Interaction of finitely-strained viscoelastic multipolar solids and fluids by an Eulerian approach

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A mechanical interaction of compressible viscoelastic fluids with viscoelastic solids in Kelvin-Voigt rheology using the concept of higher-order (so-called 2nd-grade multipolar) viscosity is investigated. The no-slip contact between fluid and solid is considered and the Eulerian-frame return-mapping technique is used for both the fluid and the solid models, which allows for a "monolithic" formulation of this fluid-structure interaction problem. In the quasistatic variant, existence and a certain regularity of weak solutions can be proved by a Schauder fixed-point argument combined with a suitable regularization. For the dynamical variant, a Faedo-Galerkin can be used.