

A fast direct imaging method for the inverse obstacle scattering problem with nonlinear point scatterers

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We consider the scattering of a time-harmonic plane wave by heterogeneous media consisting of linear or nonlinear point scatterers and extended obstacles. The generalized Foldy--Lax formulation takes fully into account of the multiple scattering by the complex media, and provides a fast way to solve the forward scattering problem. We construct a migration-type imaging function and use an FFT-based algorithm to reconstruct the shape of the extended obstacles. The nonlinear point scatterers can be used to excite high harmonic waves so that enhanced imaging resolution can be achieved.