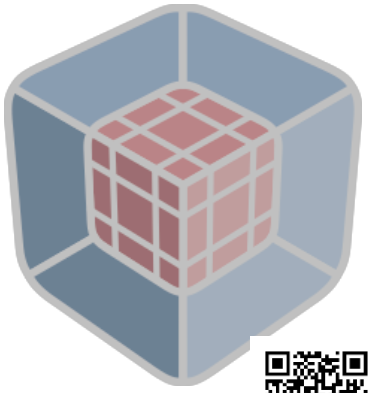
Masterthesis / HiWi

Cutting Edge High-Performance Computing: Towards Exascale CFD simulations

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 performing groundbreaking simulations. This includes leveraging Europe's first Exascale supercomputer, recently launched at our partner, Jülich Supercomputing Centre.

Your contributions are highly welcome in this exciting endeavor!

Are you an exceptional engineer with a passion for high-performance computing (HPC) and large-scale simulations? Do you thrive in the fast-paced world of HPC and have an interest for optimizing complex simulations on diverse hardware platforms? 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)
- Setup and execute large-scale simulations that leverage the full potential of diverse HPC systems
- Conduct performance analysis, profiling, and tuning to identify bottlenecks and optimize code performance across different hardware architectures
- Evaluation and profiling of code performance and efficiency on different HPC clusters in Europe including europes first exascale computer JUPITER

Focus areas

Simulation	●●●
Modeling	●○○
Implementation	●○○
Data analysis	●●○

Date

17.06.2026

Start date

Immediately

Contact

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