

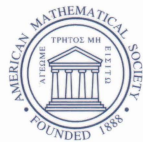
CONTEMPORARY MATHEMATICS

425

Advances in Logic

The North Texas Logic Conference
October 8–10, 2004
University of North Texas, Denton, Texas

Su Gao
Steve Jackson
Yi Zhang
Editors



American Mathematical Society

Advances in Logic

CONTEMPORARY MATHEMATICS

425

Advances in Logic

The North Texas Logic Conference
October 8–10, 2004
University of North Texas, Denton, Texas

Su Gao
Steve Jackson
Yi Zhang
Editors



American Mathematical Society
Providence, Rhode Island

Editorial Board

Dennis DeTurck, managing editor

George Andrews Carlos Berenstein Andreas Blass Abel Klein

2000 *Mathematics Subject Classification*. Primary 03C52, 03D25, 03D35, 03D80, 03E05, 03E15, 03E55, 03E60, 05C12, 52C20.

Library of Congress Cataloging-in-Publication Data

North Texas Logic Conference (2004 : University of North Texas)

Advances in logic : the North Texas Logic Conference, October 8–10, 2004, University of North Texas, Denton, Texas / Su Gao, Steve Jackson, Yi Zhang, editors.

p. cm. — (Contemporary mathematics, ISSN 0271-4132 ; V. 425)

Includes bibliographical references.

ISBN-13: 978-0-8218-3819-8 (alk. paper)

ISBN-10: 0-8218-3819-9 (alk. paper)

1. Logic, Symbolic and mathematical—Congresses. I. Gao, Su, 1968– II. Jackson, Steve, 1957– III. Zhang, Yi, 1964 Aug. 22– IV. Title.

QA9.A1N67 2004

511.3—dc22

2006047984

Copying and reprinting. Material in this book may be reproduced by any means for educational and scientific purposes without fee or permission with the exception of reproduction by services that collect fees for delivery of documents and provided that the customary acknowledgment of the source is given. This consent does not extend to other kinds of copying for general distribution, for advertising or promotional purposes, or for resale. Requests for permission for commercial use of material should be addressed to the Acquisitions Department, American Mathematical Society, 201 Charles Street, Providence, Rhode Island 02904-2294, USA. Requests can also be made by e-mail to reprint-permission@ams.org.

Excluded from these provisions is material in articles for which the author holds copyright. In such cases, requests for permission to use or reprint should be addressed directly to the author(s). (Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.)

© 2007 by the American Mathematical Society. All rights reserved.

The American Mathematical Society retains all rights
except those granted to the United States Government.

Copyright of individual articles may revert to the public domain 28 years
after publication. Contact the AMS for copyright status of individual articles.

Printed in the United States of America.

∞ The paper used in this book is acid-free and falls within the guidelines
established to ensure permanence and durability.

Visit the AMS home page at <http://www.ams.org/>

10 9 8 7 6 5 4 3 2 1 12 11 10 09 08 07

Contents

Preface	vii
A stationary-tower-free proof of the derived model theorem J. R. STEEL	1
A proof of the Σ_1^2 -absoluteness theorem ILIJAS FARAH	9
A simple inductive measure analysis for cardinals under the Axiom of Determinacy STEFAN BOLD AND BENEDIKT LÖWE	23
The complexity of the index sets of \aleph_0 -categorical theories and of Ehrenfeucht theories STEFFEN LEMPP AND THEODORE A. SLAMAN	43
Computable structures of Scott rank ω_1^{CK} in familiar classes W. CALVERT, S. S. GONCHAROV AND J. F. KNIGHT	49
Thin classes of separating sets REED SOLOMON	67
Voting rules for infinite sets and Boolean algebras ANDREAS BLASS	87
Very mad families BART KASTERMANS	105
Borel boundedness and the lattice rounding property CHARLES M. BOYKIN AND STEVE JACKSON	113
Steinhaus sets and Jackson sets SU GAO, ARNOLD W. MILLER AND WILLIAM A. R. WEISS	127
A problem list	147

Preface

Like many other fields of mathematics, mathematical logic has experienced an explosive development since it was first recognized as a field. Nowadays logic has become such a vast subject that it is becoming more and more difficult even for experts in the field to understand each other. It has become a necessary tradition for the annual meetings of the logic community to have parallel sessions of set theory, model theory, computability theory, philosophical logic, etc., in order to accommodate the large number of talks. Logicians now travel to workshops and conferences that often target their subfields of expertise. In this seemingly inevitable culture change, many people would appreciate the opportunity to listen to talks that are more technical than surveys but at the same time more insightful than technical talks. These were the type of talks delivered in the North Texas Logic Conference. Most of the speakers made a conscious effort to relate their own research to others' subfields.

