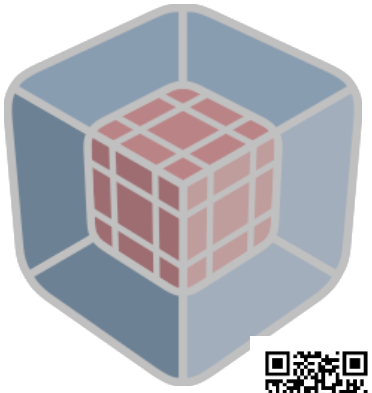
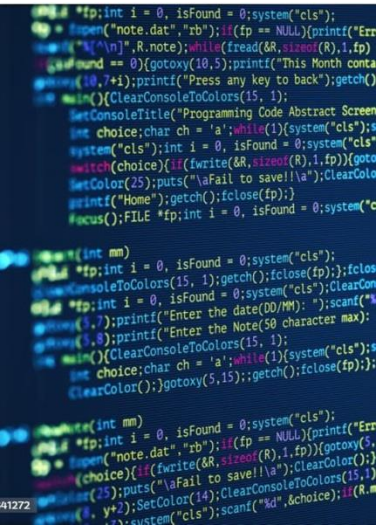
Masterthesis / HiWi

Accelerate Innovations: High-Performance Computing Software Development for Heterogenous Architectures

TECHNISCHE UNIVERSITÄT DARMSTADT

STFS





Motivation & Background

To achieve current climate goals, rapid technological changes are necessary. High-performance computing will be a crucial pillar for future engineers, enabling a swift transition of the energy system through innovative technical solutions.

The Institute for Simulation of Reactive Thermo-Fluid Systems (STFS) aims to lead this journey by developing new generation of algorithms to enable simulations of reactive multiphase flows targeting the next generation of super computers. This includes Europe's first Exascale supercomputer, currently being built at our partner, Jülich Supercomputing Centre.

Your contributions to this exciting undertaking are very welcome!

Are you a visionary engineer passionate about pushing the boundaries of computational science? Do you thrive on solving complex problems and developing cutting-edge solutions? Do you have a strong programming background (preferably in C/C++), and proficiency in Unix-based systems? If so, we encourage you to contact us for more information!

Tasks

- Familiarize with the GPU code NekCRF (https://github.com/Nek5000/nekRS)
- Design, implement, and refine high-performance algorithms tailored for heterogeneous platforms, including multi-core CPUs and GPUs.
- Stay at the forefront of advancements in HPC: Research and implement cutting-edge methodologies.
- Work closely with computational scientists and software developers: Contribute to projects that push the frontiers of computational science.

Focus Areas

Simulation	● ○ ○
Modellierung	● ● ○
Implementierung	● ● ●
Datenanalyse	● ○ ○

Date

17.06.2026

Start date

Immediately

Kontakt

Dr.-Ing. Hendrik Nicolai

nicolai@stfs.tu-darmstadt.de