

# A modified time reversal method and inverse problems for wave equation

Matti Lassas

Institute of Mathematics, Helsinki University of Technology

Matti.Lassas@hut.fi

## **Abstract**

A novel method to solve inverse problems for the wave equation is introduced. The method is a combination of the boundary control method and an iterative time reversal scheme, leading to adaptive imaging of coefficient functions of the wave equation using focusing waves in unknown medium. The approach is computationally effective since the iteration lets the medium do most of the processing of the data. The iterative time reversal scheme also gives an algorithm for approximating a given wave in a subset of the domain without knowing the coefficients of the wave equation. These results are obtained in collaboration with Kenrick Bingham, Yaroslav Kurylev, and Samuli Siltanen.

Also, we will discuss how the energy of a wave can be focused near a single point in an unknown medium. These results are done in collaboration with Matias Dahl and Anna Kirpichnikova.