

Seminar im Rahmen des GRK 2078

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Date: Tuesday, September 22, 2020
Time: 14:00 h
Format: IRTG Online-Seminar

Title: **Novel Space-Time Finite Element Simulation Methods in Material Processes**

Abstract

Moving-boundary flow simulations are an important design and analysis tool in many areas, including civil and biomedical engineering, as well as production engineering. Interface-capturing offers flexibility for complex free-surface motion, while interface-tracking is very attractive due to its mass conservation properties at low resolution. We focus on these alternatives in the context of flow simulations based on stabilized finite element discretizations of Navier-Stokes equations, including space-time formulations that allow extra flexibility concerning grid design at the interface.

Space-time approaches offer some not-yet-fully-exploited advantages; among them, the potential to allow some degree of unstructured space-time meshing. A method for generating simplex space-time meshes has been developed, allowing arbitrary temporal refinement in selected portions of space-time slabs. The method increases the flexibility of space-time discretizations, even in the absence of dedicated space-time mesh generation tools. The resulting tetrahedral and pentatope meshes are being used in the context of cavity filling flow simulations, such as those necessary to design injection molding processes.

The work on numerical methods for simulation of complex fluids in general is done in the context of the International Research Training Group 2379 "Modern Inverse Problems", operated jointly by RWTH Aachen University and the University of Texas at Austin. In this IRTG, the simulation methods are examined from the point of view of their suitability to obtain "inverse" information, such as is required in the context of optimal control, uncertainty quantification, or data assimilation. An outline of the research program of the IRTG will be given.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke
(Sprecher des GRK 2078)