HIGH-ORDER GALERKIN METHOD FOR HELMHOLTZ AND LAPLACE PROBLEMS ON MULTIPLE OPEN ARCS

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Abstract. We present a spectral numerical scheme for solving Helmholtz and Laplace problems with Dirichlet boundary conditions on a finite collection of open arcs in $\mathbb{R}^2$. An indirect boundary integral method is employed, giving rise to a first kind formulation whose variational form is discretized using weighted Chebyshev polynomials. Well-posedness of both continuous and discrete problems is established as well as spectral convergence rates under the existence of analytic maps to describe the arcs. In order to reduce computation times, a simple matrix compression technique based on sparse kernel approximations is developed. Numerical results provided validate our claims.

Keywords: Boundary integral equations, spectral methods, screens, disjoint domains, matrix compression

Mathematics Subject Classifications (2010): 65R20, 65F35, 65N22, 65N38

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