

Software testing suite for a HPC complex flow solver

Even though testing of software became standard in industry long ago, many academic high performance computing (HPC) codes still lack proper testing suites. Hence, errors are only detected at the final simulation stage and are then costly and cumbersome to repair, or even remain undiscovered and lead to wrong conclusions about the simulated physics. Hence, for our MPI-parallel multiresolution finite-volume solver ALPACA, software testing is a necessity. The ALPACA framework allows to simulate compressible multi-phase flows with over a billion degrees of freedom. The code is written completely in C++11.

In this project, the respective testing suite is to be written. The test suite should contain unit tests, integration tests and system tests and be executable on the LRZ-Linux cluster in an automated fashion. A testing environment in C++ would be preferred.

Tasks:

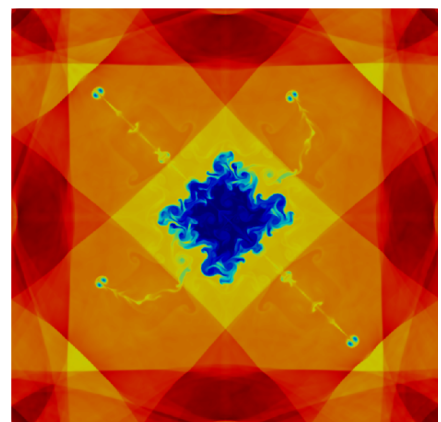
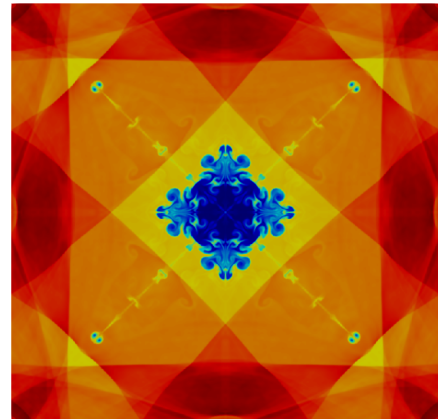
- Review of the existing framework and software testing
- Review of software testing techniques and frameworks
- Design and implementation of software tests for ALPACA

Requirements:

- Knowledge of software testing concepts and frameworks
- Ability to work independently
- Knowledge of C++11, beneficial
- Experience with numerical simulations on HPC, beneficial

Take-away:

- Insight into state-of-the-art research CFD code
- Experience with HPC-clusters
- Project management skills
- Insight into the numeric modeling of complex flows



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