

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Inverse Problems for Partial Differential Equations

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February 19th – February 25th, 2012

ABSTRACT. This workshop brought together mathematicians engaged in different aspects of inverse problems for partial differential equations. Classical topics such as the inverse problems of impedance tomography and scattering theory as well as new developments such as interior transmission eigenvalues were discussed.

Mathematics Subject Classification (2000): 35R30, 35R25, 35P25, 35P15, 35Q60, 35J05, 35L05.

Introduction by the Organisers

This workshop *Inverse Problems for Partial Differential Equations*, organized by Martin Hanke-Bourgeois (Mainz), Andreas Kirsch (Karlsruhe), William Rundell (College Station), and Matti Lassas (Helsinki) was held February 19th to February 25th, 2012. The participants consisted of 23 mathematicians, a nice mixture of researchers with various backgrounds. The participants were the usual international blend and a stimulating mixture of well-established mathematicians and junior scientists. For many in the group this was their first visit to Oberwolfach and, in some cases, their first time to meet each other.

Since the workshop was only a “half workshop” the organizers decided to concentrate on mainly analytical methods where questions of uniqueness and (if appropriate) existence were at the forefront. Although reconstructive methods were not in the center of our focus – also because there will be an Oberwolfach workshop with this particular emphasis later this year – most of the talks did show some illustrative reconstructions. With the smaller number of participants it was possible to have a relaxed schedule and yet allow the most of them to give a talk.

In 18 talks a wide range of aspects was covered in the study of inverse problems for partial differential equations, in particular for the wave equations in the time and frequency domain with their stationary and quasi-stationary approximations, equations from elasticity, and Maxwell's equations.

Three of the submitted talks were chosen on the spot to be highlighted as "expository presentations", which meant that the authors were given up to 90 minutes to present their paper within a broader context and a more detailed introduction to that area. The chosen topics included the celebrated cloaking problem, the various possibilities to use coupled physics imaging techniques, and the inverse helioseismology problem. All participants appreciated this kind of format as a wonderful opportunity to learn more about fascinating applications that have not yet been in the focus of their own specialized research.

All other talks were scheduled for a maximum of 50 minutes to allow for comments and discussions (and frequently the additional post-talk questions and comments took us up to the next speaker). Almost all participants attended all the lectures. A reason for the high attendance was the excellent overall quality of the talks; it is clear that all of the speakers had taken great care over the preparation and there was considerable confidence that talks were modified as the conference progressed in order to present a fresh set of ideas to the audience.

As usual, the service provided by the staff was exemplary. This plays an enormous part in the "Oberwolfach experience" and allows the participants to concentrate on the research projects only.

Workshop: Inverse Problems for Partial Differential Equations**Table of Contents**

Michael Vogelius	
<i>Electromagnetic Cloaking by Mapping of all Frequencies</i>	615
Armin Lechleiter (joint with Qiang Chen, Housseem Haddar, Simon Marmorat, Peter Monk)	
<i>Sampling Methods for Inverse Scattering Problems in the Time Domain</i>	615
Martin Simon (joint with Martin Hanke and Petteri Piiroinen)	
<i>Multilevel Bayesian reconstruction in impedance tomography</i>	617
Petteri Piiroinen (joint with Lassi Päivärinta)	
<i>Fractional Brownian motion and asymptotic Bayesian estimation</i>	620
Nuutti Hyvönen (joint with Otto Seiskari)	
<i>Electrical impedance tomography with two electrodes</i>	622
Otmar Scherzer (joint with Peter Elbau, Andreas Kirsch, Rainer Schulze)	
<i>Photoacoustic and Coupled Physics Imaging</i>	624
Jijun Liu (joint with Mourad Sini and Haibing Wang)	
<i>Inverse scattering problem for an obstacle with impedance boundary</i>	627
Bastian Harrach (joint with Lilian Arnold)	
<i>Inverse Eddy Current Problems</i>	630
Johannes Elschner (joint with Guanghui Hu)	
<i>Inverse scattering of elastic waves by diffraction gratings</i>	633
Peter Monk (joint with Virginia Selgas)	
<i>An Inverse Problem for a Waveguide</i>	634
John Sylvester	
<i>Transmission Eigenvalues in One Dimension</i>	635
Lauri Oksanen	
<i>Solving an inverse scattering problem in the time domain by using the iterative time-reversal control method</i>	637
Roland Griesmaier (joint with Martin Hanke and Thorsten Raasch)	
<i>Inverse source problems for the Helmholtz equation and the windowed Fourier transform</i>	640
Thorsten Hohage (joint with Laurent Gizon)	
<i>Inverse Problems in Local Helioseismology</i>	643
Rainer Kress (joint with Housseem Haddar)	
<i>Conformal mapping and inverse scattering</i>	645

Bo Zhang (joint with J. Yang, H. Zhang)	
<i>The factorization method for reconstructing a penetrable obstacle with unknown buried objects</i>	649
Fioralba Cakoni (joint with David Colton and Housseem Haddar)	
<i>Transmission Eigenvalues in Inverse Scattering Theory</i>	652
Samuli Siltanen (joint with Kim Knudsen, Matti Lassas and Jennifer L. Mueller)	
<i>Electrical impedance imaging using nonlinear Fourier transform</i>	655