Nonsmooth Problems with Applications in Mechanics
Olomouc, Czech Republic, May 19-23, 2025

Weak solutions for compressible viscoelastic fluid models in three space dimensions

Milan Pokorný[1], Yong Lu

[1] Mathematical Institute of Charles University, Prague, Faculty of Mathematics and Physics

pokorny@karlin.mff.cuni.cz

Abstract: We discuss global in time existence of weak solutions to compressible viscoelastic fluid models in three space dimensions. The first result concerns the situation with corrotational derivative in the extra stress tensor. Then, assuming additionally that the extra stress tensor has a particularly simple structure, the existence of weak solutions can be shown even in the situation when the stress diffusion is neglected which is often the case in applications.
The second result concerns Oldroyd-B type of model. It is known that in three space dimensions the Newtonian structure for the viscous part of the stress tensor is not enough to ensure the existence of weak solutions for arbitrarily large data. However, assuming the stress tensor of the power-law type it is possible to close the estimates and construct solutions provided the extra stress diffusion is present and the model of the viscous stress tensor provides bounded velocity divergence.