

COLLOCATED ENRICHMENT FOR ISOGEOMETRIC ANALYSIS OF ELLIPTIC BOUNDARY VALUE PROBLEMS WITH SINGULARITIES

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For isogeometric analysis [3] (IGA) of elliptic problems containing singularities, Oh et al. [1] introduced three enrichment methods: the corner points enrichment, crack face enrichments and partition of unity enrichment. In the paper [1], NURBS basis functions for IGA were enriched by adding the enriching singular functions, constructed through mapping techniques introduced in [2]. Enriched IGA effectively handle the singularity problems and yields highly accurate numerical solutions of elliptic boundary value problems containing singularities. Moreover, the variation diminishing property of NURBS basis functions yields a stable convergence to enriched IGA of high order. Since enriching singular functions are implicitly included in the bilinear form of Galerkin IGA, the special cares for the integrations of singular functions are not necessary. However, handling the integrals of the product of enriching functions and background NURBS basis functions is complicated tasks encountered in the enriched IGA. In order to reduce this difficulty, we investigate enriched IGA in collocation approach. Numerical examples show that the collocation enriched IGA yields almost as accurate results as those obtained by Galerkin enriched IGA in less computing time.

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