Integral equation methods in inverse obstacle scattering with a generalized impedance boundary condition

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The inverse problem under consideration is to reconstruct the shape of an impenetrable obstacle with a generalized impedance boundary condition from the far field pattern for scattering of time-harmonic acoustic plane waves. We propose an inverse algorithm that extends the approach suggested by Johansson and Sleeman (2007) for the case of the inverse problem for a sound-soft scatterer. It is based on a system of nonlinear boundary integral equations associated with a single-layer potential approach to solve the forward scattering problem which extends the integral equation method proposed by Cakoni and Kress (2013) for a related boundary value problem for the Laplace equation. In addition, we also present an algorithm for reconstructing the impedance function when the shape of the scatterer is known. We discuss the mathematical foundations of the methods and exhibit their feasibility by numerical examples.

References

[1] R. Kress, *Integral equation methods in inverse obstacle scattering with a generalized impedance boundary condition.* In: Contemporary Computational Mathematics – a celebration of the 80th birthday of Ian Sloan (J. Dick, F. Y. Kuo, H. Wozniakowski, eds.), Springer, 2018.