

# The use of Weighted Quadrature in the Galerkin IsoGeometric Method Formation and Assembly.

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## ABSTRACT

In this talk we present recent advances on the construction for the new formation and assembly strategy proposed in [1]. In this paper, the major conceptual change of paradigm with respect to the standard implementation is the idea of using weighted quadrature: if the test function is incorporated in the integration weight while the trial function, the geometry parametrization and the PDEs coefficients are taken as the integrand function, then this approach is very effective in reducing the computational cost.

The novelty that we introduce consists in the construction and use of Gaussian weighted rules. The construction of such rules is done via the resolution of the nonlinear exactness conditions and leads to rules with optimal number of nodes.

Finally we show via benchmark tests that the optimal order of approximation of the method and the accuracy of full Gauss quadrature is maintained while the computational burden of forming the matrix equations is significantly reduced.

## REFERENCES

- [1] Calabrò, F. and Sangalli, G. and Tani, M. (2017) Fast formation of isogeometric Galerkin matrices by weighted quadrature, *Comput. Methods Appl. Mech. Engrg.*, **316**, 606–622.