CONTEMPORARY MATHEMATICS

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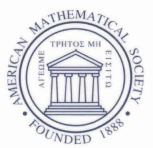
Mathematical Studies in Nonlinear Wave Propagation

NSF-CBMS Regional Research Conference on
Mathematical Methods in Nonlinear Wave Propagation
North Carolina A&T State University
Greensboro, North Carolina
May 15–19, 2002

Dominic P. Clemence
Guoqing Tang
Editors



American Mathematical Society

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The NSF-CBMS Regional Research Conference on "Mathematical Methods in Nonlinear Wave Propagation" was held at North Carolina A&T State University, Greensboro, North Carolina, May 15–19, 2002.

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Contents

Preface

The NSF-CBMS Regional Research Conference, "Mathematical Methods in Nonlinear Wave Propagation", was hosted by the Mathematics Department at North Carolina A&T State University, May 15-19, 2002. The five-day-long conference was intended to stimulate interest and activity in the study of nonlinear wave phenomena, with encouraging minority participation as a stated priority. The proceedings were anchored by ten lectures on wave propagation in nonlinear fiber optics, delivered by Professor J. K. Shaw of Virginia Tech, with supporting lectures and semi-structured discussion sessions by other researchers in nonlinear mathematics. Participants included faculty and other postdoctoral researchers, as well as graduate and undergraduate students, with participation mostly from within North Carolina. The conference anchor lectures were chosen to give a focal subject of application to a diverse set of specialized mathematical areas, thus creating opportunities for collaborations amongst mathematicians of different specialties, and at the same time laying a foundation for interdisciplinary collaboration.

The ten principal lectures gave a fiber optics communications overview and addressed both modeling as well as mathematical issues; these have been published as the CBMS conference series monograph, "Mathematical Principles of Optical Fiber Communications". The present volume is a collection of the supporting lectures given at the conference as well as papers which grew out of poster presentations and ensuing discussions. It is expected to be a useful research companion of the monograph accessible to diverse mathematical specialists interested in fiber optic communications and other nonlinear phenomena, as well as to engineers and other scientists interested in the mathematics of nonlinear wave propagation; the volume is envisaged as an easily accessible reference for interdisciplinary collaboration.

The meeting offered opportunities for collaboration amongst mathematicians of different specialties, while at the same time laying a foundation for interdisciplinary collaboration. While the majority of participants were mathematicians, others represented engineering disciplines and physics. The 44 registered participants represented 14 universities, 2 NASA research centers, and three private firms. While participation was mainly from within the state, 10 other states and one foreign nation were represented. Although only 3 HBCU's were represented, 21 participants were African-American minorities.

On each of the first four days of the conference, four lectures were given, two by Professor Shaw and two by other invited speakers, followed by informal discussion sessions; the last day ended at lunch following Professor Shaw's final two lectures. Active experts came from dynamical systems and chaos, scattering and

spectral theory, nonlinear wave equations, optimal control, optical waveguide design, and numerical simulation. In addition to the main lectures, structured discussion sessions were offered in the afternoons, as well as poster presentations on Saturday. In addition to Professor Shaw's outline, all abstracts were distributed to all participants at the beginning of the conference. The following delivered one or two lectures each: Tuncay Aktosun (Mississippi State University, Mathematics), Bolindra Borah (North Carolina A&T State University, Mathematics). Sin-Chung Chang (NASA, Glenn, Engineering), Martin Klaus (Virginia Tech, Mathematics), Ching Ken Loh (NASA, Taitech, Engineering), Ronald Mickens (Clark Atlanta University, Physics), William H. Prosser (NASA, Langley, Engineering), Jianke Yang (University of Vermont, Mathematics).

