UNIVERSITÄT SALZBURG

Fachbereich
Mathematik
Hellbrunnerstraße 34
5020 Salzburg

Gastvortrag

Donnerstag, 18. September 2014
10 Uhr c.t.
Seminarraum II

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Multi-Level hp-Adaptivity: High-Order Mesh Adaptivity without the Difficulties of Constraining Hanging Nodes

Abstract:
The implementation of hp-adaptivity is challenging as hanging nodes, edges, and faces have to be constrained to ensure compatibility of the shape functions. For this reason, most hp-code frameworks restrict themselves to 1-irregular meshes to ease the implementational effort. This work alleviates these difficulties by introducing a new formulation for high-order mesh adaptivity that provides full local hp-refinement capabilities at a comparably small implementational effort. Its main idea is the extension of the hp-d method such that it allows for high-order overlay meshes yielding a hierarchical, multi-level hp-formulation of the Finite Element Method. This concept enables intuitive refinement and coarsening procedures, while linear independence and compatibility of the shape functions are guaranteed by construction. The proposed method is demonstrated to achieve exponential rates of convergence for problems with non-smooth solutions, is used alongside the Finite Cell Method to simulate the heat flow around moving objects on a non-conforming background mesh and is combined with an energy-based refinement indicator for automatic hp-adaptivity.

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Einladender: Andreas Schröder