



Oberseminar Mathematische Strömungsmechanik

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Ghost Fluid Methods for Sharp Interface Simulation

Abstract: The ghost fluid methods (GFM) provide simple ways to simulate the multi-medium flows of immiscible interfaces. Especially, the modified GFM (MGFM) and its variants, based on multi-medium Riemann problems, are capable of faithfully taking into account the effects of nonlinear wave interaction and medium property near the interface. In this talk, I shall start with the traditional conservative schemes and explain the difficulties encountered when they are applied to multi-medium flows with an immiscible interface. The frame of GFMs is then introduced with a one-dimensional gas-water Riemann problem with their detailed corresponding definitions of ghost fluid states and show the different performance of various GFMs. A mathematical model is set up to illustrate the numerical errors caused at the interface for understanding better the behaviors of GFMs. In addition, I shall explain the ways of analyzing the accuracy of a GFM based algorithm and emphasize that reasonable treatments for ghost fluid states or interface conditions are crucial when a GFM is applied to interfacial phenomena involving strong discontinuity and strong wave-interface interaction. The implementations and its high dimensional extension of MGFM will also be briefly illustrated for fluid-fluid, fluid-structure coupling. In the final, various examples are provided to show that the MGFM has strong potentials to solve complex engineering problems. In the end of the talk, I may talk about the remaining problems in the development of the ghost fluid methods.

room 40.03.003 (Emil Fischer Str. 40)

Wednesday, June 3, 2026 at 12:30 pm,

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Christian Klingenberg