Operator adapted BEM for the Helmholtz equation

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ABSTRACT

The Helmholtz equation is a fundamental equation when treating wave propagation problems in a time-harmonic setting. In particular, when the Helmholtz equation is considered in a exterior domain, as is typically the case in scattering problems, a numerical method based on an integral equation is an attractive option, leading to boundary element methods (BEMs). At high frequencies/wavenumbers, such methods face several challenges that arise from the highly oscillatory nature of the sought solution and the kernels of the integral operators. In this talk, we will discuss specialized approximation spaces that incorporate the oscillatory structure of the solution, and we will present quadrature schemes that are able to cope with highly oscillatory integrands. The resulting method lead to almost wavenumber-robust methods.