Inverse Problems Network Meeting 3

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Abstract of Talk

AN OVERVIEW OF THE LINEAR SAMPLING METHOD IN THE TIME DOMAIN AND ITS ANALYSIS FOR IMAGING PENETRABLE OBSTACLES

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This is joint work with F. Cakoni (University of Rutgers) and P. Monk (University of Delaware).

We consider the problem of locating and reconstructing the geometry of an obstacle from time domain measurements of causal waves. More precisely, we assume that the incident fields are due to causal point sources placed on a surface, and that the corresponding scattered fields are measured on the same surface. To determine the position and shape of the target from such multi-static scattering data, we propose to apply the Time Domain Linear Sampling Method (TDLSM).

We start by motivating this inverse problem in different scenarios, such as acoustic waveguides, and showing the performance of TDLSM there. We then focus on the case of a penetrable obstacle and explain the difficulties arising in the analysis of the TDLSM. In this respect, we propose a new study of the TDLSM based on localizing the interior transmission eigenvalues in the Fourier-Laplace domain; by doing so, we prove that the TDLSM for penetrable targets has similar blow-up properties to its usual frequency domain version. We also prove new time domain estimates for the forward problem and the interior transmission problem, as well as analyze several time domain operators arising in the inversion scheme.