

1107-45-210

Hatim Farouq Alqadah* (hatim.alqadah.ctr@nrl.navy.mil), 4555 Overlook Avenue, SW,
Washington, DC 20375-5320. *A Compressive Multi-Frequency Linear Sampling Method.*

The linear sampling method (LSM) is a qualitative inverse scattering technique that circumvents the non-linearity of the inverse scattering problem to reconstruct the support of a scatterer without the need to resort to any linearizing wave approximations. The method relies on computing approximate solutions to a set of Fredholm integral equation of the first kind which we refer to as the Herglotz density. In this work we discuss a multi-frequency variant of the LSM which aims to provide improved stability for reconstructing the Herglotz density, particularly in the case of limited and under-sampled observation aperture data. We show that when the frequency step-size is small enough the total frequency variation of the Herglotz density is well approximated by a sparse vector where the non-zero entries correspond to the interior modes of the scatterer within the bandwidth. This result motivates the use of sparse regularization techniques for inverting the far-field equations. We discuss the use of ℓ_1 minimization algorithms for computing this minimum frequency variation solution. Imaging results using numerically computed forward scattering data will be presented. (Received January 15, 2015)