

Isogeometric Topological Shape Optimization Using Level Set Method

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In isogeometric approach, a geometric model is easily converted to an isogeometric analysis model without loss of higher order geometric information such as normal vector and curvature. Nevertheless, the isogeometric method has a difficulty of topological shape variations due to the tensor product nature of the NURBS. In the isogeometric framework, we employ a level set method where the initial domain is kept fixed and its boundary is represented by an implicit moving boundary embedded in the level set function that could facilitate to handle complicated topological shape changes. The limitation of tensor-product patches can be resolved by modeling voids using Heaviside enrichment. Even in a single patch, continuous stress fields as well as discontinuous displacement fields can be obtained. Due to the use of implicit moving boundary, it is easy to represent the topological shape variations, where the overall shape is controlled by outer control points.

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