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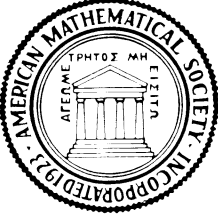
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## Automated Theorem Proving: After 25 Years

W. W. Bledsoe and D. W. Loveland, Editors

This volume contains papers based on a special session for automated theorem proving held at the annual meeting of the American Mathematical Society in Denver, January, 1983. At the meeting special awards were given to honor historically significant work (the *Milestone Prize*: Hao Wang, awardee) and to honor excellent current work (the *Current Research prize*: Lawrence Wos and Steven Winker, awardees). Roughly a dozen leading contributors to the field were invited to present papers; papers characterizing their research work or a broader perspective were encouraged. Papers range from a historical overview of twenty-five years of research in the automated theorem proving field to significant technical papers, including a reprint of a *Scientia Sinica* paper giving a new and elegant decision procedure for a portion of elementary geometry.

Most of the major efforts in building automated theorem provers (or theorem proving assistants) are covered by papers in this volume, a notable but less familiar example (to the ATP community) being the Suppes interactive theorem prover for teaching logic and axiomatic set theory. The well-known provers of Andrews, Bledsoe, Boyer and Moore, and Wos, et al. are represented as are term rewriting, combining decision procedures and automating mathematical discovery. The book is intended for every mathematician and computer scientist interested in the state-of-the-art in automated theorem proving, but in particular, it is intended to encourage active research mathematicians to contribute their insight to this field.

### Contents

- D. W. Loveland.** *Automated theorem proving: a quarter century review*  
*Citation to Hao Wang*
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*Citation to Lawrence Wos and Steven Winker*
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## Topics in Complex Analysis

Dorothy B. Shaffer, Editor

(Contemporary Mathematics, Volume 38)

Most of the mathematical ideas presented in this volume are based on papers given at an AMS meeting held at Fairfield University in October 1983. The unifying theme of the talks was Geometric Function Theory.

Papers in this volume generally represent extended versions of the talks presented by the authors. In addition, the proceedings contain several papers that could not be given in person. A few of the papers have been expanded to include further research results obtained in the time between the conference and submission of manuscripts. In most cases, an expository section or history of recent research has been added. The authors' new research results are incorporated into this more general framework. The collection represents a survey of research carried out in recent years in a variety of topics.

The paper by Y. J. Leung deals with the Loewner equation, classical results on coefficient bodies and modern optimal control theory. Glenn Schober writes about the class  $\Sigma$ , its support points and extremal configurations. Peter Duren deals with support points for the class  $S$ , Loewner chains and the process of truncation.

A very complete survey about the role of polynomials and their limits in class  $S$  is contributed by T. J. Suffridge.

A generalization of the univalence criterion due to Nehari and its relation to the hyperbolic metric is contained in the paper by David Minda. The omitted area problem for functions in class  $S$  is solved in the paper by Roger Barnard. New results on angular derivatives and domains are represented in the paper by Burton Rodin and Stefan E. Warschawski, while estimates on the radial growth of the derivative of univalent functions are given by Thom McGregor.

In the paper by B. Bshouty and W. Hengartner a conjecture of Bombieri is proved for some cases. Other interesting problems for special subclasses are solved by B. A. Case and J. R. Quine; M. O. Reade, H. Silverman and P. G. Todorov; H. Silverman and E. M. Silvia.

New univalence criteria for integral transforms are given by Edward Merkes. Potential theoretic results are represented in the paper by Jack Quine with new results on the Star Function and by David Tepper with free boundary problems in the flow around an obstacle. Approximation by functions which are the solutions of more general elliptic equations are treated by A. Dufresnoy, P. M. Gauthier and W. H. Ow.

At the time of preparation of these manuscripts, nothing was known about the proof of the Bieberbach conjecture. Many of the authors of this volume and other experts in the field were recently interviewed by the editor regarding the effect of the proof of the conjecture. Their ideas regarding future trends in research in complex analysis are presented in the epilogue by Dorothy Shaffer.

A graduate level course in complex analysis provides adequate background for the enjoyment of this book.

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## Recursion Theory

Anil Nerode and Richard A. Shore, Editors

(Proceedings of Symposia in Pure Mathematics, Volume 42)

This Proceedings of the 1982 AMS Summer Research Institute in Recursion Theory, co-sponsored by the Association for Symbolic Logic at Cornell University, June 28 to July 17, represents the largest and broadest meeting ever devoted to recursion theory. It should be a landmark in the subject, as was the AMS Institute at Cornell in 1957.

Anyone from graduate students to active researchers with interests in any aspects of recursion theory, including its interactions with set theory, model theory, constructive mathematics, foundations of mathematics and computer science, will be interested in this book. The background required varies with the papers; some require a basic course in logic or recursion theory only, others advanced research.

The book contains major surveys with expository papers as well as important new research in the general area of recursion theory. From the survey and expository articles a reader can get a general view of recent progress in the various areas of recursion theory, an introduction to current techniques and an idea of some of the important problems still to be solved. One should also get some picture of how recursion theory has interacted with other areas of logic, mathematics and computer science.

