DIMACS
Series in Discrete Mathematics and Theoretical Computer Science

Volume 34

African Americans in Mathematics

DIMACS Workshop
June 26–28, 1996

Nathaniel Dean
Editor

American Mathematical Society
Selected Titles in This Series

34 Nathaniel Dean, Editor, African Americans in Mathematics
33 Ravi B. Boppana and James F. Lynch, Editors, Logic and random structures
32 Jean-Charles Grégoire, Gerard J. Holzmann, and Doron A. Peled, Editors, The SPIN verification system
31 Neil Immerman and Phokion G. Kolaitis, Editors, Descriptive complexity and finite models
30 Sandeep N. Bhatt, Editor, Parallel Algorithms: Third DIMACS Implementation Challenge
29 Doron A. Peled, Vaughan R. Pratt, and Gerard J. Holzmann, Editors, Partial Order Methods in Verification
28 Larry Finkelstein and William M. Kantor, Editors, Groups and Computation II
27 Richard J. Lipton and Eric B. Baum, Editors, DNA Based Computers
26 David S. Johnson and Michael A. Trick, Editors, Cliques, Coloring, and Satisfiability: Second DIMACS Implementation Challenge
25 Gilbert Baumslag, David Epstein, Robert Gilman, Hamish Short, and Charles Sims, Editors, Geometric and Computational Perspectives on Infinite Groups
23 Panos M. Pardalos, David I. Shalloway, and Guoliang Xue, Editors, Global Minimization of Nonconvex Energy Functions: Molecular Conformation and Protein Folding
22 Panos M. Pardalos, Mauricio G. C. Resende, and K. G. Ramakrishnan, Editors, Parallel Processing of Discrete Optimization Problems
21 D. Frank Hsu, Arnold L. Rosenberg, and Dominique Sotteau, Editors, Interconnection Networks and Mapping and Scheduling Parallel Computations
20 William Cook, László Lovász, and Paul Seymour, Editors, Combinatorial Optimization
19 Ingemar J. Cox, Pierre Hansen, and Bela Julesz, Editors, Partitioning Data Sets
17 Eric Sven Ristad, Editor, Language Computations
16 Panos M. Pardalos and Henry Wolkowicz, Editors, Quadratic Assignment and Related Problems
15 Nathaniel Dean and Gregory E. Shannon, Editors, Computational Support for Discrete Mathematics
14 Robert Calderbank, G. David Forney, Jr., and Nader Moayeri, Editors, Coding and Quantization: DIMACS/IEEE Workshop
13 Jin-Yi Cai, Editor, Advances in Computational Complexity Theory
12 David S. Johnson and Catherine C. McGeoch, Editors, Network Flows and Matching: First DIMACS Implementation Challenge
11 Larry Finkelstein and William M. Kantor, Editors, Groups and Computation
10 Joel Friedman, Editor, Expanding Graphs
9 William T. Trotter, Editor, Planar Graphs
8 Simon Gindikin, Editor, Mathematical Methods of Analysis of Biopolymer Sequences
7 Lyle A. McGeoch and Daniel D. Sleator, Editors, On-Line Algorithms
6 Jacob E. Goodman, Richard Pollack, and William Steiger, Editors, Discrete and Computational Geometry: Papers from the DIMACS Special Year
5 Frank Hwang, Fred Roberts, and Clyde Monma, Editors, Reliability of Computer and Communication Networks
4 Peter Gritzmann and Bernd Sturmfels, Editors, Applied Geometry and Discrete Mathematics, The Victor Klee Festschrift
3 E. M. Clarke and R. P. Kurshan, Editors, Computer-Aided Verification '90

(Continued in the back of this publication)
List of Participants in the Group Photograph

