On the inverse scattering problem with uncertainties

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SUMMARY

We focus on the inverse obstacle reconstruction problem, commonly known as the "inverse scattering problem", which aims to determine the shape of an object using radar measurements. This problem has significant applications in geoscience, medical imaging and non-destructive testing. Over recent years, many techniques have been investigated to study this problem, such as those in [1], [2] and [3]. In that work, we employ shape optimization methods, which have the advantage of not requiring movement to recover the object. To enhance the robustness of the method, we will address the inverse problem under uncertainties by minimizing the moments of the Kohn-Vogelius functional.

We start by theoretically studying the problem and the underlying equation, namely the Helmholtz equation, and then proceed with numerical experiments to show the method's feasibility and importance.

Keywords: inverse scattering, shape optimization, robust method, Nesterov scheme, Kohn-Vogelius functional

AMS Classification: 49Q10, 35R30, 65N21

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