

A variational approach to fluid-structure interactions

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In this talk some recent existence results in fluid-structure interactions are discussed. It focuses on the case when visco-elastic bulk solids are interacting with fluids. One of the characteristic difficulties of the respective PDE systems is the variable-in-time fluid domain being a part of the solution. The construction of solutions is by step-wise minimization. Such a variational approximation seems to be irreplaceable for large deformation solids, since the respective state spaces are (for physical reasons) non-convex. We introduce a two time-scale approximation scheme that is capable to construct second-order in time PDEs via step-wise minimization. Further it allows to construct weak solutions describing bulk solids interacting with fluids governed by the incompressible or compressible Navier-Stokes equations. The talk is based on collaborations with Benesova, Breit and Kampschulte.