# Isospectral Transformations A New Approach To Analyzing Multidimensional Systems And Networks Springer Monographs In Mathematics

Issues in Logic, Operations, and Computational Mathematics and Geometry: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Logic, Operations, and Computational Mathematics and Geometry. The editors have built Issues in Logic, Operations, and Computational Mathematics and Geometry: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Logic, Operations, and Computational Mathematics and Geometry in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Logic, Operations, and Computational Mathematics and Geometry: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

This dissertation, "Isospectral Transformations Between Soliton-solutions of the Korteweg-de Vries Equation" by ???, Tad-ming, Lee, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: "/ s: }: /pw pxwpt a?!!Sƒr?"- DEGREES ++, r-9van -'"@"r...0/00-0/00-"& oJpprqDOI: 10.5353/th_b2986626 Subjects: Spectral theory (Mathematics) Inverse scattering transform Solitons Differential equations, Nonlinear Differential equations, Partial

This book features papers presented during a special session on dynamical systems, mathematical physics, and partial differential equations. Research articles are devoted to broad complex systems and models such as qualitative theory of dynamical systems, theory of games, circle diffeomorphisms, piecewise smooth circle maps, nonlinear parabolic systems, quadtratic dynamical systems, billiards, and intermittent maps. Focusing on a variety of topics from dynamical properties to stochastic properties of dynamical systems, this volume includes discussion on discrete-numerical tracking, conjugation between two critical circle maps, invariance principles, and the central limit theorem. Applications to game theory and networks are also included. Graduate students and researchers interested in complex systems, differential equations, dynamical systems, functional analysis, and mathematical physics will find this book useful for their studies. The special session was part of the second USA-Uzbekistan Conference on Analysis and Mathematical Physics held on August 8-12, 2017 at Urgench State University (Uzbekistan). The conference encouraged communication and future collaboration among U.S. mathematicians and their counterparts in Uzbekistan and other countries. Main themes included algebra and functional analysis,

dynamical systems, mathematical physics and partial differential equations, probability theory and mathematical statistics, and pluripotential theory. A number of significant, recently established results were disseminated at the conference's scheduled plenary talks, while invited talks presented a broad spectrum of findings in several sessions. Based on a different session from the conference, Algebra, Complex Analysis, and Pluripotential Theory is also published in the Springer Proceedings in Mathematics & Statistics Series.

The focus of this book is on algebro-geometric solutions of completely integrable nonlinear partial differential equations in (1+1)-dimensions, also known as soliton equations. Explicitly treated integrable models include the KdV, AKNS, sine-Gordon, and Camassa-Holm hierarchies as well as the classical massive Thirring system. An extensive treatment of the class of algebro-geometric solutions in the stationary as well as time-dependent contexts is provided. The formalism presented includes trace formulas, Dubrovin-type initial value problems, Baker-Akhiezer functions, and theta function representations of all relevant quantities involved. The book uses techniques from the theory of differential equations, spectral analysis, and elements of algebraic geometry (most notably, the theory of compact Riemann surfaces). The presentation is rigorous, detailed, and self-contained, with ample background material provided in various appendices. Detailed notes for each chapter together with an exhaustive bibliography enhance the presentation offered in the main text.

Spectral Transform and Solitons

This Festschrift had its origins in a conference called SimonFest held at Caltech, March 27-31, 2006, to honor Barry Simon's 60th birthday. It is not a proceedings volume in the usual sense since the emphasis of the majority of the contributions is on reviews of the state of the art of certain fields, with particular focus on recent developments and open problems. The bulk of the articles in this Festschrift are of this survey form, and a few review Simon's contributions to a particular area. Part 1 contains surveys in the areas of Quantum Field Theory, Statistical Mechanics, Nonrelativistic Two-Body and $N$-Body Quantum Systems, Resonances, Quantum Mechanics with Electric and Magnetic Fields, and the Semiclassical Limit. Part 2 contains surveys in the areas of Random and Ergodic Schrodinger Operators, Singular Continuous Spectrum, Orthogonal Polynomials, and Inverse Spectral Theory. In several cases, this collection of surveys portrays both the history of a subject and its current state of the art. Exhaustive lists of references enhance the presentation offered in these surveys. A substantial part of the contributions to this Festschrift are survey articles on the state of the art of certain areas with special emphasis on open problems. This will benefit graduate students as well as researchers who want to get a quick, yet comprehensive introduction into an area covered in this volume.

