Constructing high-quality parameterization of computational domain by boundary reparameterization

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High-quality construction of analysis-suitable parameterization for computational domain plays an important role in isogeometric analysis. Reparameterization can improve the distribution of isoparametric structure without changing the geometry. In this paper, using the boundary reparameterization method, we propose a new approach to construct high-quality parameterization of computational domain with rational Bézier form, which is the fundamental element in 2D and 3D isogeometric analysis using NURBS or T-splines. The inner control points and weights can be obtained by constraint optimization method with high-quality boundary parameterization. Several 2D and 3D examples are presented to illustrate the effectiveness of proposed method in planar parameterization and volumetric parameterization of computational domain in isogeometric applications.

Keywords: Isogeometric analysis, Analysis-suitable parameterization, Boundary reparameterization, Rational Bézier volume