This present volume is based on the talks given in the conference. As editors, we find the papers accessible and enjoyable to read on the one hand, and a good sample of the variety of research in logic on the other.

The North Texas Logic Conference was held on October 8-10, 2004, at the University of North Texas in Denton, Texas. It was a part of a special two-year program in logic at UNT, during which time Richard Ketchersid and Mike Oliver were visiting UNT and helping with the organization of the conference.

We would like to thank the NSF for a grant DMS-0444019 to provide travel support to our invited speakers, graduate student participants and new PhDs. The College of Arts and Sciences at UNT provided generous funding for the conference. In addition, the Department of Mathematics at UNT also invited Ted Slaman to give a Millican Lecture during the conference. In addition to the local organizing effort by Richard Ketchersid and Mike Oliver, Ross Bryant, Sara Munday and Belinda Firth also helped with the conference website, registration, refreshments, computer access, local information and reimbursements. We would like to take the opportunity to thank them all for a successful conference.

Finally we would like to thank the participants, especially all the speakers, for a very interesting and fruitful conference. Last but not least, we thank the authors of the papers in this volume for their excellent contributions, and the American Mathematical Society for publishing this volume as the proceedings of the conference.

Su Gao
Steve Jackson
Yi Zhang

Titles in This Series

- 425 **Su Gao, Steve Jackson, and Yi Zhang, Editors**, *Advances in logic*, 2007
- 424 **V. I. Burenko, T. Iwaniec, and S. K. Vodopyanov, Editors**, *Analysis and geometry in their interaction*, 2007
- 423 **Christos A. Athanasiadis, Victor V. Batyrev, Dimitrios I. Dais, Martin Henk, and Francisco Santos, Editors**, *Algebraic and geometric combinatorics*, 2007
- 422 **JongHae Keum and Shigeyuki Kondō, Editors**, *Algebraic Geometry*, 2007
- 421 **Benjamin Fine, Anthony M. Gaglione, and Dennis Spellman, Editors**, *Combinatorial group theory, discrete groups, and number theory*, 2007
- 420 **William Chin, James Osterburg, and Declan Quinn, Editors**, *Groups, rings and algebras*, 2006
- 419 **Dinh V. Huynh, S. K. Jain, and S. R. López-Permouth, Editors**, *Algebra and Its applications*, 2006
- 418 **Lothar Gerritzen, Dorian Goldfeld, Martin Kreuzer, Gerhard Rosenberger, and Vladimir Shpilrain, Editors**, *Algebraic methods in cryptography*, 2006
- 417 **Vadim B. Kuznetsov and Siddhartha Sahi, Editors**, *Jack, Hall-Littlewood and Macdonald polynomials*, 2006
- 416 **Toshitake Kohno and Masanori Morishita, Editors**, *Primes and knots*, 2006
- 415 **Gregory Berkolaiko, Robert Carlson, Stephen A. Fulling, and Peter Kuchment, Editors**, *Quantum graphs and their applications*, 2006
- 414 **Deguano Han, Palle E. T. Jorgensen, and David Royal Larson, Editors**, *Operator theory, operator algebras, and applications*, 2006
- 413 **Georgia M. Benkart, Jens C. Jantzen, Zongzhu Lin, Daniel K. Nakano, and Brian J. Parshall, Editors**, *Representations of algebraic groups, quantum groups and Lie algebras*, 2006
- 412 **Nikolai Chernov, Yulia Karpeshina, Ian W. Knowles, Roger T. Lewis, and Rudi Weikard, Editors**, *Recent advances in differential equations and mathematical physics*, 2006
- 411 **J. Marshall Ash and Roger L. Jones, Editors**, *Harmonic analysis: Calderón-Zygmund and beyond*, 2006
- 410 **Abba Gumel, Carlos Castillo-Chavez, Ronald E. Mickens, and Dominic P. Clemence, Editors**, *Mathematical studies on human disease dynamics: Emerging paradigms and challenges*, 2006
- 409 **Juan Luis Vázquez, Xavier Cabré, and José Antonio Carrillo, Editors**, *Recent trends in partial differential equations*, 2006
- 408 **Habib Ammari and Hyeonbae Kang, Editors**, *Inverse problems, multi-scale analysis and effective medium theory*, 2006
- 407 **Alejandro Adem, Jesús González, and Guillermo Pastor, Editors**, *Recent developments in algebraic topology*, 2006
- 406 **José A. de la Peña and Raymundo Bautista, Editors**, *Trends in representation theory of algebras and related topics*, 2006
- 405 **Andrew Markoe and Eric Todd Quinto, Editors**, *Integral geometry and tomography*, 2006
- 404 **Alexander Borichev, Håkan Hedenmalm, and Kehe Zhu, Editors**, *Bergman spaces and related topics in complex analysis*, 2006
- 403 **Tyler J. Jarvis, Takashi Kimura, and Arkady Vaintrob, Editors**, *Gromov-Witten theory of spin curves and orbifolds*, 2006
- 402 **Zvi Arad, Mariagrazia Bianchi, Wolfgang Herfort, Patrizia Longobardi, Mercedes Maj, and Carlo Scoppola, Editors**, *Ischia group theory 2004*, 2006
- 401 **Katrin Becker, Melanie Becker, Aaron Bertram, Paul S. Green, and Benjamin McKay, Editors**, *Snowbird lectures on string geometry*, 2006

