Exact Geometry Simulation for Optimized Design of Vehicles and Vessels

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Abstract: Based on the idea of bridging the gap between Computer Aided Design (CAD) and the Finite Element Method (FEM), the so called Isogeometric Analysis introduced by Hughes et al. [1] extends the isoparametic concept by using more general basis functions such as Non-Uniform Rational B-Splines. The major point is to exactly represent the geometry already at the coarsest level of discretization. Different numerical aspects like adaptivity and local refinement [2] among other things, are currently investigated in the scope of the collaborative project EXCITING (Exact geometry simulation for optimized design of vehicles and vessels) funded by the European Union. In this talk, we will introduce the Isogeometric Analysis, compare it with standard FEM approaches and comment on current developments in EXCITING.

1. T. J. R. Hughes, J. A. Cottrell and Y. Bazilevs
   Isogeometric analysis: CAD, finite elements, NURBS, exact geometry and mesh refinement
   Computer Methods in Applied Mechanics and Engineering, **194**, pp. 4135-4195, 2005.

2. M. R. Dörfel, B. Jüttler and B. Simeon
   Adaptive Isogeometric Analysis by Local h-Refinement with T-Splines
   Computer Methods in Applied Mechanics and Engineering (to appear), 2008.

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