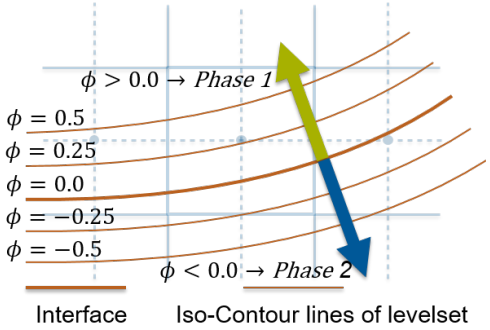
Chair of Aerodynamics
and Fluid Mechanics
Department of Mechanical Engineering

Term paper / Interdisciplinary Project (IDP) / Student Research Job (HiWi) *07.01.2020*

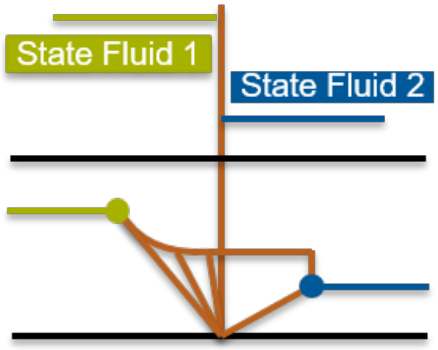
Compressible Interface Solvers: Implementation and Analysis

Simulating compressible multi-phase flows requires sophisticated discretization of the fluid interfaces in order to capture the flow physics and inhibiting instabilities correctly. In our framework the interface is modeled using the sharp-interface method and a Riemann problem is solved across the interface. This allows for a conservative exchange across the interface while using different equations-of-state in the participating fluids.



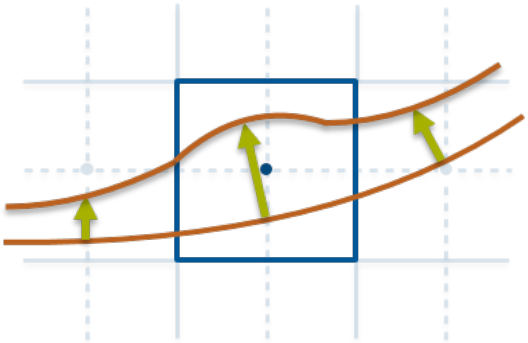
In this work the effects of different interface Riemann solvers and equations-of-states are to be investigated using our in-house compressible multi-phase finite-volume solver. In addition to the already existing solvers and equations-of-state new ones are to be implemented and tested. The full set of solvers shall be analyzed, running one- and two-dimensional simulation on the LRZ Linux Cluster[2].

<u>Tasks:</u>
- Familiarization with Interface solvers and equations-of-state
- Implementation of new solvers and equation-of-states
- Thorough analysis of the schemes



<u>Requirements:</u>
- Ability to work independently
- Knowledge of C++17
- Knowledge of Level-set or Riemann solvers, beneficial
- Knowledge of Linux or HPC-clusters, beneficial

<u>Take-away:</u>
- Insight into state-of-the-art compressible CFD code
- Experience with HPC-clusters
- Project management skills
- Improved C++ skills



2 https://doku.lrz.de/display/PUBLIC/Linux+Cluster

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