TITLES IN THIS SERIES

- 400 **Shiferaw Berhanu, Hua Chen, Jorge Hounie, Xiaojun Huang, Sheng-Li Tan, and Stephen S.-T. Yau, Editors**, Recent progress on some problems in several complex variables and partial differential equations, 2006
- 399 **Dominique Arlettaz and Kathryn Hess, Editors**, An Alpine anthology of homotopy theory, 2006
- 398 **Jay Jorgenson and Lynne Walling, Editors**, The ubiquitous heat kernel, 2006
- 397 **José M. Muñoz Porras, Sorin Popescu, and Rubí E. Rodríguez, Editors**, The geometry of Riemann surfaces and Abelian varieties, 2006
- 396 **Robert L. Devaney and Linda Keen, Editors**, Complex dynamics: Twenty-five years after the appearance of the Mandelbrot set, 2006
- 395 **Gary R. Jensen and Steven G. Krantz, Editors**, 150 Years of Mathematics at Washington University in St. Louis, 2006
- 394 **Rostislav Grigorchuk, Michael Mihalik, Mark Sapir, and Zoran Šunić, Editors**, Topological and asymptotic aspects of group theory, 2006
- 393 **Alec L. Matheson, Michael I. Stessin, and Richard M. Timoney, Editors**, Recent advances in operator-related function theory, 2006
- 392 **Stephen Berman, Brian Parshall, Leonard Scott, and Weiqiang Wang, Editors**, Infinite-dimensional aspects of representation theory and applications, 2005
- 391 **Jürgen Fuchs, Jouko Mickelsson, Grigori Rozenblioum, Alexander Stolin, and Anders Westerberg, Editors**, Noncommutative geometry and representation theory in mathematical physics, 2005
- 390 **Sudhir Ghorpade, Hema Srinivasan, and Jugal Verma, Editors**, Commutative algebra and algebraic geometry, 2005
- 389 **James Eells, Etienne Ghys, Mikhail Lyubich, Jacob Palis, and José Seade, Editors**, Geometry and dynamics, 2005
- 388 **Ravi Vakil, Editor**, Snowbird lectures in algebraic geometry, 2005
- 387 **Michael Entov, Yehuda Pinchover, and Michah Sageev, Editors**, Geometry, spectral theory, groups, and dynamics, 2005
- 386 **Yasuyuki Kachi, S. B. Mulay, and Pavlos Tzermias, Editors**, Recent progress in arithmetic and algebraic geometry, 2005
- 385 **Sergiy Kolyada, Yuri Manin, and Thomas Ward, Editors**, Algebraic and topological dynamics, 2005
- 384 **B. Diarra, A. Escassut, A. K. Katsaras, and L. Narici, Editors**, Ultrametric functional analysis, 2005
- 383 **Z.-C. Shi, Z. Chen, T. Tang, and D. Yu, Editors**, Recent advances in adaptive computation, 2005
- 382 **Mark Agranovsky, Lavi Karp, and David Shoikhet, Editors**, Complex analysis and dynamical systems II, 2005
- 381 **David Evans, Jeffrey J. Holt, Chris Jones, Karen Klintworth, Brian Parshall, Olivier Pfister, and Harold N. Ward, Editors**, Coding theory and quantum computing, 2005
- 380 **Andreas Blass and Yi Zhang, Editors**, Logic and its applications, 2005
- 379 **Dominic P. Clemence and Guoqing Tang, Editors**, Mathematical studies in nonlinear wave propagation, 2005
- 378 **Alexandre V. Borovik, Editor**, Groups, languages, algorithms, 2005

For a complete list of titles in this series, visit the
AMS Bookstore at www.ams.org/bookstore/.

The articles in this book are based on talks given at the North Texas Logic Conference in October of 2004. The main goal of the editors was to collect articles representing diverse fields within logic that would both contain significant new results and be accessible to readers with a general background in logic. Included in the book is a problem list, jointly compiled by the speakers, that reflects some of the most important questions in various areas of logic. This book should be useful to graduate students and researchers alike across the spectrum of mathematical logic.

ISBN 978-0-8218-3819-8



9 780821 838198

CONN/425

AMS *on the Web*
www.ams.org