

INNOVATIVE FICTITIOUS DOMAIN APPROACHES FOR HIGH-ORDER METHODS AND IGA

ALEXANDER DÜSTER^{*}, ERNST RANK[†] AND DOMINIK SCHILLINGER[§]

^{*} Hamburg University of Technology
Schwarzenbergstr. 95c, 21073 Hamburg, Germany
alexander.duester@tuhh.de, www.tuhh.de/skf

[†] Technische Universität München
Arcisstr. 21, 80290 München, Germany
ernst.rank@tum.de, www.cie.bv.tum.de

[§] The University of Texas at Austin
201 East 24th Street, Austin, TX 78712, USA
dominik@ices.utexas.edu, <http://users.ices.utexas.edu/~dominik>

Key words: Fictitious domain approaches, high-order methods, isogeometric analysis

ABSTRACT

Fictitious domain methods were introduced in the early sixties as an approach to avoid the necessity of exactly meshing a domain of computation. Since then many variants of these appealing approaches have been suggested, like embedded domain, immersed boundary methods or special implementations of the extended finite element method. Whereas classical fictitious domain methods concentrated on low order elements and often suffered from a loss of accuracy close to the domain's boundary, their combination with high order methods as well as with isogeometric analysis (IGA) show high accuracy, often even exponential rate of convergence and superior flexibility in handling complex geometries. This mini-symposium will specifically focus on this new generation of fictitious domain methods and discuss questions ranging from accuracy, robustness and convergence properties to non-linear applications, implementation issues, integration with CAD and geometric modeling or engineering applications in solid and fluid mechanics.