On Multiple-Level Constrained Approximation in the *hp*-FEM

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In this paper we present a novel approach to constrained approximation (approximation with hanging nodes) in the *hp*-FEM. This technique, which is essential for the efficiency of all adaptive finite element codes, is nontrivial from both the mathematical and programming points of view. In most implementations, one uses a simplifying assumption called *1-irregularity rule* (adjacent elements can at most differ by one refinement level). The presented approach is free of such limitations. It is demonstrated that the absence of irregularity restrictions can make dramatical differences in the ability of adaptive *hp*-FEM to resolve small-scale phenomena as well as in its overall efficiency. Numerical examples are presented.

References

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