Density Patch Problem for Compressible Fluids

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Abstract

The motion of a compressible viscous barotropic fluid is described by the Navier-Stokes system. It is a system of hyperbolic-parabolic mixed-type PDEs. In this talk, we will study the so-called density patch problem: *If we are given a density that is initially discontinuous across a \( C^{1+\alpha} \) curve \( \gamma \) and \( \alpha \)-Hölder continuous on the two disjoint components delimited by \( \gamma \), is this structure preserved in time?*

An important quantity in the mathematical analysis of this system is the so-called effective flux, which was discovered in [Hoff and Smoller, 1985]. More precisely, the mathematical properties of this quantity play a crucial role in the study of the propagation of oscillations in compressible fluids [Serre, 1991], in the construction of weak solutions [Lion, 1996], or the propagation of discontinuity surfaces [Hoff, 2002], to cite just a few examples. In the case of density-dependent viscosities, the behavior of the effective flux degenerates, which renders the analysis more subtle.

1 References


