Sampling Methods for Inverse Scattering in Frequency and Time Domain

Armin LECHLEITER, INRIA Saclay–Ile-de-France/Ecole Polytechnique

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The shape of a scattering object can be theoretically characterized and numerically computed from measurements of scattered waves using so-called sampling methods. Such methods evaluate an indicator function of the support of the obstacle at a given set of sampling points to compute a picture of the scattering object. The advantage of this class of methods over, e.g., non-linear optimization methods is that the indicator function building the core of these methods can be directly computed from measured data. Therefore, sampling methods are very fast when compared to "traditional" methods that need to solve partial differential equations to tackle the underlying inverse problem.
Sampling methods for inverse scattering problems have been introduced and investigated in the last 10 years in the frequency domain, thus considering time-harmonic waves. In this talk, we show how to extend these methods to the time domain. The time domain formulation has the advantage to naturally incorporate multiple frequencies, while still sharing the advantagous features of its frequency domain counterpart. We demonstrate numerically that this feature improves reconstructions in situations where the frequency domain method does not yield good reconstructions, e.g., for limited aperture data.

Références

[1] Qiang Chen, Houssem Haddar, Armin Lechleiter and Peter Monk, *A Sampling Method for Inverse Scattering in the Time Domain*, preprint, 2010.

Armin LECHLEITER, INRIA Saclay–Ile-de-France/Ecole Polytechnique, CMAP, Route de Saclay, 91128 Palaiseau Cedex, France
alechle@cmap.polytechnique.fr