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# MINI-SYMPOSIUM ON TOOL SUPPORT FOR DEVELOPING HIGHLY-PARALLEL CFD APPLICATIONS

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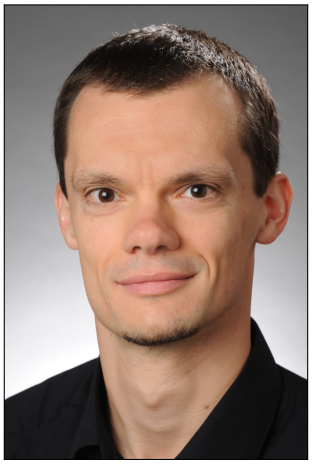
**Abstract.** Code complexity of parallel Computational Fluid Dynamics (CFD) solvers has seen tremendous growth in recent years: expanding feature sets and more complex hardware, such as accelerators and hierarchical memories, took their toll. This can be partially mitigated by abstraction, for instance as offered by third-party libraries, but at the expense of larger and more intricate software stacks that need to be managed. The conjunction of abstraction, code complexity, and growing software stacks complicates code analysis and, in turn, leads to performance problems potentially remaining undiscovered and unfixed. Consequently, tools support is indispensable in various aspects throughout the software engineering life-cycle to support both developers and users. This mini-symposium aims at gathering developers and users of software tools assisting in the development of sophisticated, highly-parallel HPC software for CFD. It provides a platform for experts of different fields empowering discussion and knowledge transfer to achieve the overarching goal: raising reproducibility, automation, and documentation during the whole software-engineering life-cycle of CFD applications on high-performance computers. The tools are ranging from performance analysis, over debugging of HPC codes, to management of the involved software stacks.

A list of potential contributions may include, but it is not limited to:

- Tools for automation in the software development life-cycle
- Workflows for automated testing and deploying of software projects
- Methods and tools for debugging and correctness checking of highly-parallel applications
- Tool support for (node-level) performance analysis
- User success stories of utilizing tools

## Short bio of the organizers

Jana Gericke-Schuster – is a mechanical engineer, PhD student at the University of Siegen and part of the High-Performance Simulation Tools research group at the DLR Institute of Software Methods for Product Virtualization. Her research interests include high-performance and scientific computing especially in the context of the Lattice Boltzmann Method (LBM). Jana is a developer of the open-soure LBM solver Musubi. Since 2019, she contributes to the biannual CFD workshop as lecturer in collaboration with the High-Performance Computing Center (HLRS) in Stuttgart, Germany.



Dr. Ronny Tschüter – is a computer scientist and head of the HPC Competence Center research group at the DLR Institute of Software Methods for Product Virtualization. He completed his dissertation at TU Dresden in the field of parallel I/O performance analysis. His research focuses on HPC architectures, parallel programming, performance engineering, and performance analysis tools. Ronny is also involved in the development of performance analysis tools such as Score-P, OTF2, and Vampir.

Dr. Immo Huismann – leads the High-Performance Simulation Tools research group at the DLR Institute of Software Methods for Product Virtualization. Starting out from studying mechanical engineering at TU Dresden and completing the dissertation at the Cluster For Advancing Electronics Dresden (cfaed), the research focus now lies on performance engineering for highly-parallel applications. This is implemented via improving the runtime and scalability of high-performance computing codes employed at DLR, such as TAU, TRACE, Musubi, CODA and b2000++pro and combinations thereof.