1. Dr. William A. Massey (organizer)
2. Dr. Nathaniel Dean (organizer)
3. Dr. Eldon McIntyre
4. Tamika Thompson
5. Katrina K. Ashford
6. Sophia Reid
7. Djuan Lea
8. Cassandra McZeal
9. Louise Brown
10. Dr. Stella Ashford
11. Carolyn Coleman
12. Kossi Delali Edoh
13. Alain Togbe
14. Dr. Oneska Mack-Humphrey
15. Gregory L. Allen
16. Diana Dismus-Campbell
17. Robert C. Stolz
18. Dr. Camille A. McKayle
19. Dr. Earl R. Barnes
20. Dr. Danielle D. Carr
21. Dr. Dawn A. Lott-Crumpler
22. Fredrick Onyango Rege
23. Atiya N. Hoey
24. Tasha R. Inniss
25. Jason M. Lewis
26. Kori Needham
27. Alfred Noel
28. Dr. Floyd Williams
29. Daryl R. Brydie
30. Dr. Don Hill
31. Angela E. Grant
32. Rod Moten
33. Dr. Johnny L. Houston
34. Dr. Curtis Clark, Jr.
35. Dr. Fern Hunt
36. Dr. Melvin R. Currie
37. Sirbrittie Grant
38. Martin Khumbah
39. Dr. Scott Williams
40. Glo Williams
41. Charles Boxill
42. Dr. Leon C. Woodson
43. Dr. Sylvester Reese
44. Kimani Stancil
45. Harold Young
46. Dr. Charles Thompson
47. Robert McDonald
48. Dr. Carolyn Mahoney
49. Asamoah Nkwant
50. Lemuel R. Riggins
51. Brad Gray
52. Dr. Isom Herron
53. Michael O. Keeve
54. Dr. Donald R. King
55. Michael Gatlin
56. Nonetta M. Pierre
57. Dr. Lee Lorch
58. Illya Hicks
60. James A. DeBardelaben
61. Otis B. Jennings
62. Gene Jarrett
63. Craig J. Sutton
64. Dion Stevens
65. Tyrone E. McCoy, Jr.
66. Dr. Debra Curtis
67. Idris Stovall
68. John Sims
69. Dr. Nathanial Whittaker
70. Dr. Arthur Grainger
71. Dr. Jonathan David Farley
72. Dr. Donald F. St. Mary
73. Dr. James A. Donaldson
74. Cyril Coumarbatch
75. Mark Lewis
76. Jimmie L. Davis, Jr.
This page intentionally left blank
African Americans in Mathematics

DIMACS Workshop
June 26–28, 1996

Nathaniel Dean
Editor
This DIMACS volume includes papers by invited speakers and poster presenters at
the Second Conference for African-American Researchers in the Mathematical Sciences,
held at DIMACS June 26–28, 1996. It also includes papers on issues related to African-
American involvement in the mathematical sciences.

Supported in part by the Sloan Foundation and AT&T Labs.

1991 Mathematics Subject Classification. Primary 00B15, 00B25, 01A80.

Library of Congress Cataloging-in-Publication Data
Conference for African-American Researchers in the Mathematical Sciences (2nd : 1996 : Center
for Discrete Mathematics and Theoretical Computer Science)
African Americans in mathematics : Second Conference for African-American Researchers in
the Mathematical Sciences, June 26–28, 1996 / Nathaniel Dean, editor.
p. cm. — (DIMACS series in discrete mathematics and theoretical computer science, ISSN
1052-1798 ; v. 34)
Held at the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) at
Rutgers University in Piscataway, N.J.
"NSF Science and Technology Center in Discrete Mathematics and Theoretical Computer
Science, a consortium of Rutgers University, Princeton University, AT&T Labs, Bell Labs, and
Bellcore."
Includes bibliographical references.
1. Mathematics—Congresses. 2. Afro-American mathematicians—Congresses. I. Dean, Nathaniel, 1956-. II. NSF Science and Technology Center in Discrete Mathematics and Theo-
retical Computer Science. III. Title. IV. Series.
QA1.C623 1996
510—DC21 97-21748
CIP

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 Assistant to the Publisher, American Mathematical Society,
P.O. Box 6248, Providence, Rhode Island 02940-6248. 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.)

© 1997 by the American Mathematical Society. All rights reserved.
The American Mathematical Society retains all rights
except those granted to the United States Government.
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 homepage at URL: http://www.ams.org/
10 9 8 7 6 5 4 3 2 1 02 01 00 99 98 97
# Contents

Foreword ix  
Preface xi  

**Part I. Invited Research Talks**

1. Chain decomposition theorems for ordered sets and other musings  
   **Jonathan David Farley** 3  
2. Unimodality and the independent set numbers of matroids  
   **Carolyn R. Mahoney** 15  
3. On achieving channels in a bipolar game  
   **Curtis Clark** 23  
4. Discrete approximation of invariant measures for multidimensional maps  
   **Walter M. Miller** 29  
5. Some numerical methods for a maximum entropy problem  
   **Nathaniel Whitaker** 47  
6. Hydrodynamic stability, differential operators and spectral theory  
   **Isom H. Herron** 57  
7. The role of Selberg's trace formula in the computation of Casimir energy for certain Clifford-Klein space-times  
   **Floyd L. Williams** 69  
8. Some dynamics on the irrationals  
   **Scott W. Williams** 83

