

SMOOTHED PROJECTIONS IN FINITE ELEMENT EXTERIOR CALCULUS

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Differential forms and exterior calculus represent an area of growing importance for the understanding of the finite element method. Instead of considering the design of discrete approximations for each particular problem separately, it has proved beneficial to simultaneously study approximations of an entire differential complex. A key tool in the stability theory of such approximations is the existence of projection operators, which connect the continuous and discrete complexes and commute with the exterior derivative. However, a difficulty in the classical approach is that the canonical interpolation operators, derived directly from the degrees of freedom, are not bounded in the proper Sobolev spaces. Therefore, the theory is forced to rely on extra regularity. The construction of smoothed projections, which are properly bounded and commute with the exterior derivative, represents an alternative approach.

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