NEW

Reviews in Operator Theory 1980-86

Introduction by Paul R. Halmos

Operator theory is the branch of mathematics that treats the objects of analysis (numerical valued functions and their limiting properties) by the methods of modern topology and algebra. While, roughly speaking, the area 46 deals primarily with the objects (i.e., topological vector spaces) associated with the category of topological linear algebra, the area 47 deals with the morphisms between these objects (i.e., the mappings-both linear and nonlinear-between these spaces). Although functional analysis and operator theory developed as identifiable fields in the early part of this century they have seen tremendous growth in the past few decades and have found applications to diverse areas, both to purely mathematical areas and to other scientific disciplines. These volumes contain a wealth of information about linear operators, algebraic systems of linear operators, differential and integral operators, and nonlinear operators.

All the *Mathematical Reviews* entries having operator theory (*MR* classification number 47) as a primary or secondary classification between 1980 and 1986 appear in these volumes. Within each section, reviews are ordered by their *MR* number. Relevant cross-references are given with each review, and author and key indexes appear in the fourth volume.

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CATEGORIES IN COMPUTER SCIENCE AND LOGIC

John W. Gray and Andre Scedrov, Editors

Category theory has had important uses in logic since the invention of topos theory in the early 1960s, and logic has always been an important component of theoretical computer science. A new development has been the increase in direct interactions between category theory and computer science. In June 1987, an AMS-IMS-SIAM Summer Research Conference on Categories in Computer Science and Logic was held at the University of Colorado in Boulder. The aim of the conference was to bring together researchers working on the interconnections between category theory and computer science or between computer science and logic. The conference emphasized the ways in which the general machinery developed in category theory could be applied to specific questions and be used for category-theoretic studies of concrete problems. This volume represents the proceedings of the conference. (Some of the participants' contributions have been published elsewhere.)

The papers published here relate to three different aspects of the conference. The first concerns topics relevant to all three fields, including, for example, Horn logic, lambda calculus, normal form reductions, algebraic theories, and categorical models for computability theory. In the area of logic, topics include semantical approaches to proof-theoretical questinos, internal properties of specific objects in (pre-) topoi and their representations, and categorical sharpening of model theoretic notions. Finally, in the area of computer science, the use of category theory in formalizing aspects of computer programming and program design is discussed.

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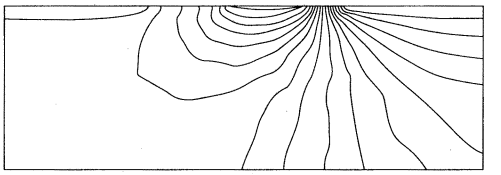

Computational Aspects of VLSI Design with an Emphasis on Semiconductor Device Simulation

Randolph E. Bank, Editor

(Lectures in Applied Mathematics, Volume 25)

Numerical simulation is rapidly becoming an important part of the VLSI design process, allowing the engineer to test, evaluate, and optimize various aspects of chip design without resorting to the costly and time-consuming process of fabricating prototypes. This procedure not only accelerates the design process, but also improves the end product, since it is economically feasible to numerically simulate many more options than might otherwise be considered. With the enhanced computing power of today's computers, more sophisticated models are now being developed.

This volume contains the proceedings of the AMS-SIAM Summer Seminar on Computational Aspects of VLSI Design, held at the Institute for Mathematics and Its Applications at the University of Minnesota, in the spring of 1987. The seminar featured presentations by some of the top experts working in this area. Their contributions to this volume form an excellent overview of the mathematical and computational problems arising in this area.

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The Mathematics Behind the Computer Graphics

Robert L. Devaney and Linda Keen, Editors

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MATHEMATICIANS AND EDUCATION REFORM

Naomi Fisher, Harvey Keynes, and Philip Wagreich, Editors

(CBMS Issues in Mathematics Education, Volume 1)

Educational issues are receiving unprecedented attention in the broad mathematical sciences community, as mathematicians and other scientists have become concerned about the quality of instruction in the nation's schools, colleges, and universities. A mathematically literate population is crucial to supporting our increasingly technological society. In addition, the mathematical sciences community faces the challenge of increasing the number of students who are prepared to pursue a career in mathematics, science, or engineering. This challenge requires not only raising the quality of mathematics education, but also showing students the beauty and usefulness of the subject. In these ways, mathematical scientists can make crucial contributions to educational reform.

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From practical information about organizing a program to exploration of the intellectual issues of educational reform, this volume presents a range of views on various aspects of the involvement of mathematicians in educational change. While it will prove especially useful for those considering involvement in an educational program, this book is also important reading for the entire community, for the issues explored here will be of increasing importance for the future of the mathematical sciences.

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Michael H. Freedman and Feng Luo

(University Lecture Series, Volume 1)

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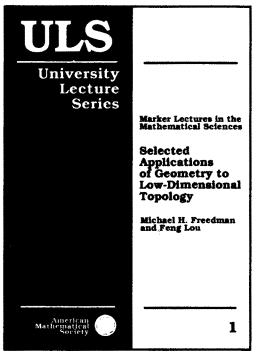
Keeping technical details to a minimum, the authors lead the reader on a fascinating exploration of several developments in geometric topology. They begin with the notions of manifold and smooth structures and the Gauss-Bonnet theorem,



and proceed to the topology and geometry of foliated 3-manifolds. They also explain, in terms of general position, why four-dimensional space has special attributes, and they examine the insight Donaldson theory brings. The book ends with a chapter on exotic structures on R^4, with a discussion of the two competing theories of four-dimensional manifolds, one topological and one smooth.

Background material was added to clarify the discussions in the lectures, and references for more detailed study are included. Suitable for graduate students and researchers in mathematics and the physical sciences, the book requires only background in undergraduate mathematics. It should prove valuable for those wishing a not-too-technical introduction to this vital area of current research.

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