Explaining how graph theory and social network analysis can be applied to team sports analysis, This book presents useful approaches, models and methods that can be used to characterise the overall properties of team networks and identify the prominence of each team player. Exploring the different possible network metrics that can be utilised in sports analysis, their possible applications and variances from situation to situation, the respective chapters present an array of illustrative case studies. Identifying the general concepts of social network analysis and network centrality metrics, readers are shown how to generate a methodological protocol for data collection. As such, the book

provides a valuable resource for students of the sport sciences, sports engineering, applied computation and the social sciences.

This invaluable book is a unique collection of tributes to outstanding discoveries pioneered by Leon Chua in nonlinear circuits, cellular neural networks, and chaos. It is comprised of three parts. The first OCo cellular nonlinear networks, nonlinear circuits and cellular automata OCo deals with Chua''s Lagrangian circuits, cellular wave computers, bio-inspired robotics and neuro-morphic architectures, toroidal chaos, synaptic cellular automata, history of Chua''s circuits, cardiac arrhythmias, local activity principle, symmetry breaking and complexity, bifurcation trees, and Chua''s views on nonlinear dynamics of cellular automata. Dynamical systems and chaos is the scope of the second part of the book, where we find genius accounts on theory and application of Julia set, stability of dynamical networks, chaotic neural networks and neocortical dynamics, dynamics of piecewise linear systems, chaotic mathematical circuitry, synchronization of oscillators, models of catastrophic events, control of chaotic systems, symbolic dynamics, and solitons. First hand accounts on the discovery of memristors in HP Labs, historical excursions into OCyancient memristorsOCO, analytical analysis of memristors, and hardware memristor emulators are presented in the third and final part of the book.The book is quintessence of ideas on future and emergent hardware, analytic theories of complex dynamical systems and interdisciplinary physics. It is a true Renaissance volume where bright ideas of electronics, mathematics and physics enlighten facets of modern science.The unique DVD covers the artistic aspects of chaos, such as several stunningly melodious musical compositions using chaotic atttractors, a virtual gallery of hundreds of colorful attractors, and even a cartoon-like play on the genesis of Chua''s circuit that was based on a widely acclaimed performance in Rome and other venues in Italy. In short, it is a veritable kaleiscope of never-before-published historical, pedagogical, and futuristic technical visions on three timely topics of intense interest for both lay readers and experts alike."

This book presents a new approach to the analysis of networks, which emphasizes how one can compress a network while preserving all information relative to the network's spectrum. Besides these compression techniques, the authors introduce a number of other isospectral transformations and demonstrate how, together, these methods can be applied to gain new results in a number of areas. This includes the stability of time-delayed and non time-delayed dynamical networks, eigenvalue estimation, pseudospectra analysis and the estimation of survival probabilities in open dynamical systems. The theory of isospectral transformations, developed in this text, can be readily applied in any area that involves the analysis of multidimensional systems and is especially applicable to the analysis of network dynamics. This book will be of interest to Mathematicians, Physicists, Biologists, Engineers and to anyone who has an interest in the dynamics of networks.

These refereed proceedings present recent developments on specific mathematical and physical aspects of nonlinear dynamics. The new findings discussed in here will be equally useful to graduate students and researchers. The topics dealt with cover a wide range of phenomena: solitons, integrable systems, Hamiltonian structures, Bäcklund and Darboux transformation, symmetries, fi- nite-dimensional dynamical systems, quantum and statistical mechanics, knot theory and braid group, R-matrix method, Hirota and Painlevé analysis, and applications to water waves, lattices, porous media, string theory and even cellular automata.

