abstract-rohde13

Heterogeneous Multiscale Methods for Compressible Two-Phase Flow with Phase Transition

We consider an ideal fluid that can appear in a liquid and a vapour phase. In the bulk phases the dynamics is governed by the compressible Euler equations. Mass transfer across the interface and effects of surface tension is taken into account.
In the first part of the talk a free-boundary formulation for the overall problem is introduced and basic analytical results are discussed.

The numerical solution of the two-phase problem requires an explicit tracking of the interface. We will propose in the second part a heterogenous multiscale framework that relies on standard finite volume solvers for the bulk region and (approximate) Riemann solvers for the local evolution of the interface. The approach will be tested on standard bubble/droplet configurations.
While a rigorous analysis for the full flow problem appears to be out of reach we present a convergence result for a scalar model problem. The proof relies on the uniform boundedness of a new functional that majorizes the BV-seminorm of the discrete solution.