SMOOTH IMPLODING SOLUTIONS FOR 3D COMPRESSIBLE FLUIDS

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We will talk about singularity formation for the 3D isentropic compressible Euler and Navier-Stokes equations for ideal gases. These equations describe the motion of a compressible ideal gas, which is characterized by a parameter called adiabatic constant. Finite time singularities for generic adiabatic constants were found in the recent work of Merle, Raphaël, Rodnianski and Szeftel.

We will construct a new family of profiles corresponding to the largest possible self-similar exponent. In particular, this allows us to drop the genericity assumption and construct smooth self-similar profiles for all values of the adiabatic constant. This provides the first known smooth self-similar profile for monoatomic gases. We also present a different stability analysis around those profiles that allows us to show singularity formation for initial data with constant density at infinity. These results are joint work with Tristan Buckmaster and Javier Gómez-Serrano.