This book focuses on recent progress in complexity research based on the fundamental nonlinear dynamical and statistical theory of oscillations, waves, chaos, and structures far from equilibrium. Celebrating seminal contributions to the field by Prof. M. I. Rabinovich of the University of California at San Diego, this volume brings together perspectives on both the fundamental aspects of complexity studies, as well as in applications in different fields ranging from granular patterns to understanding of the cognitive brain and mind dynamics. The slate of world-class authors review recent achievements that together present a broad and coherent

coverage of modern research in complexity greater than the sum of its parts.
Algebraic Analysis: Papers Dedicated to Professor Mikio Sato on the Occasion of his 60th Birthday, Volume II is a collection of research papers on algebraic analysis and related topics in honor to Professor Mikio Sato's 60th birthday. This volume is divided into 29 chapters and starts with research works concerning the fundamentals of KP equations, strings, Schottky problem, and the applications of transformation theory for nonlinear integrable systems to linear prediction problems and isospectral deformations,. The subsequent chapters contain papers on the approach to nonlinear integrable systems, the Hodge numbers, the stochastic different equation for the multi-dimensional weakly stationary process, and a method of harmonic analysis on semisimple symmetric spaces. These topics are followed by studies on the quantization of extended vortices, moduli space for Fuchsian groups, microfunctions for boundary value problems, and the issues of multi-dimensional integrable systems. The remaining chapters explore the practical aspects of pseudodifferential operators in hyperfunction theory, the elliptic solitons, and Carlson's theorem for holomorphic functions. This book will prove useful to mathematicians and advance mathematics students.
This volumes provides a comprehensive review of interactions between differential geometry and theoretical physics, contributed by many leading scholars in these fields. The contributions promise to play an important role in promoting the developments in these exciting areas. Besides the plenary talks, the coverage includes: models and related topics in statistical physics; quantum fields, strings and M-theory; Yang-Mills fields, knot theory and related topics; K-theory, including index theory and non-commutative geometry; mirror symmetry, conformal and topological quantum field theory; development of integrable systems; and random matrix theory. Sample Chapter(s). Chapter 1: Yangian and Applications (787 KB). Contents: Yangian and Applications (C-M Bai et al.); The Hypoelliptic Laplacian and the ChernOCoGaussOCoBonnet (J-M Bismut); S S Chern and ChernOCoSimos Terms (R Jackiw); Localization and Conjectures from String Duality (K F Liu); Topologization of Electron Liquids with ChernOCoSimons Theory and Quantum Computation (Z H Wang); Topology and Quantum Information (L H Kauffman); Toeplitz Quantization and Symplectic Reduction (X N Ma & W P Zhang); Murphy Operators in Knot Theory (H R Morton); Separation Between Spin and Charge in SU(2) YangOCoMills Theory (A J Niemi); LAwner Equations and Dispersionless Hierarchies (K Takasaki & T Takebe); and other papers. Readership: Graduate students and professional researchers in geometry and physics."
This volume is an outgrowth of the Sixth Workshop on Lie Theory and Geometry, held in the province of Cordoba, Argentina in November 2007. The representation theory and structure theory of Lie groups play a pervasive role throughout mathematics and physics. Lie groups are tightly intertwined with geometry and each stimulates developments in the other. The aim of this volume is to bring to a larger audience the mutually beneficial interaction between Lie theorists and geometers that animated the workshop. Two prominent themes of the representation theoretic articles are Gelfand pairs and the representation theory of real reductive Lie groups. Among the more geometric articles are an exposition of major recent developments on noncompact homogeneous Einstein manifolds and aspects of inverse spectral geometry presented in settings accessible to readers new to the area.
The book provides a single compact source for undergraduate and graduate students and professional physicists who want to understand the essentials of supersymmetric quantum mechanics (SUSYQM). The text contains a large selection of examples, problems, and solutions that illustrate the fundamentals of SUSYQM and its applications. It is richly illustrated with figures and contains an attractive and relevant list of topics.
This book provides an overview of recent progress in computer simulations of

