

Dynamics of Singularity Surfaces for Multidimensional, Compressible Navier-Stokes Flows

David Hoff

hoff@indiana.edu

University of Indiana, USA

Elementary heuristic considerations suggest that, for solutions of the system of the title, discontinuities in the fluid density and in the spatial gradient of the fluid velocity should convect along particle trajectories and decay exponentially in time. These heuristics are reflected only weakly in the known existence results, however. In the present work we show that, for piecewise smooth initial data, there exist piecewise smooth solutions obeying these heuristics in a strict, pointwise sense. The analysis consists of a set of *a priori* estimates coupling the regularity of the hypersurface of singularity, a modulus of piecewise-Hölder continuity of the density, and some fairly intricate regularity properties of the velocity. A certain hyperbolic, dissipative effect is then applied to close these estimates, independently of time.