All conference lectures were held in Marteena Hall (home of the Mathematics and Physics Departments) on the campus of North Carolina A&T State University. A block of rooms was reserved at the Drury Inn, Greensboro. Scheduled transportation between the hotel and the conference venue was provided. On Wednesday evening, a reception was hosted by the Dean of the College of Arts and Sciences, Dr. Caesar R. Jackson, followed by a dinner hosted by the Vice Chancellor for Research, Dr. Earnestine Psalmonds.

The local organizing committee consisted of Shea D. Burns, Mingxiang Chen, Dominic P. Clemence (co-chair), Janis Oldham, and Guoqing Tang (co-chair), all of NC A&T State University Mathematics Department. The organizers are grateful for logistical assistance from Ms. Belinda Clemence of the Mathematics and Sciences Learning Resource Center, which hosted the lunches, Ms. Sharon Goins and Ms. Patricia Shelton of the Mathematics Department, as well as Mathematics and Physics graduate students Courtney Davis, Mookesh Dhanasar, Michelle Massey, and Tenesha Young.

We thank the National Science Foundation and the Conference Board of Mathematical Sciences for financially supporting the conference. We are also grateful to both NSF (DPC,GT) and NASA (DPC) for supporting the preparation of this volume.

Dominic P. Clemence
NC A&T State University

Guoqing Tang
NC A&T State University

List of Participants

Tuncay Aktinson
Mississippi State University

John Baxley
Wake Forest University

Bolindra Borah
NC A&T State University

Jason Bullock
NC A&T State University

Van Burbach
Pyramid Environmental
Greensboro

Shea D. Burns
NC A&T State University

Mingxiang Chen
NC A&T State University

Sin-Chung Chang
NASA - Glenn Research Center

James Chew
NC A&T State University

Maya Chhetri
University of North Carolina at
Greensboro

Belinda Clemence
NC A&T State University

Dominic P. Clemence
NC A&T State University

Courtney Davis
NC A&T State University

Mookesh Dhanasar
NC A&T State University

Thembekile P. Dube
NC State University

Kofi Fadimba
University of Rhode Island

Virginia Fluitt
NC A&T State University

Justin Foster
NC A&T State University

Roy Goodman
NJ Institute of Technology

Wenzhang Huang
University of Alabama at Huntsville

Frank Ingram
NC State University

Flloyd James
NC A&T State University

Abebe Kebede
NC A&T State University

Mark E. Kithcart
NC A&T State University

Martin Klaus
Virginia Tech

Ching Y. Loh
NASA - Taitech
Glenn Research Center

Michelle Massey
NC A&T State University

Ronald Mickens
Clark Atlanta University

Gaston N'guerekata
Morgan State University

Janis M. Oldham
NC A&T State University

Hwa-Hyang Park
NC A&T State University

William H. Prosser
NASA - Langley Research Center

J. Kenneth Shaw
Virginia Tech

Pete Schultz
Clarkson College

Bhekimpilo Sibanda
University of Zimbabwe

Valentino Simpao
Mathematical Consulting Services
Hopkinsville, Kentucky

Stephen Robinson
Wake Forest University

Lois Simon
Morgan State University

Alexandra Smirnova
Georgia State University

Wilbur L. Smith
NC A&T State University

Guoqing Tang
NC A&T State University

Niccassia Williams
Morgan State University

Jianke Yang
University of Vermont

Tenesha Young
NC A&T State University

Titles in This Series

379 **Dominic P. Clemence and Guoqing Tang, Editors,** Mathematical studies in nonlinear wave propagation, 2005

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Lively discussions and stimulating research were part of a five-day conference on Mathematical Methods in Nonlinear Wave Propagation sponsored by the NSF and CBMS. This volume is a collection of lectures and papers stemming from that event. Leading experts present dynamical systems and chaos, scattering and spectral theory, nonlinear wave equations, optimal control, optical waveguide design, and numerical simulation.

The book is suitable for a diverse audience of mathematical specialists interested in fiber optic communications and other nonlinear phenomena. It is also suitable for engineers and other scientists interested in the mathematics of nonlinear wave propagation.

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