nonperturbative phenomena in quantum field theory, particularly in the context of the lattice approach. It is a collection of extensive self-contained reviews of various subtopics, including algorithms, spectroscopy, finite temperature physics, Yukawa and chiral theories, bounds on the Higgs meson mass, the renormalization group, and weak decays of hadrons. Physicists with some knowledge of lattice gauge ideas will find this book a useful and interesting source of information on the recent developments in the field.
Contents:Techniques and Results for Lattice QCD Spectroscopy (T DeGrand)Lattice Field Theories at High Temperatures and Densities (R V Gavai)Upper Bound on the Higgs Mass (A Hasenfratz)Lattice Yukawa Models (R E Shrock)Bosonic Algorithms (A D Sokal)Algorithms for Simulating Fermions (M Creutz)Scaling, the Renormalization Group and Improved Lattice Actions (R Gupta)Lattice Approach to Electroweak Matrix Elements (C Bernard & A Soni)
Readership: High energy physicists. Keywords:Quarks;Lattices;Gluons;Lattice Gauge Theory;Computational Physics;Monte Carlo Methods;Confinement;Quantum Field Theory;Non-Perturbative Field Theory
Issues in Logic, Probability, Combinatorics, and Chaos Theory: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Approximation Theory. The editors have built Issues in Logic, Probability, Combinatorics, and Chaos Theory: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Approximation Theory in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Logic, Probability, Combinatorics, and Chaos Theory: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.
We read in order to know we are not alone, I once heard, and perhaps it could also be suggested that we write in order not to be alone, to endorse, to promote continuity. The idea for this book took about ten years to materialize, and it is the author's hope that its content will constitute the beginning of further explorations beyond current horizons. More speci cally, this book appeals to the reader to engage upon and persevere with a journey, moving through the less well explored territories in the evolution of the very early universe, and pushing towards new landscapes. P- haps, during or after consulting this book, this attitude and this willingness will be embraced by someone, somewhere, and this person will go on to enrich our quantum cosmological description of the early universe, by means of a clearer supersymm- ric perspective. It is to these creative and inquisitive 'young minds' that the book is addressed. The reader will not therefore nd in this book all the answers to all the problems regarding a

supersymmetric and quantum description of the early universe, and this remark is substantiated in the book by a list of unresolved and challenging problems, itself incomplete.

It is known that to any Riemannian manifold (M, g ) , with or without boundary, one can associate certain fundamental objects. Among them are the Laplace-Beltrami opera tor and the Hodge-de Rham operators, which are natural [that is, they commute with the isometries of (M,g)], elliptic, self-adjoint second order differential operators acting on the space of real valued smooth functions on M and the spaces of smooth differential forms on M, respectively. If M is closed, the spectrum of each such operator is an infinite divergent sequence of real numbers, each eigenvalue being repeated according to its finite multiplicity. Spectral Geometry is concerned with the spectra of these operators, also the extent to which these spectra determine the geometry of (M, g) and the topology of M. This problem has been translated by several authors (most notably M. Kac). into the col loquial question "Can one hear the shape of a manifold?" because of its analogy with the wave equation. This terminology was inspired from earlier results of H. Weyl. It is known that the above spectra cannot completely determine either the geometry of (M , g) or the topology of M. For instance, there are examples of pairs of closed Riemannian manifolds with the same spectra corresponding to the Laplace-Beltrami operators, but which differ substantially in their geometry and which are even not homotopically equiva lent.

This book offers a modern introduction to the Hamiltonian theory of dynamical systems, presenting a unified treatment of all types of dynamical systems, i.e., finite, lattice, and field. Particular attention is paid to nonlinear systems that have more than one Hamiltonian formulation in a single coordinate system. As this property is closely related to integrability, this book presents an algebraic theory of integrable.

Isospectral TransformationsA New Approach to Analyzing Multidimensional Systems and NetworksSpringer

The third volume in this sequence of books consists of a collection of contributions that aims to describe the recent progress in nonlinear differential equations and nonlinear dynamical systems (both continuous and discrete). Nonlinear Systems and Their Remarkable Mathematical Structures: Volume 3, Contributions from China just like the first two volumes, consists of contributions by world-leading experts in the subject of nonlinear systems, but in this instance only featuring contributions by leading Chinese scientists who also work in China (in some cases in collaboration with western scientists). Features Clearly illustrate the mathematical theories of nonlinear systems and its progress to both the non-expert and active researchers in this area Suitable for graduate students in Mathematics, Applied Mathematics and some of the Engineering sciences Written in a careful pedagogical manner by those experts who have been involved in the research themselves, and each contribution is reasonably self-contained

