Due to improvements in active and passive safety today’s vehicles have reached a high level of protection, which strongly depends on the careful design of different safety components and elements. One safety element used for years in passive safety design of automotive bodies has been the crash can. The crash can is designed to successively fold itself and, thus, to absorb kinetic energy in case of a crash. Recently, a novel kind of crash cans was developed by ZF Boge, so-called crash tubes.

The mechanisms employed by the crash tube, i.e., interference fit with friction, reverse drawing and multiple self contact are promising for further applications in body design for passive safety elements. Due to the design of a crash tube, strain rates are inherently one order of magnitude higher than in conventional crash cans. This poses challenges to the numerical simulation that are addressed with the proposal on hand.
The aim of this project is the numerical simulation of crash tubes - a highly challenging task due to the occurring large-deformations and, as a consequence of the design of crash tubes, the arising self-contact with respect to friction.

Thus, in the focus of the current project stand efficient detection strategies for self contact the development of (weak information) transfer operators for non-matching interfaces the implementation of efficient, inherently parallel, globalization strategies for the solution of the arising nonlinear programming problems

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