Stefan Krömer: Injective elastic deformations via surface penalty terms.

For many models of elastic solids, injectivity is a crucial constraint because it represents non-interpenetration of matter. On a theoretical level, this is achieved by imposing the well-known Ciarlet-Nečas condition. Beyond mere heuristics, its approximation, especially mathematically rigorous and computationally efficient approximation, is much less well understood, though. I will present recent theoretical progress in that area using an artificial boundary term penalizing self-interpenetration which correctly reproduces injectivity on the boundary in a limiting sense. For practical numerical tests, we consider a linear elastic model augmented with locking-type constraints to ensure local injectivity and preservation of orientation.

This is joint work with Jan Valdman (UTIA Prague).