FINITE ELEMENT QUASI-INTERPOLATION AND BEST APPROXIMATION

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ABSTRACT. We devise and analyze quasi-interpolation operators for scalar- and vector-valued finite element spaces constructed on affine, shape-regular meshes with some continuity across mesh interfaces. These operators are L^1-stable, leave the corresponding finite element space point-wise invariant, whether homogeneous boundary conditions are imposed or not, and, assuming regularity in the fractional Sobolev spaces $W^{s,p}$ where $p \in [1,\infty]$ and s can be arbitrarily close to zero, they give optimal local approximation estimates in any L^p-norm. The theory is illustrated on H^1-, $H(\mathrm{curl})$- and $H(\mathrm{div})$-conforming spaces. More details can be found in [1, 2].

Keywords: Quasi-interpolation, Finite Elements, Best Approximation

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REFERENCES

[1] A. Ern and J.-L. Guermond. Finite element quasi-interpolation and best approximation. Technical Report `http://arxiv.org/abs/1505.06931`, arXiv, 2015.

[2] Mollification in strongly Lipschitz domains with application to continuous and discrete de Rham complex. Technical Report `http://arxiv.org/abs/1509.01325`, arXiv, 2015. To appear in *Comp. Methods Appl. Math.*

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