

The Navier-Stokes equations for a compressible fluid with anisotropic viscous-stress tensor

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Abstract

In this talk I will present a result concerning the existence of weak-solutions close to equilibrium for the Navier-Stokes equations for a compressible barotropic fluid. The main feature of this result is that we can consider general symmetric fourth order viscous-stress tensors which account for eventual anisotropy and/or heterogeneity of the fluid. The two main technical ingredients are:

1. We can control the density oscillations via a defect measure constructed using the energy equation. This is a crucial step in order to be able to construct solutions as weak-limits of regular approximate solutions.
2. We show that the two energy-functionals introduced by D. Hoff in a series of works in the 90s can be estimated using only L^p information for the density with $p < \infty$. These energy functionals translate nonlinear parabolic regularization effects and they provide crucial information for the time derivative of the velocity field.