

Parametrix for the inverse source problem of thermoacoustic tomography with reduced data

Speaker: Leonid Kunyansky, University of Arizona, Tucson

Abstract: We consider the inverse source problem of thermo- and photoacoustic tomography, with data registered on an open surface partially surrounding the source of acoustic waves. Our goal is to find efficient non-iterative solutions to this problem.

I will present two different methods. Mostly I will present a novel procedure based on solving the exterior Dirichlet problem and computing the Radon transform of the solution. This technique works under assumption of a constant speed of sound. I will also briefly discuss a method based on modifying the time-reversed solution by two Hilbert transforms, one in time and one in a certain spatial variable. This techniques works for a smooth known speed of sound, subject to an additional geometric condition.

Both techniques produce accurate approximations to the sought initial condition, with the error being an infinitely smooth function. In addition, our numerical simulations demonstrate that such error is quite small in practical terms.

(Joint work with M. Eller and P. Hoskins)