During the last decade, scientists working in quantum theory have been engaging in promising new fields such as quantum computation and quantum information processing, and have also been reflecting on the possibilities of nonlinear behavior on the quantum level. These are challenging undertakings because (1) they will result in new solutions to important technical

and practical problems that were unsolvable by the classical approaches (for example, quantum computers can calculate problems that are intractable if one uses classical computers); and (2) they open up new 'hard' problems of a fundamental nature that touch the foundation of quantum theory itself (for example, the contradiction between locality and nonlinearity and the interpretation of quantum computing as a universal process).In this book, one can distinguish two main streams of research to approach the just-mentioned problem field: (1) a theoretical structural part, which concentrates on the elaboration of a nonlinear quantum mechanics and the fundamentals of quantum computation; and (2) a theoretical experimental part, which focuses on the theoretical aspects of applications that arise from new technology and novel research perspectives such as quantum optics and quantum cryptography. Particular attention is also paid to the measurement problem, the classical limit and alternative interpretations (such as the hidden measurement approach).

This book presents an isospectral approach for several important mechanical vibrating systems. Discrete and continuous isospectral systems are discussed using a simple multi-degree of freedom spring-mass system followed by illustration of isospectral beams and their solution through evolutionary computing. Next, it addresses axially loaded Euler-Bernoulli beams and aims to find isospectral counterparts of these systems. The practical application of these isospectral systems for vibration testing and for finding new closed form solutions is discussed. A considerable part of the book is devoted to isospectral rotating beams and their non-rotating analogs including Rayleigh beams. Aimed at researchers and graduate students in mechanical; aerospace; civil; automotive; ocean engineering especially mechanical vibrations, this monograph: Discusses isospectral vibrating systems to aid vibration testing and computational analysis Explores isospectral analogs between rotating and non-rotating structures Provides simpler isospectral beams for vibration testing and for 3D printing Uses firefly optimization method and electromagnetism inspired optimization method to find isospectral systems Shows the use of isospectral systems to find new closed form solutions using an indirect approach

This book constitutes the refereed post-proceedings of the International Conference on Mathematical Modeling and Computational Physics, MMCP 2011, held in Stará Lesná, Slovakia, in July 2011. The 41 revised papers presented were carefully reviewed and selected from numerous submissions. They are organized in topical sections on mathematical modeling and methods, numerical modeling and methods, computational support of the experiments, computing tools, and optimization and simulation.

The Inverse Scattering Transformation and The Theory of Solitons

This book presents a modern and systematic approach to Linear Response Theory (LRT) by combining analytic and algebraic ideas. LRT is a tool to study systems that are driven out of equilibrium by external perturbations. In particular the reader is provided with a new and robust tool to implement LRT for a wide array of systems. The proposed formalism in fact applies to periodic and random systems in the discrete and the continuum. After a short introduction describing the structure of the book, its aim and motivation, the basic elements of the theory are presented in chapter 2. The mathematical framework of the theory is outlined in chapters 3–5: the relevant von Neumann algebras, noncommutative $L^p$- and Sobolev spaces are introduced; their construction is then made explicit for common physical systems; the notion of isopectral perturbations and the associated dynamics are studied. Chapter 6 is dedicated to the main results, proofs of the Kubo and Kubo-Streda formulas. The book closes with a chapter about possible future developments and applications of the theory to periodic light conductors. The book addresses a wide audience of mathematical physicists, focusing on the conceptual aspects rather than technical details and making algebraic methods accessible to analysts.

This book offers a modern introduction to the Hamiltonian theory of dynamical systems,

presenting a unified treatment of all types of dynamical systems, i.e., finite, lattice, and field. Particular attention is paid to nonlinear systems that have more than one Hamiltonian formulation in a single coordinate system.

This book is comprised of selected research articles developed from a workshop on Ergodic Theory, Probabilistic Methods and Applications, held in April 2012 at the Banff International Research Station. It contains contributions from world leading experts in ergodic theory, numerical dynamical systems, molecular dynamics and ocean/atmosphere dynamics, nonequilibrium statistical mechanics. The volume will serve as a valuable reference for mathematicians, physicists, engineers, biologists and climate scientists, who currently use, or wish to learn how to use, probabilistic techniques to cope with dynamical models that display open or non-equilibrium behavior.

