Adaptive interferometric imaging

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Abstract

The problem of imaging objects embedded in randomly inhomogeneous media (clutter) is considered. To solve this problem, we propose an adaptive array imaging method based on a space-time interferometric functional. The key idea is to exploit systematically the coherence in the data by calculating cross-correlations of the recorded echoes at the array, over carefully chosen space-time windows. The adaptivity of our approach resides in the estimation of two medium dependent parameters that determine the window sizes. Our method provides statistically stable images, that is, images that do not depend on the particular realization of the clutter. Due to the presence of the clutter however, the image we obtain is a blurry version of the real object. When data for a probe target at a known location are available the blurring Kernel can be estimated and sharper images can be obtained by deblurring. We illustrate the robustness of our method with numerical simulations.

This is joint work with L. Borcea (Rice University, USA) and G. Papanicolaou (Stanford University, USA)