**Part II. Poster Presentations**

1. Finding elliptic curves defined over $\mathbb{Q}$ of high rank  
   **Garikai Campbell** 107  
2. Symplectic matrix structure in numerical integration  
   **Michael Keeve** 111  
3. A numerical algorithm for the computation of invariant circles  
   **Kossi Edoh** 117
Classification of nilpotent orbits in symmetric spaces
   ALFRED G. NOËL  123
Evaluating texture measures for low-level features in color images of human skin
   KORI E. NEEDHAM  129
Lattice paths and RNA secondary structures
   ASAMOAH NKWANTA  137
Nuprl as a concurrent interactive theorem prover
   RODERICK MOTEN  149

Part III. Historical Articles

   Yesterday, today and tomorrow
   LEE LORCH  157

   The challenge of diversity
   ETTA Z. FALCONER  169

   What next? A meta-history of black mathematicians
   PATRICIA CLARK KENSCHAF  183

   A personal history of the origins of the National Association of Mathematicians’ “Presentations by Recipients of Recent Ph.D.’s”
   DONALD M. HILL  187

   Dr. J. Ernest Wilkins, Jr.: The man and his works
   NKECHI AGWU AND ASAMOAH NKWANTA  195
Foreword

The “Second Conference for African-American Researchers in the Mathematical Sciences” was held at DIMACS, the Institute for Advanced Study, and the research facilities of Bell Labs and AT&T Labs in Murray Hill in June 1996. DIMACS expresses its thanks to Nate Dean and William Massey for their tireless efforts to organize this program and produce this volume. DIMACS was honored to be a partner in this conference dedicated to showcasing and advancing research by African-American mathematicians.

DIMACS gratefully acknowledges the generous support that makes these programs possible. The National Science Foundation, through its Science and Technology Center program; the New Jersey Commission on Science and Technology; DIMACS partners at Rutgers, Princeton, AT&T Labs, Bell Labs, and Bellcore generously support all DIMACS programs. We would like to express our thanks to the Institute for Advanced Study, the Sloan Foundation, AT&T Labs, and Bell Labs for additional support and use of facilities that contributed successfully to making this program one of national significance.

Fred S. Roberts
Director

Bernard Chazelle
Co-Director for Princeton

Stephen R. Mahaney
Associate Director
Preface

The Second Conference for African-American Researchers in the Mathematical Sciences was held for three days at the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) at Rutgers University in Piscataway, New Jersey, June 26-28, 1996. It was organized by Nathaniel Dean and William A. Massey, both of Bell Laboratories, the research division of Lucent Technologies. The main goal of the conference was to highlight current research by African-American researchers and graduate students in mathematics, to strengthen the mathematical sciences by encouraging the increased participation of African-American and underrepresented groups, to facilitate working relationships between them, and to help cultivate their careers.

We had over 100 researchers and graduate students in attendance who were exposed to a variety of technical and cultural events. Participants were introduced to some of the major research centers in New Jersey: DIMACS at Rutgers University in Piscataway, the Institute for Advanced Study (IAS) in Princeton, as well as Bell Laboratories and AT&T Labs who were both located in Murray Hill. Visiting all these research institutions was a first for most of the participants. There were twelve one-hour invited technical talks given by researchers spanning a variety of mathematical and scientific disciplines. At IAS we held group discussions, led by Fern Hunt (NIST) and Camille McKayle (Lafayette College) that focused on issues surrounding minority participation in mathematics, such as: The Career Life Cycle of an African-American Mathematician; Jobs of the Present, Jobs of the Future; The Public Image of Mathematics and Mathematicians in the African-American Community; and Affirmative Action. At Murray Hill, a select group of 17 graduate students presented their current research during the poster session where they interacted in smaller groups with conference attendees as well as researchers both from Bell Labs and AT&T Labs. This volume includes papers by the invited speakers and poster presenters as well as papers on issues related to African-American involvement in the mathematical sciences.

We wish to thank the staff at DIMACS for helping to organize and host this event. We thank DIMACS, the Sloan Foundation, and AT&T Labs
for providing funds, and we thank DIMACS, Bell Labs, and IAS for the use of their facilities. We would also like to thank the participants of the conference, the authors, the anonymous referees, and Christine M. Thivierge of AMS for helping with this event and the preparation of this volume.

Nathaniel Dean & William A. Massey
March 1997
This page intentionally left blank
Selected Titles in This Series

(Continued from the front of this publication)

2 Joan Feigenbaum and Michael Merritt, Editors, Distributed Computing and Cryptography
1 William Cook and Paul D. Seymour, Editors, Polyhedral Combinatorics