Johannes Kepler Universität Linz
Institut für Numerische Mathematik
o.Univ.-Prof. Dr. Ulrich Langer

Talk announcement

Prof. Ronald H.W. Hoppe
(Univ. of Houston/Univ. of Augsburg)

Friday, October 17, 2008
13:00, HF 136

Convergence Analysis of Adaptive Non-Standard Finite Element Methods

Adaptive finite element methods have become powerful tools for the efficient and reliable numerical solution of partial differential equations and systems thereof. They consist of successive loops of the cycle

$$\text{SOLVE} \Longrightarrow \text{ESTIMATE} \Longrightarrow \text{MARK} \Longrightarrow \text{REFINE} .$$

Here, SOLVE stands for the solution of the finite element discretized problem with respect to a given triangulation of the computational domain using, e.g., advanced iterative solvers based on multilevel and/or domain decomposition methods. The following step ESTIMATE provides a cheaply computable, localizable a posteriori error estimator for the global discretization error or some other problem-specic quantity of interest. The subsequent step MARK deals with the selection of elements, faces and/or edges of the triangulation for refinement and/or coarsening, whereas the final step REFINE takes care of the technical realization of the refinement/coarsening process.
An important issue is the convergence analysis of the adaptive loop in the sense of a guaranteed reduction of the underlying error functional. During the past decade, such a convergence analysis has been successfully established mainly for standard conforming finite element discretizations of second order elliptic boundary value problems. In this contribution, we focus on recent results for non-standard discretizations such as mixed and mixed-hybrid methods as well as nonconforming techniques including Discontinuous Galerkin methods.