

Isogeometric Analysis and Applications in Solid Mechanics and Shape Optimization

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Over the last years, the new paradigm of Isogeometric Analysis -- IGA has demonstrated its potential to bridge the gap between Computer Aided Design and the Finite Element Method -- FEM. The distinctive aspect of IGA is the usage of one common basis for creating geometry models, for meshing, and for numerical simulation. In this way, a seamless integration of all computational tools within a single design loop comes into reach. Moreover, increased smoothness of the basis functions and an exact representation of the boundary are properties which are also attractive from a numerical viewpoint.

The presentation is aimed at the application of IGA in the field of solid mechanics, in particular vibrational analysis. We start with a short overview on the methodology, point out the common features and differences when compared to the FEM, and concentrate then on the analysis of linear and nonlinear problems where the numerical advantages of higher smoothness become apparent. The last part of the talk is devoted to the field of shape optimization, which benefits in particular from the IGA framework.