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Inverse Problems in Wave Propagation

With 100 Illustrations

Springer

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FOREWORD

This IMA Volume in Mathematics and its Applications

INVERSE PROBLEMS IN WAVE PROPAGATION

is based on the proceedings of a very successful two-week workshop with the same title, which was an integral part of the 1994–1995 IMA program on "Waves and Scattering." We would like to thank Jan Achenbach, Guy Chavent, George Papanicolaou, Paul Sacks, Kennan T. Smith and William Symes for their excellent work as organizers of the meeting. We would like to express our further gratitude to Chavent, Papanicolaou, Sacks and Symes, who served as editors of the proceedings.

We also take this opportunity to thank the National Science Foundation (NSF), the Army Research Office (ARO) and the Office of Naval Research (ONR), whose financial support made the workshop possible.

Avner Friedman

Robert Gulliver

PREFACE

The Workshop on Inverse Problems in Wave Propagation took place from March 6 through 17, 1995, as part of the 1994–95 IMA academic year program on **Waves and Scattering**. This workshop was one of the largest in IMA history, with over 180 attendees.

Inverse problems in wave propagation originate in the notion that mechanical or electromagnetic waves interact with or scatter from material heterogeneities and propagate the information thus encoded over great distances. Therefore it should be possible to extract some information about distant structural features from the measurements of scattered waves. Tasks of this nature arise in exploration, crustal, and whole-Earth geophysics; ocean acoustics, civil and environmental engineering, ultrasonic nondestructive testing, biomedical ultrasonics, radar, solar astrophysics, and other areas of science and technology.

Workshop topics, and contributions to this volume, represent most of these scientific and technical topics, together with fundamental mathematical investigations of the relation between waves and scatterers. The interpenetration of contemporary mathematical analysis and computational methods with physics and engineering, and the interchange of ideas between various areas of applied science, is a very exciting characteristic of this subject, as will become apparent to the reader of this volume.

The organizers thank Avner Friedman, Bob Gulliver, and the staff of IMA for their usual superb conference management, which contributed greatly to a successful meeting on this very active subject.

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