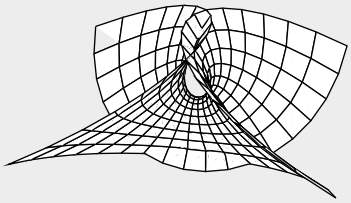

Oberseminar Mathematische Strömungsmechanik

Institut für Mathematik der Julius-Maximilians-Universität Würzburg

Hyperbolic equations - structure preserving methods & other topics

Barbara Re

Politecnico di Milano, Italy

On computing weakly compressible multi-phase flows

Abstract:

Transient compressible two-phase flows exhibit a complex multi-scale nature. Diffuse interface methods represent a popular strategy to model such flow fields, which considers a small, artificial mixing of the fluids at the otherwise resolved interface. These methods are based on augmented systems of governing equations, which include suitable transport terms to account for the interaction between phases.

In this talk, we discuss a diffuse interface method specifically suited for weakly compressible non-equilibrium two-phase flows. The underlying model is a Baer-Nunziato type model, in which each fluid is described by its own pressure, velocity, and temperature, and thermodynamic model. The mechanical equilibrium at the interfaces can be enforced through a relaxation process, governed by finite-value parameters. The total energy equations are replaced by the equations for the pressure evolution, and the set of governing equations is scaled so that the two-phase counterpart of the incompressibility condition is recovered in the zero-Mach limit. A robust discretization of the non-conservative terms is derived following the non-disturbance pressure and velocity condition.

Numerical results show the validity of the proposed approach to simulate two-phase, almost-pure, and two-fluid flows, both considering the simple stiffened gas model and the Peng-Robinson equation of state.

Reference:

Barbara Re, Rémi Abgrall: *A pressure-based method for weakly compressible two-phase flows under a Baer-Nunziato type model with generic equations of state and pressure and velocity disequilibrium* July 2021

via Zoom video conference (request the Zoom link from klingen@mathematik.uni-wuerzburg.de)

Friday, Apr. 1 at 3 pm CET

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Christian Klingenberg