

Seminar of the Work Group
Nonlinear Partial Differential Equations
WS 23/24

October 31st, 2023, 11:30 - 13:00
Seminar room: SR 3.061

On a Compressible Fluid-structure Interaction Problem with Slip Boundary Conditions

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Abstract

In this talk, I will present a recent project on a compressible barotropic fluid system interacting with a linear (visco)-elastic solid equation. In particular, the elastic structure formulates the moving boundary of the fluid, and the Navier-slip type boundary condition is taken into account. Depending on the reference geometry (flat or not), we show the existence of weak solutions to the coupled system provided the adiabatic exponent satisfies $\gamma > \frac{12}{7}$ without damping and $\gamma > \frac{3}{2}$ with structure damping, utilizing the domain extension and regularization approximation. Moreover, via a modified relative entropy method in time-dependent domains, we prove the weak-strong uniqueness property of weak solutions. Finally, we give a rigorous justification of the incompressible inviscid limit of the compressible fluid-structure interaction problem with a flat reference geometry, in the regime of low Mach number, high Reynolds number, and well-prepared initial data. This talk is based on joint work with Sourav Mitra (IIT, Indore) and Šárka Nečasová (IMCAS, Prague).