

Analysis and simulation of non-Newtonian fluid – structure interaction

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Numerical study of non-Newtonian fluid – structure interaction (FSI) provides significant challenges not only due to the strong coupling between the solid and fluid substructures, but also the complexity of fluid model in a moving domain. As a result, advances in numerical study for non-Newtonian FSI have been limited and there are still many open problems in the area. In this talk both monolithic and decoupling approaches are considered for analytical and numerical studies of fluid–structure interaction problems, where the fluid is governed by a quasi-Newtonian or a viscoelastic fluid model. We will present finite element error estimates for a quasi-Newtonian FSI system and numerical results that show comparisons with a Newtonian FSI system. For a viscoelastic FSI problem we will discuss some issues with the stress boundary condition on the interface and present simulation results with/without interface stress boundary conditions.