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：

A new simple adaptive finite element method for eigenvalue problems

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报告地点： 科技综合楼三层

311 报告厅

Abstract:

A new simple adaptive finite element method is proposed to solve the eigenvalue problems of the second order elliptic self-adjoint operators. The proposed algorithm consists of two steps. In the first step, the standard adaptive finite element method is used to solve a source problem (with a properly chosen right-hand side function) associated to the eigenvalue problem, whose main purpose is to design an adaptive locally refined mesh which can captures the singularity caused by the operator and the boundary of the domain. In the second step, the eigenvalue problem is approximately solved by some finite element methods defined over the final adaptive mesh from the first step. Compared with the standard adaptive finite element method for the eigenvalue problem in the literature, a distinctive feature of our algorithm herein is that, instead of solving the eigenvalue problem over and over again, our method only solves one discrete (generalized) eigenvalue problem in the whole procedure. We perform several numerical examples in both 2D and 3D, and results shows that the computational cost of our method is much less than standard method without losing accuracy of the approximation of the eigenpairs. This demonstrate the efficiency and superiority of the new algorithm, and its potential to be applied to large-scale adaptive computations.

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