Frequency domain wave equation imaging

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Abstract

We study numerical methods for the inverse Helmholtz problem. The methods are based on the Kaczmarz procedure of computerized tomography, combined with fast marching schemes for the Helmholtz equation. We solve the fully nonlinear problem, i. e. we do not resort to linearizations such as Born or Rytov. We demonstrate the efficacy of the methods with numerical examples from ultrasound mamography. We derive a heuristic condition for the initial guess that implies convergence.