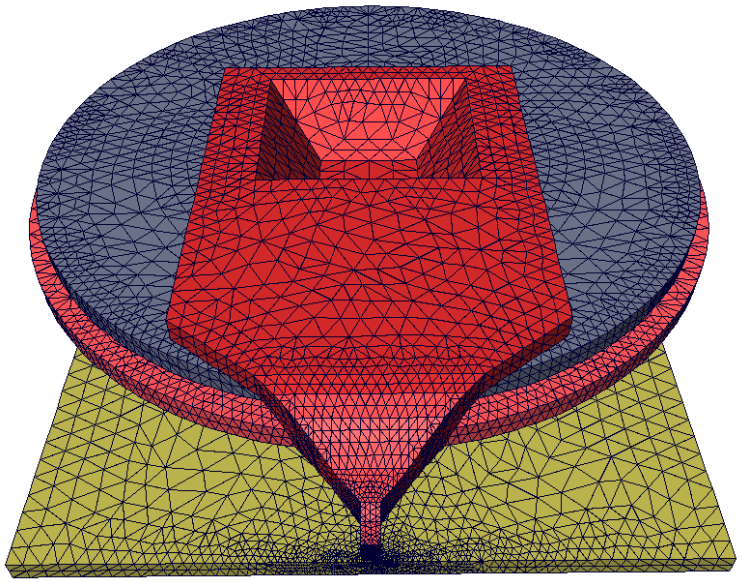
GRADUATE SCHOOL
computational engineering

TECHNISCHE UNIVERSITÄT DARMSTADT

Subject: Adjoint-Based Model Reduction and Error Control in Multiphysics Problems

Research Focus/ Cross-sectional Area: Multirate and multiscale methods (R1)



Description:

Large-scale, multi-physics problems on complex geometries, coupled with an ever increasing demand for accuracy and model fidelity, render direct numerical simulation an ineffective tool despite the enormous capabilities of today's computers. Several systematic strategies for reducing model complexity such as proper orthogonal decomposition, centroidal Voronoi tesselation, and adjoint-based approaches have been developed. The main idea is to replace the large-scale systems with systems of lower dimensions having similar response characteristics.
Equally important is the use of adaptive methods to control the discretization and modeling errors, which are commonly recognized as critical aspects in the numerical solution of PDE-based multi-physics problems.

Requirements:

Applicants are expected to have a strong interest in numerical analysis of dynamical systems with a close link to real life applications.

Supervisors: J. Lang, Numerics in PDEs
M. Schäfer, Numerical Methods in Fluid Dynamics
S. Ulbrich, Nonlinear Optimization and Optimal Control