H1-CONFORMINGFINITE ELEMENT COCHAIN COMPLEXES ON CARTESIAN MESHES

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In recent years considerable effort was put into the development of H1-conforming methods with exact divergence constrains in two and three dimensions. This talk, instead, is concerned with the full finite element cochain complex.

The starting point is the one-dimensional H1-conforming finite element cochain complex based on cubic polynomials with Hermitian interpolation. Based on the tensor product construction, we obtain H1-conforming finite element spaces Vk on Cartesian meshes of arbitrary order n. In particular, for each finite element form uh ∈ Vk ⊂ H1Λk, its exterior derivative fulfills duh ∈ Vk+1 ⊂ H1Λk+1.

Moreover, commuting interpolation operators for differentiable functions as well as commuting quasi-interpolation operators that are continuous in L2 are provided.

The construction of the H1-conforming finite element cochain complex and the corresponding commuting quasi-interpolation operators is then extended to higher order polynomial spaces.

REFERENCES

[1] F. Bonizzoni and G. Kanschat, H1-conforming finite element cochain complexes and commuting quasi-interpolation operators on cartesian meshes. Calcolo, Vol.58(18), 2021.