BLOCK-JACOBI PRECONDITIONERS FOR LOCAL MULTI-TRACE FORMULATIONS

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Abstract. Local Multi-Trace Formulations (local MTF) are block-sparse boundary integral equations adapted to elliptic PDEs with piece-wise constant coefficients (typically multi-subdomain scattering problems) only recently introduced in [1]. In these formulations, transmission conditions are enforced by means of local operators, so that only adjacent subdomains communicate. Although they provide an appealing framework for domain decomposition, present literature only offers two contributions in this direction. In [2] a new version of local MTF is proposed that involves a relaxation parameter in the enforcement of transmission conditions. In [3] the authors conduct a basic explicit study of this modified local MTF in a 1-D setting with 2 subdomains and determine a critical value for the relaxation parameter that minimises the spectral radius of block-Jacobi iteration operators.

In the present talk we describe new contributions [4, 5] extending these results to arbitrary geometrical settings in 2-D and 3-D, only assuming that the subdomain partition does not involve any junction point. In the simplified case where material characteristics of all subdomains equal, we can conduct a full spectral analysis of the MTF operators.

Keywords: Multitrace formulations, Calderón projectors, Dirichlet-to-Neumann operators, optimal Schwarz methods.

Mathematics Subject Classifications (2010): 65M55, 65F10, 65N22.

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