

Quasi-local multi-trace formulations

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In the context of time harmonic wave scattering by piecewise homogeneous penetrable objects, we present a new variant of the multi-trace boundary integral formulations (MTF). This new approach differs from the so-called “local” MTF by the presence of regularisation terms involving boundary integral operators and localised at junctions i.e. points where at least three subdomains abut. It lends itself to much more standard analysis: all operators are continuous in standard Sobolev trace spaces, a Garding inequality can be proved, which implies quasi-optimal approximation property for conformal Galerkin discretisations. As regards numerical performances, this new formulation also appears slightly more accurate compared to pre-existing MTF, while the speed of convergence of iterative solvers remains comparable.

References:

[1] X.Claeys, Quasi-local multi-trace boundary integral formulations, Numer. Methods Partial Differential Equations, 31(6):2043–2062, 2015.

[2] X.Claeys and R. Hiptmair and C. Jerez-Hanckes, Multi-trace boundary integral equations, chapter in Direct and Inverse Problems in Wave Propagation and Applications, 51–100, Radon Ser. Comput. Appl. Math., 14, De Gruyter, Berlin, 2013.

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