DISCONTINUOUS TRACE APPROXIMATION IN THE PRACTICAL DPG METHOD*

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ABSTRACT. Most variants of the DPG method with optimal test functions are based upon an ultra-weak formulation of the problem under consideration. This means that principal unknown functions (like displacements and stresses) are approximated in weaker norms than usual so that discontinuous basis functions are conforming, cf., e.g., [1, 2, 3]. The use of discontinuous approximations has obvious advantages when considering non-uniform meshes and local mesh refinements. Standard DPG theory for boundary value problems of second order requires, however, that approximations of traces of primal unknowns be continuous. This is due to the fact that, although primal unknowns are measured in L^2-spaces, their traces are analyzed in trace spaces of H^1-functions, cf. [1]. The numerical results presented by Demkowicz and Gopalakrishnan in [1] use conforming approximations, thus need continuous basis functions to approximate the trace $\hat{u}$ of the principal unknown u. However, in the preprint version of [1], the authors report on experiments where this trace unknown is approximated by discontinuous basis functions, and no negative effects were observed.

In this talk we explain why this variational crime has no effect on the approximation of u as long as the polynomial degrees stay bounded. For more details we refer to [4].

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