This volume shares and makes accessible new research lines and recent results in several branches of theoretical and mathematical physics, among them Quantum Optics, Coherent States, Integrable Systems, SUSY Quantum Mechanics, and Mathematical Methods in Physics. In addition to a selection of the contributions presented at the "6th International Workshop on New Challenges in Quantum Mechanics: Integrability and Supersymmetry", held in Valladolid, Spain, 27-30 June 2017, several high quality contributions from other authors are also included. The conference gathered 60 participants from many countries working in different fields of Theoretical Physics, and was dedicated to Prof. Véronique Hussin—an internationally recognized expert in many branches of Mathematical Physics who has been making remarkable contributions to this field since the 1980s. The reader will find interesting reviews on the main topics from internationally recognized experts in each field, as well as other original contributions, all of which deal with recent applications or discoveries in the aforementioned areas.

This monograph systematically develops and considers the so-called "dressing method" for solving differential equations (both linear and nonlinear), a means to generate new non-trivial solutions for a given equation from the (perhaps trivial) solution of the same or related equation. Throughout, the text exploits the "linear experience" of presentation, with special attention given to the algebraic aspects of the main mathematical constructions and to practical rules of obtaining new solutions.

The subject of this book is the hierarchies of integrable equations connected with the one-component and multi component loop groups. There are many publications on this subject, and it is rather well defined. Thus, the author would like t.o explain why he has taken the risk of revisiting the subject. The Sato Grassmannian approach, and other approaches standard in this context, reveal deep mathematical structures in the base of the integrable hi erarchies. These approaches concentrate mostly on the algebraic picture, and they use a language suitable for applications to quantum field theory. Another well-known approach, the a-dressing method, developed by S. V. Manakov and V.E.

Zakharov, is oriented mostly to particular systems and ex act classes of their solutions. There is more emphasis on analytic properties, and the technique is connected with standard complex analysis. The language of the a-dressing method is suitable for applications to integrable nonlinear PDEs, integrable nonlinear discrete equations, and, as recently discovered, for t.he applications of integrable systems to continuous and discret.e geometry. The primary motivation of the author was to formalize the approach to int.e grable hierarchies that was developed in the context of the a-dressing method, preserving the analytic struetures characteristic for this method, but omitting the peculiarit.ies of the construetive scheme. And it was desirable to find a start.

This is the third Volume in a series of books devoted to the interdisciplinary area between mathematics and physics, all ema nating from the Advanced Study Institutes held in Istanbul in 1970, 1972 and 1977. We believe that physics and mathematics can develop best in harmony and in close communication and cooper ation with each other and are sometimes inseparable. With this goal in mind we tried to bring mathematicians and physicists together to talk and lecture to each other-this time in the area of nonlinear equations. The recent progress and surge of interest in nonlinear ordi nary and partial differential equations has been impressive. At the same time, novel and interesting physical applications mul tiply. There is a unifying element brought about by the same characteristic nonlinear behavior occurring in very widely differ ent physical situations, as in the case of "solitons," for exam ple. This Volume gives, we believe, a very good indication over all of this recent progress both in theory and applications, and over current research activity and problems. The 1977 Advanced Study Institute was sponsored by the NATO Scientific Affairs Division, The University of the Bosphorus and the Turkish Scientific and Technical Research Council. We are deeply grateful to these Institutions for their support, and to lecturers and participants for their hard work and enthusiasm which created an atmosphere of lively scientific discussions.

This volume covers aspects of Schr|dinger equation inversion for the purposeof determining interaction potentials in particle, nuclear and atomic physics from experimental data. It includes reviews and reports on the latest developments in mathematics, supersymmetric quantum mechanics, inversion for fixed-l nucleon-nucleon potentials, inversion of fixed-E optical potentials and their generalizations. Also included are some topics on nonlinear differential equations relating to theSchr|dinger or other equations of particle, nuclear, atomic and molecular physics which can be solved by inverse scattering transformations. The material collected in this volume gives a clear picture of the status ofresearch in this rapidly growing field. The book addresses students and young scientists as well as researchers in theoretical physics and functional analysis.