数学与系统科学研究院

计算数学所学术报告

报告人：　　**Quanling Deng**

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报告题目：

Spectral approximation of elliptic operators by the Hybrid High-Order method

邀请人：　谢和虎 研究员

报告时间：**2019** 年 **4** 月 **15** 日（周一）

上午 **10:00-11:00**

报告地点：　　科技综合楼三层

311 报告厅

Abstract:

The talk starts with Babuška's challenging questions raised in his recent emails on FEM spectrum and then discusses the approximation of elliptic operators by a recently-developed non-conforming method. We study the approximation of the spectrum of a second-order elliptic differential operator by the Hybrid High-Order (HHO) method. The HHO method is formulated using cell and face unknowns which are polynomials of some degree k>0. The key idea for the discrete eigenvalue problem is to introduce a discrete operator where the face unknowns have been eliminated. Using the abstract theory of spectral approximation of compact operators in Hilbert spaces, we prove that the eigenvalues converge as h^{2t} and the eigenfunctions as h^{t} in the H^1-seminorm, where h is the mesh-size, t\in [s,k+1] depends on the smoothness of the eigenfunctions, and s>1/2 results from the elliptic regularity theory. The convergence rates for smooth eigenfunctions are thus h^{2k+2} for the eigenvalues and h^{k+1} for the eigenfunctions. Our theoretical findings, which improve recent error estimates for Hybridizable Discontinuous Galerkin (HDG) methods, are verified on various numerical examples including smooth and non-smooth eigenfunctions. Moreover, we observe numerically in one dimension for smooth eigenfunctions that the eigenvalues superconverge as h^{2k+4} for a specific value of the stabilization parameter.

Collaborating authors: Victor Calo, Matteo Cicuttin, Quanling Deng, Alexandre Ern.

欢迎大家参加！