Chair for Computational Analysis of Technical Systems

RWTH AACHEN UNIVERSITY

Doctoral Position

in DFG International Research Training Group 2379 “Modern Inverse Problems”

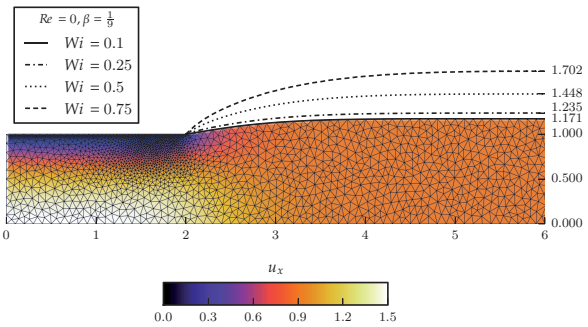
The new DFG International Research Training Group (IRTG) 2379 builds on a unique consortium, at RWTH Aachen University with its Aachen Institute of Advanced Study in Computational Engineering Science, and at the **University of Texas at Austin** with its **Institute for Computational Engineering and Sciences**. The projects are embedded in the field of modern inverse problems and introduce a new innovative perspective into the education of future scientists and engineers.

The advertised position is associated with the project “P1 Novel stabilized finite-element methods for microstructured and complex fluids,” and advised jointly by Prof. Marek Behr at RWTH Aachen and Prof. Leszek Demkowicz at UT Austin. The project will advance the state of the art in the computational treatment of viscoelastic (VE) constitutive equations and similar model equations arising elsewhere. The applications of this research range from production engineering and melt-based forming processes (die swell of VE fluid shown in figure), to biomedical device design, to aerospace technology.

Low-order stabilized finite elements (FEM) are the workhorse of computational engineering, but are sensitive to element quality and stabilization parameters. Discontinuous Petrov-Galerkin (DPG) methods have a solid mathematical foundation and robustness, but are not yet used in industrial contexts. By merging the properties of FEM and DPG, robust method for microstructured fluids in industrial settings will be obtained.

The research goals of this project are:

- Understanding of the **stability and accuracy** properties of two alternate finite element discretization approaches;
- Transfer of **Discontinuous Petrov-Galerkin** stability and accuracy advantages to low-order **industrial FE** formulations;
- Insight into numerical behavior of **sensitivities and adjoints** required for design tasks in both approaches.



Your profile: Requirement for this position is a master’s degree in CES, engineering, applied mathematics, physics, or a similar subject with a superior academic record. Practical programming experience in Fortran or C as well as with parallelization are of advantage. Familiarity with UNIX operating system would be ideal. Excellent written and spoken English language skills are required.

Our offer: The candidate will be a regular employee and must meet required personal qualifications. This is a full-time position with a civil service pay scale TV-L E 13:

http://www.cats.rwth-aachen.de/cms/CATS/Der-Lehrstuhl/Stellenangebote/~qspt/Stelleninfos/lidx/1/

The expected appointment period is **three years**. Full involvement in the IRTG activities, including joint RWTH-UT colloquia, annual workshops and schools, and short courses is expected. A **six-month** research stay at University of Texas in Austin is part of the training program. Applications are being reviewed now.

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Starting date: October 2018

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