Weighted quadrature scheme for hierarchical B-splines

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Gauss-Legendre quadratures are one of the most preferred choices for numerical integration in finite element methods (FEM). In recent years there has been a renewed interest in designing efficient quadrature schemes for isogeometric FEM, which should additionally exploit inter-element continuity between shape functions. One of the prominent techniques are the so-called weighted quadratures [1], designed for B-splines on tensor-product meshes.

In this work we focus on extending the results from [1] to locally refinable meshes. Namely, for hierarchical B-spline spaces [2] we propose an efficient algorithm for computing Galerkin system matrices using the weighted quadratures. The cost of the proposed algorithm depends linearly on to the number of degrees of freedom and has a favorable dependence also with respect to the spline degree. Performance of the method is supported by numerical tests.

References

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