The organizers' intention was to consider recursion theory in the broadest sense. This is reflected in the lists of participants and lectures as well as in the contents of the book. The hour talks were roughly grouped around seven short courses—two in Classical Recursion Theory and one each in Generalized Recursion Theory, Fine Structure of  $L$ , Descriptive Set Theory, Effective Mathematics, and Complexity Theory (Computer Sciences). These series correspond to the sections of this volume except that two set-theoretic subjects have been grouped into one section and the papers on the foundational topics have been combined with those on computer science. Both of these are natural alignments since the talks in Descriptive Set Theory dealt mainly with the structure of  $L(\mathbf{R})$  and the papers in complexity theory are strongly related to classical undecidability and incompleteness results.

The major research articles include the following. **Carl J. Jockusch, Jr.** and **Richard A. Shore** on the minimal cover problem—a key to recent results on the degrees of unsolvability.

**Wolfgang Maas** on automorphisms of the lattice of r.e. sets.

**Gerald Sacks** and **Theodore A. Slaman** on the r.e. degrees in  $E$ -recursion theory (Post Problem and density, respectively).

**H. D. Donder**, **R. B. Jensen** and **L. J. Stanley** on combinatorial principles in  $L$ .

**Jean-Yves Girard** and **Jean Pierre Ressayre** on  $\Pi_1^1$  logic—a major paper on a subject newly developed by Girard and others which while at its root is proof theoretic seems to have important implications for and applications to generalized recursion theory, descriptive set theory and other areas.

Expository and survey articles include

**Robert I. Soare**, the first article presenting an accessible approach to the  $0'''$  priority method introduced by Lachlan and currently being extensively exploited by Harrington and others to settle many important questions about the r.e. sets and degrees.

**Richard A. Shore**, a survey of recent work on the structure of the degrees of unsolvability.

**Anil Nerode** and **J. Remmel**, an encyclopedic survey of the lattice of r.e. substructures of effectively presented mathematical systems.

Papers by **Kenneth McAloon**, **Stephen S. Simpson** and **Paul Young** on the connections between logic and recursion theory on the one hand and strength of axiom systems and low level complexity of computation on the other.

**Sy D. Friedman**, an introduction to the fine structure of  $L$  from a recursion theoretic viewpoint with some new applications.

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# The Geometric Topology of 3-manifolds

R. H. Bing

"This is an outstanding book for graduate students and a good one for workers in the field, it is well referenced and the author has a sense of history and a desire to place results in a context. . . The author's mathematical personality permeates the book. If a reader is charmed by a kind of down home, friendly style then that reader will enjoy learning from, or reviewing material in this book. . . All this is not to say the proofs in the book are loose; they definitely are not. Where the author says he will prove something, he does, generally directly and with great emphasis on giving the reader understanding."

- L. Neuwirth

*Zentralblatt für Mathematik  
und ihre Grenzgebiete*

"This book is a classic in the study of the geometric topology of 3-manifolds. Virtually everything that is known about 3-manifolds from the standpoint of geometric topology is included here. One has wild surfaces, the Schoenflies theorem, triangulation, Dehn's lemma, the shrinking criterion, linking, the loop theorem, covering spaces, as well as the important side approximation theorem. Many of these results are applications of the side approximation theorem.

There is an extensive bibliography which the reader will find very useful in pursuing other topics as well as the geometric topology of 3-manifolds.

Many of the topics covered are accompanied by historical remarks which are very useful in tracing the evolution of the concepts involved in 3-manifold theory. The book would be suitable as a text for a second graduate course in topology. The exposition is excellent and the student (not to say the teacher) would find the book understandable and stimulating."

- J. E. Keesling

*Mathematical Reviews*

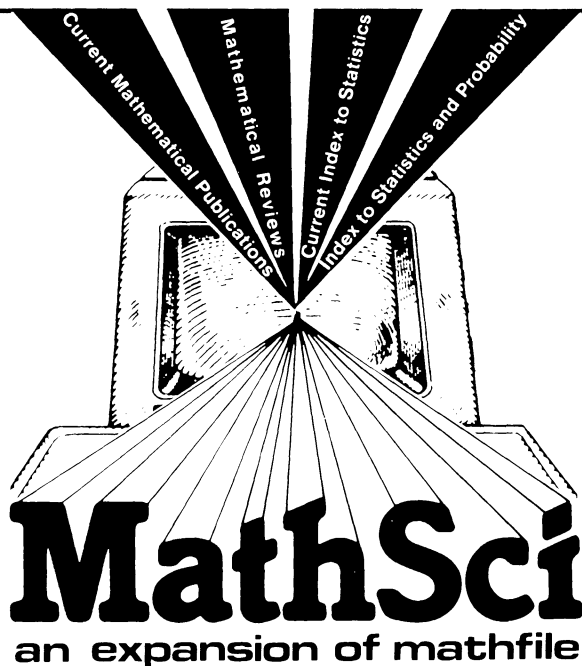
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