Boundary Element Method with NURBS-geometry and independent field approximations in plane elasticity

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ABSTRACT

Since the introduction of *isogeometric analysis* (IGA) by Hughes et al. in 2005 [1], one of the most promising directions of research in computational mechanics during the recent years has been towards the synthesis of the CAD geometry and methods of stress analysis (see [2] for a review of work in this area). IGA utilizes the same functions for representing the exact geometry as well as the approximation of the field variables and it has been successfully implemented in the framework of both, finite and boundary element methods [3].

However, in certain cases, the strict dependence of the basis functions for field approximation on functions of geometry representation is more of a hindrance than an advantage. Particularly, in BEM, boundary displacements and tractions have different continuity properties, which cannot be accurately approximated by the same basis. To alleviate this difficulty we further develop the idea, originally proposed in [4], to weaken this dependence by introducing independent h- and p-refinements of the displacement and traction fields while keeping the exact original NURBS-geometry. We show the performance of the method in comparison with Lagrange BEM and IGA BEM for a number of benchmark problems.

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