CONTEMPORARY MATHEMATICS

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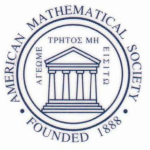
Inverse Problems: Theory and Applications

INdAM Workshop on
Inverse Problems and Applications
June 3–9, 2002
Cortona, Italy

Special Session at
AMS-UMI First Joint International Meeting on
Inverse Boundary Problems and Applications
June 12–16, 2002
Pisa, Italy

Giovanni Alessandrini
Gunther Uhlmann
Editors



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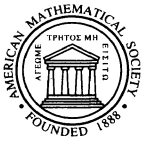

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Preface

This volume consists of the Proceedings of the Workshop on *Inverse Problems and Applications* organized by the Istituto Nazionale di Alta Matematica *Francesco Severi* (INdAM), which was held in Cortona, Italy, June 3–9, 2002 and of the Special Session *Inverse Boundary Problems and Applications* held at the First Joint Meeting of the American Mathematical Society and of the Unione Matematica Italiana, Pisa, Italy, June 12–16, 2002.

One of the main objectives of the workshops was to interchange ideas and encourage interaction between American and Italian scientists interested in Inverse Problems.

Inverse Problems arise in practical situations such as medical imaging, exploration geophysics, and non-destructive evaluation where measurements made in the exterior of a body are used to deduce properties of the hidden interior. A large class of inverse problems arise from a physical situation modeled by a partial differential equation. The inverse problem is to determine some coefficients of the equation given some information about the solutions. Analysis of such problems brings together diverse areas of mathematics such as complex analysis, differential geometry, harmonic analysis, integral geometry, microlocal analysis, numerical analysis, optimization, partial differential equations, probability etc. and is a fertile area for interaction between pure and applied mathematics. This interplay is well represented during these proceedings where several theoretical and applied aspects of inverse problems are considered.

This book includes articles on a broad range of inverse problems including the inverse conductivity problem, inverse problems for Maxwell's equations, time reversal mirrors, ultrasound using elastic pressure waves, inverse problems arising in the environment, inverse scattering for the three body problem and optical tomography. This volume also include several articles on unique continuation, a closely related subject to inverse problems, as well as the study of propagation of singularities for hyperbolic equations in anisotropic media.

We thank INdAM for the support of the Cortona Workshop, we also acknowledge additional support from the Ministero dell'Istruzione, dell'Università e della Ricerca (National Research Project 2000 *Inverse problems in medical imaging*) and from the Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni of INdAM (Progetto di Ricerca e Formazione 2001 *Problemi Inversi*).

Furthermore we thank all the participants for their contributions to these successful and enjoyable workshops. We are grateful also to the referees for their prompt and attentive reports.

The Editors

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This volume is suitable for graduate students and research mathematicians interested in inverse problems and applications.

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