Weak-strong uniqueness in fluid structure interaction problem

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Abstract

The relative energy inequality was introduced by Dafermos [1] and in the fluid context introduced by Germain [5]. Deriving the relative energy inequality for sufficient smooth test functions and proving the weak-strong uniqueness it gives us very powerful and elegant tool for the purpose of measuring the stability of a solution compared to another which has a better regularity. This method was developed by E. Feireisl, A. Novotný and co-workers in the framework of singular limits problems (see for example [2], [3] and [4]). The aim of the lecture is show the weak-strong uniqueness in the case of motion of rigid body in a bounded domain filled by incompressible fluid with mixed boundary conditions and also the application of the weak-strong uniqueness to the case of the compressible Navier-Stokes system in the time-dependent domain. For more details see [6] and [7].

References

[1] Dafermos C. M., The second law of thermodynamics and stability, Arch. Rational Mech. Anal., **70**, 167-179, 1979.

[2] Feireisl E., Novotný, A., *Singular Limits in Thermodynamics of Viscous Fluids*, Birkhäuser, Basel, 2009.

[3] Feireisl E., Jin, B. J., Novotný, A., Relative Entropies, Suitable Weak Solutions and Weak-Strong Uniqueness for the Compressible Navier-Stokes System, Journal of Mathematical Fluid Mechanics, **14** ,717-730, 2012.

[4] Feireisl E., Nečasová, Š., Sun, Y., Inviscid incompressible limits on expanding domains, Nonlinearity, **27** (10), 2465-2477, 2014.

[5] Germain P., Weak-strong uniqueness for the isentropic compressible Navier-Stokes system, J. Math. Fluid. Mech., **13** (1), 137-146, 2011

[6] Chemetov, N., Nečasová, Š., Muha, B., Weak-strong uniqueness for fluid-rigid body interaction problem with slip boundary condition, Preprint 2017

[7] Kreml O., Nečasová Š., Piasecki T., Weak-strong uniqueness for compressible Navier-Stokes system with slip boundary conditions on time dependent domains, Preprint 2016