Isogeometric Higher Order BEM for Electromagnetic Problems

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ABSTRACT

Although far older, the idea of utilizing parametric mappings instead of unstructured meshes in finite element methods got its place in the spotlight with the introduction of *Isogeometric Analysis* by Hughes et. al. [4]. However, even though the perfect geometry description through *non-uniform rational B-Splines (NURBS)* and the isoparametric ansatz spaces solved many severe problems, they turned out to cause new ones as well.

Many of these issues originate from the process of parametrizing volumetric discretization explicitly from CAD boundary parametrizations, c.f. [2], and thus can be avoided by considering boundary element methods instead of volumetric finite element methods.

This talk will motivate the isogeometric concept with respect to its utilization in boundary element methods, where the 3D *Laplace Equation* and the *electric wave equation* resulting from *Maxwell's Equations* are considered as examples. The construction of the *Spline Complex*, c.f. [1], as ansatz space will be applied to the boundary element setting and convergence estimates for traces of $\underline{H}(\mathrm{curl}, \Omega)$ will be presented. Convergence behaviour and performance of parametric boundary element methods will be discussed and it will be showcased in how far the utilization of the isogeometric techniques might impact the performance of modern boundary element methods.

Acknowledgement: The work of Felix Wolf is supported by the *Excellence Initiative* of the German Federal and State Governments and the Graduate School of Computational Engineering.

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