

Technical University of Denmark



## Bounds on the stably recoverable information for the Helmholtz equation in R2

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## CT-2: Contributed talk, Session 2

SCHEDULED: TBA

ORGANIZERS: Valter Pohjola, *University of Jyväskylä*

### TALKS 1. Borg-Levinson theorems for unbounded potentials

DETAILS: Valter Pohjola, *University of Jyväskylä*

ABSTRACT. The Borg-Levinson problem consists of showing that Dirichlet eigenvalues and Neumann boundary data of the corresponding eigenfunctions of the operator  $-\Delta + q$ , determine the potential  $q$ . We will discuss this result in the case where  $q \in L^{n/2}(\Omega, \mathbb{R})$  and  $n \geq 3$ . We also discuss the case of incomplete spectral data, in the sense that the above spectral data is unknown for some finite number of eigenvalues. In this case we will consider potentials  $q, q \in L^p(\Omega, \mathbb{R})$  with  $p = n/2$ , for  $n \geq 4$  and  $p > n/2$ , for  $n = 3$ .

### 2. Edge detection in electrical impedance tomography

Matteo Santacesaria, *Politecnico di Milano*

ABSTRACT. In this talk we will present a new imaging method able to reconstruct discontinuities (e.g. edges of inclusions) of an electrical conductivity from boundary voltage and current measurements. The method combines the high contrast sensitivity of Electrical Impedance Tomography with improved spatial resolution obtained through introduction of a nonphysical (virtual) variable. This talk presents the theoretical background of the method as well as numerical reconstructions. This is a joint work with A. Greenleaf, M. Lassas, S. Siltanen and G. Uhlmann.

### 3. Bounds on the stably recoverable information for the Helmholtz equation in $\mathbb{R}^2$

Mirza Karamehmedović, *Technical University of Denmark*

ABSTRACT. Linearisation casts inverse boundary problems in terms of inverse source problems (ISP). For the ISP with the two-dimensional Helmholtz equation, the singular value decomposition of the forward operator reveals a sharp cutoff in the stably recoverable information. We prove and numerically validate lower and upper bounds on this cutoff. Our result explicitly links the amount of stably recoverable information with the size parameter of the problem and with the zeros of the Bessel functions  $J_m$  and  $Y_m$ .

### 4. Semiclassical analysis of elastic surface waves

Jian Zhai, *Rice University*

ABSTRACT. We will give a semiclassical description of surface waves in a three-dimensional elastic medium, which is stratified near the boundary at some scale comparable to the wave length. The analysis is based on the work of Colin de Verdiere on acoustic surface waves. The description is geometric on the surface and locally spectral “beneath”. Eigenvalues of some 1D differential operator are effective Hamiltonians for surface waves in semiclassical sense. We will give a study of those differential operators. Related inverse spectral problems will be discussed.