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ISOGEOMETRIC MORTAR-BASED CONTACT ALGORITHM: IMPLEMENTATION ASPECTS

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Over the last few decades, the mortar finite element method has proven itself as an accurate and robust discretization technique with solid mathematical foundations. The main idea of the method, in the application to computational contact mechanics, is the weak enforcement of contact constraints by employing well-defined function spaces of Lagrange multipliers. There are several variants of the mortar contact method. Nevertheless, in this contribution, we will only focus on the variant called mortar-based method [1].

Another ingredient that contributes to increasing the accuracy and robustness of numerical solution of contact problems is the isogeometric analysis [2]. It is a modern method of spatial discretization, which utilizes as basis functions various types of splines, most frequently NURBS (abbreviation for Non-Uniform Rational B-Splines). Isogeometric contact analysis has several interesting features such as the higher continuity on the boundaries of finite elements, or the ability to perform the patch-wise contact searching.

The objective of this contribution is to present an algorithmic treatment of the mortar-based isogeometric contact formulation. In particular, describe the process of integration of the contact virtual work term and its linearization. The correctness of the resulting procedure will be demonstrated by means of several well-known benchmark problems of computational contact mechanics.

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