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presso l’Aula Seminari della Sezione di Matematica

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terrà il seguente seminario

Adaptive finite element approximation of eigenvalue problems

Part 1: Introductory remarks on AFEM for eigenvalue problems

Abstract: This talk presents the basic ideas of the adaptive finite element method (AFEM) for the Poisson equation and gives a brief summary of the concept of optimal decay rates related to nonlinear approximation classes. The talk furthermore outlines the extension to the adaptive computation of simple eigenvalues of the Laplacian.

Part 2: Adaptive nonconforming finite element approximation of eigenvalue clusters

Abstract: The adaptive finite element approximation of multiple eigenvalues leads to the situation of eigenvalue clusters because the eigenvalues of interest and their multiplicities may not be resolved by the initial mesh. In practice, also little perturbations in coefficients or in the geometry immediately lead to an eigenvalue cluster. The first part of this talk presents an adaptive algorithm for eigenvalue clusters and shows optimal decay rates of the error in terms of degrees of freedom. Numerical tests suggest that the adaptive cluster approximation is superior compared to the use of an adaptive scheme for each eigenvalue separately, even if the multiplicities are known.
The optimality in terms of the concept of nonlinear approximation classes is concerned with the approximation of invariant subspaces spanned by eigenfunctions of an eigenvalue cluster. In order to obtain eigenvalue error estimates in the case of nonconforming finite element approximations, the last part of the talk presents new error estimates for nonconforming finite elements which relate the error of the eigenvalue approximation to the error of the approximation of the invariant subspace.