



Hybrid finite element methods for non-linear and non-smooth problems in solid mechanics

In this talk, we discuss the application of several hybrid finite element methods to non-linear and non-smooth problems in solid mechanics. We consider non-conforming methods based on isogeometric elements and standard polynomial spaces. The choice of the Lagrange multiplier for isogeometric mortar methods is discussed, including trace spaces and biorthogonal spaces. The potential of isogeometric mortar methods is presented with a vibroacoustical example of a parameter dependent violin bridge. For several material and geometry variations a model order reduction by reduced basis methods is performed. For non-linear problems of Signorini-type, we provide optimal order a priori estimates for the trace and the flux, based on modern duality techniques. Lastly, the use of hybrid discontinuous Galerkin and weakly conforming methods in solid mechanics is discussed and illustrated by numerical benchmarks.

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