

Fast formation of isogeometric Galerkin matrices by weighted quadrature: algorithmic details and numerical validation

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ABSTRACT

Weighted quadrature is a novel approach that aims at reducing the computational effort of assembling isogeometric Galerkin matrices. In this approach, the approximation of the integrals is performed by incorporating the test function in the quadrature weights, while the trial function, the geometry parametrization and the PDE coefficients form the integrand function. When combined with sum-factorization, which exploits the tensor structure of the basis functions, this approach yields an asymptotic complexity of order $O(Np^{d+1})$, where d is the physical dimension of the problem, p is the spline degree and N is the number of degrees of freedom. In this talk we focus on the algorithmic details and show numerical experiments that confirm the potential of this approach.

REFERENCES

- [1] F. Calabró, G. Sangalli and M. Tani, *Fast formation of isogeometric Galerkin matrices by weighted quadrature*, Comput. Methods Appl. Mech. Engrg. (2016).