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Multilevel sampling method for reconstructing the support of quantum potential. (Chinese. English summary) Zbl 07448526

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Summary: In this paper, we propose a multilevel sampling method to reconstruct the support of potential in stationary Schrödinger equation from the near field scattered data. To identify the location of scatterers in inverse scattering problem, we usually need to locate in prior some approximate domains containing all the scatterers. Otherwise, an approximate domain with much larger size than that of the actual scatterers has to be used, which will lead to huge extra computations. The multilevel sampling method proposed here, which is simple and effective, facilitates to find the location and the shape of the support of potential. The indicator function in this method only involves the operations of matrices and vectors and is easy to implement numerically. The numerical examples show that in general the near field data corresponding to a couple of incident directions and a few iterations are sufficient to obtain satisfactory reconstructions.

MSC:

78A46 Inverse problems (including inverse scattering) in optics and electromagnetic theory
81U40 Inverse scattering problems in quantum theory
35Q55 NLS equations (nonlinear Schrödinger equations)

Keywords:

multilevel sampling method; stationary Schrödinger equation; quantum potential; near field data

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