Software Development for CERN's Finite Element Quench Simulation (FiQuS) Framework

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Proposal for a student research assistant (HiWi) position
Study field: Computational Engineering | Electrical Engineering | Mathematics | Computer Science

Description

CERN recently started a project to build a comprehensive open-source quench simulation tool called FiQuS (**Fi**nite Element **Qu**ench **S**imulation). It is based on the finite element (FE) framework GetDP and FE mesher Gmsh. The idea is to build a flexible tool which allows users to build and simulate complex models from human-readable input files hiding the complexity of the underlying kernel.

FiQuS is written mostly in python with small parts written in GetDP's own scripting language. Following modern software engineering standards, focus is put on continuous integration and deployment, in particular comprehensive testing of all parts of the software. Furthermore, the use of high-performance computing is planned to be integrated while keeping the tool simple to use.

We are looking for a motivated student to help our team shape FiQuS and make this new and demanding project succeed. The exact details of the work can be discussed depending on the wishes of the student and range from software engineering tasks to building finite element models. Possible duties may include

- Setup of automated and comprehensive testing in the CI/CD pipeline

- Maintenance of the gitlab project including CI/CD, wiki, documentation

- Development of template finite element formulations or model geometries

- Preparation of the tool for use of high-performance computing methods

Prerequisites

Basic knowledge of programming in python and software engineering methods such as git or CI/CD is desirable but not a necessity (can be learned as part of the introductory phase)

Basic knowledge of the finite element method and/or magnet technology could be beneficial but is not necessary

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