A new formulation of the linear sampling method: spatial resolution and post-processing

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Abstract

A new formulation of the linear sampling method is described, which requires the regularized solution of a single functional equation set in the direct sum of L^2 spaces. This new approach presents the following notable advantages: it is computationally more effective than the traditional implementation, since time consuming samplings of the Tikhonov minimum problem and of the generalized discrepancy equation are avoided; it allows a quantitative estimate of the spatial resolution achievable by the method; it facilitates a post-processing procedure for the optimal selection of the scatterer profile by means of edge-detection techniques. The formulation is described in a two-dimensional framework and in the case of obstacle scattering although generalizations to three dimensions and penetrable inhomogeneities are straightforward.