Trimming and Local Refinement for Isogeometric Shells Analysis

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ABSTRACT

The Isogeometric B-Rep analysis of shells reduces the gap between geometric design and numerical analysis, allowing for computations on the exact geometry [1]. However, accurate simulations require a proper handling of trimmed surfaces. Moreover, small geometric features or localized mechanical responses demand for higher discretization accuracy in selected areas.

In this work we show how Kirchhoff-Love shell analysis can be performed efficiently by combining local refinement techniques together with immersed boundary methods. In particular, we use Hierarchical B-Splines to locally refine the mesh in an effective, yet simple way. This is combined with the Finite Cell Method (FCM) [2] to capture the trimmed geometry. High accuracy is achieved by employing conforming integration domains [3], without distorting the element shape.

In conclusion, we show how these methodologies can create a powerful tool for the integration of design and analysis of B-Rep shell models.

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