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Flexible weights for high order Whitney forms

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We consider the interpolation of fields in $P_r^- \Lambda^k(T)$, the finite element spaces of trimmed polynomial k-forms of arbitrary degree $r \geq 1$, see [2], from their *weights*, see [4], namely their integrals $\int_s \omega$ on k-chains $s \in \mathcal{S}_r^k(T)$ supported in T. These integrals have a clear physical interpretation, such as circulations along curves, fluxes across surfaces, densities in volumes, depending on the value of k. This construction hinges on an appropriate choice of the set of chains $\mathcal{S}_r^k(T)$, which we call *small simplices* [4], in order to guarantee unisolvence [3] and minimality [1].

In this presentation, for $k = 1$, we rely on the flexibility of the weights with respect to their geometrical support to study different sets $\mathcal{S}_r^1(T)$ of 1-chains s, for a high order interpolation of differential 1-forms ω in the space $P_r^- \Lambda^1(T)$, constructed starting from good sets of nodes for a high order multi-variate polynomial representation of scalar fields, that are 0-forms. We analyse the growth of the generalized Lebesgue constant with the degree r and preliminary numerical results for edge elements support the nonuniform choice, in agreement with the well-known nodal case.

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