A new time reversal technique for photo-acoustic tomography in a cavity

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We consider the mathematical model of photoacoustic tomography in a cavity. It is modeled by the inverse problem of a wave equation with the zero Neumann boundary condition. The measured data is the trace of the solution on a part of the boundary. The function to be reconstructed is the initial value of the solution. We propose a Neumann series reconstruction formula, which converges exponentially when the geometric control condition holds. Moreover, the first term of the series converges to the function to be reconstructed exponentially when the observation time goes to infinity. Therefore, the first term of the series is a good approximate reconstruction when the observation time is large enough.

This is a joint work with Leonid Kunyansky.