Reconstructing Small Perturbations of Scatterers from Electric or Acoustic Far-Field Measurements

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Abstract

We consider the problem of determining the boundary perturbations of an object from far-field electric or acoustic measurements. Assuming that the unknown object boundary is a small perturbation of a circle, we develop a linearized relation between the far-field data that result from fixed Dirichlet boundary conditions, entering as parameters, and the shape of the object, entering as variables. This relation is used to find the Fourier coefficients of the perturbation of the shape and makes use of an expansion of the Dirichlet-to-Neumann operator.