WAVENUMBER-EXPLICIT BOUNDS FOR FIRST KIND INTEGRAL EQUATIONS IN WAVE SCATTERING.

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There has been significant interest in the derivation of wavenumber-explicit bounds for the inverses of operators arising in the boundary integral equation formulation of time-harmonic scattering problems, when the scatterer is a bounded Lipschitz domain (see e.g. [1, 2]). In the first part of this talk, we will obtain such bounds for the interior Dirichlet to Neumann map. Building on results from [2], we prove that the norm of the inverse of the boundary single-layer potential operator grows at worst as a polynomial function of the wavenumber, provided that a set of positive wavenumbers of arbitrarily small Lebesgue measure is excluded. This result holds even in cases where the exterior of the obstacle is strongly trapping, and although the integral equation fails to be uniquely solvable at every Dirichlet eigenvalue of the domain.

[1] S. N. Chandler-Wilde, E. A. Spence, A. Gibbs, and V. P. Smyshlyaev.
High-frequency bounds for the Helmholtz equation under parabolic trapping and applications in numerical analysis. SIAM Journal on Mathematical Analysis, 2020.

[2] D. Lafontaine, E. A. Spence, and J. Wunsch.
For most frequencies, strong trapping has a weak effect in frequency-domain scattering. Communications on Pure and Applied Mathematics, 2021.