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Mortar boundary elements*

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Abstract

Recently we started investigating non-conforming boundary element methods. The first paper [1] deals with the incorporation by Lagrangian multipliers of essential boundary conditions at the border of open surfaces in trace spaces of H^1. The second paper [2] analyzes the use of Crouzeix-Raviart elements for the discretization of hypersingular operators. Although in both cases there are no well-posed continuous formulations we proved that the discrete schemes converge almost quasi-optimally, that is, standard *a priori* error estimates are perturbed only by logarithmic terms.

In this talk we deal with the more general case of domain decomposition in trace spaces of H^1 where continuity of approximating functions across interfaces is incorporated in a weak discrete sense. This strategy gives huge flexibility for discretizations which can be almost independent in individual sub-domains. Such a discretization is well-known for finite elements and is called mortar method. We consider this domain decomposition method for the discretization of hypersingular integral equations, prove its almost quasi-optimal convergence and present numerical results to underline the theory.

References

[1] Gatica, G.N., Healey, M. and Heuer, N., *The boundary element method with Lagrangian multipliers*. Accepted for publication in Numerical Methods for Partial Differential Equations.

[2] Heuer, N. and Sayas, F.-J., *Crouzeix–Raviart Boundary Elements*. Report 07/5, BICOM, Brunel University, 2007.

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