

volume 161

lecture notes in pure and applied mathematics



spectral and scattering theory

edited by
Mitsuru Ikawa



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about the book

This useful volume, based on the Taniguchi International Workshop held recently in Sanda, Hyogo, Japan, discusses **current problems** and offers the most **up-to-date methods** for research in spectral and scattering theory.

Written by world-renowned experts and providing proofs in each chapter, *Spectral and Scattering Theory* examines tunneling effects and the $W^{k,p}$ -continuity of scattering matrices ... the uniqueness theorem, eigenfunctions, Stark effects, and semiclassical asymptotics in Schrödinger equations of many-body systems ... nonlinear periodic Schrödinger equations and Toda lattice equations ... scattering poles of acoustic equations and the scattering of elastic equations ... Klein-Gordon-Zakharov equations ... nonlinear dynamics ... the stationary phase method for spaces of large dimension ... micro-local analysis in domains with corners and edges ... and more.

With nearly **1200** bibliographic citations, figures, and display equations, *Spectral and Scattering Theory* is an excellent resource for mathematicians, mathematical analysts, physicists, theoretical engineers, and upper-level undergraduate, graduate, and continuing-education students investigating partial differential equations.

about the editor ...

MITSURU IKAWA is a Professor of Mathematics at Osaka University, Japan. The author of more than 40 professional papers and book chapters, he is a member of the Mathematical Society of Japan, and serves as editor of the *Osaka Journal of Mathematics* and associate editor of the *Japanese Journal of Mathematics*. Dr. Ikawa received the B.Sc. (1965) and M.Sc. (1967) degrees in mathematics from Kyoto University, Japan, and the Ph.D. degree (1970) in mathematics from Osaka University, Japan.

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Ikawa



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proceedings of the Taniguchi international workshop

edited by
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Additional Volumes in Preparation

Preface

This volume represents the Proceedings of the Taniguchi International Workshop on Spectral and Scattering Theory held at Sanda, Hyogo, Japan. The workshop was fully supported by the Taniguchi Foundation. The organizing committee consisted of H. Tamura, K. Yajima, and M. Ikawa (Chairman).

Scattering theory dates back to the work of Lord Rayleigh. With the advent of quantum mechanics, scattering theory has received rigorous mathematical treatment and has gradually evolved into an important branch of mathematical physics. Spectral and scattering theory has applications to pure and applied mathematics.

Needless to say, spectral and scattering theory is inseparable from theories of partial differential equations and functional analysis. Nowadays, it has applications to differential geometry, to number theory via spectral theory of automorphic functions, and to engineering via inverse problems of scattering theory.

For the purpose of reviewing these applications, and of developing new areas, mainly from the viewpoints of mathematical analysis and mathematical physics, we held this international workshop. The problems considered here are:

- Spectral and scattering theory of linear and nonlinear Schrödinger operators
- Periodic Toda lattice
- Scattering poles of bounded obstacles
- Spectral theory of Laplacians in domains with corners and ends
- Inverse scattering
- Stational method on a space of large dimension

We would like to express our sincere gratitude to Mr. T. Taniguchi for his generous financial support, which made it possible to concentrate on mathematics and to fully enjoy the workshop. We would like to thank Professor K. Itô, the Coordinator of Section 1, Mathematics, Taniguchi Foundation, for his approval. This book represents the scientific activities of the workshop and we hope that these activities contribute to the development of spectral and scattering theory. We wish to note another aspect of the workshop, an atmosphere of "mutual understanding"—an ideal of Mr. Taniguchi.

We wish to thank the staff of Marcel Dekker, Inc., for showing interest in these proceedings and for their cooperation during the preparation of this volume for publication.

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