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# Two-velocity formulation of the degenerate Navier-Stokes equations

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## Abstract

This talk will be devoted to existence result for the low Mach number limit system obtained from the full compressible Navier-Stokes model with density-dependent viscosities. We will first present derivation of the incompressible system called Kazhikhov-Smagulov model. Under special compatibility condition between the viscous tensor and the diffusive term we will prove the existence of global in time weak solutions [1]. The proof relies on use of relative velocity, which is divergence free and which allows to reduce the coupling between particular subsystems. We will also mention possible generalizations of constraints appearing in the system and present an application to the full compressible system [2], which together with [3] yields the existence of solutions. References:

1. D. Bresch, V. Giovangigli, E. Zatorska. Two-velocity hydrodynamics in fluid mechanics: Part I Well posedness for zero Mach number systems, to appear in JMPA, (2015).
2. D. Bresch, B. Desjardins, E. Zatorska. Two-velocity hydrodynamics in fluid mechanics: Part II Existence of global  $\kappa$ -entropy solutions to compressible Navier-Stokes systems with degenerate viscosities, to appear in JMPA, (2015).
3. A. Vasseur, C. Yu. Existence of Global Weak Solutions for 3D Degenerate Compressible Navier-Stokes Equations, arXiv:1501.06803, (2015).

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