大家参加!