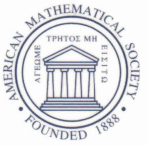
CONTEMPORARY MATHEMATICS

428

Harmonic Analysis, Partial Differential Equations, and Related Topics

Fifth Prairie Analysis Seminar
October 14–15, 2005
Kansas State University
Manhattan, Kansas

Estela A. Gavosto
Marianne K. Korten
Charles N. Moore
Rodolfo H. Torres
Editors



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Preface

These are the proceedings of the fifth annual Prairie Analysis Seminar held on the campus of Kansas State University in Manhattan, Kansas on October 14 and 15, 2005. This annual meeting is sponsored by the Departments of Mathematics of Kansas State University and the University of Kansas and alternates between the two campuses.

Since its inception, this series of conferences has had a unique format. A main speaker is chosen to give two one-hour lectures. In consultation with the main speaker, two other speakers are selected who each give a one-hour lecture. This serves to give the conference an emphasis and a focus. In addition, there is time for many contributed talks, most of which are usually on related topics. It has always been an important aspect of the meeting to provide an opportunity for those early in their careers to present their work and gain exposure.

Professor Carlos Kenig, the Louis Block Professor in the Department of Mathematics of the University of Chicago, graciously accepted the organizers' invitation to be the main speaker at the conference. For the hour lectures, he suggested inviting Professors Alexandru Ionescu of the University of Wisconsin and James Colliander of the University of Toronto, who were also very kind in accepting our invitation.

In addition to the lectures of these main speakers there were 21 contributed talks.

The mathematics presented at the conference and in this volume has roots in classical analysis, harmonic analysis, functional analysis, and differential equations, and represents the many directions in which these areas have evolved as well as the many very fruitful interactions between them.

This conference was made possible through funding from the National Science Foundation through grant DMS 0531048, the Mathematical Sciences Research Institute, Berkeley, and the Department of Mathematics of Kansas State University through the Isidore and Hilda Dressler Endowment for the Enrichment of Mathematics. We are very grateful for their support.

We would also like to thank the secretarial staff of the Department of Mathematics at Kansas State University for their invaluable assistance, including Sheree Walsh, Teresa Cabanting and Reta McDermott. Further thanks go to the many graduate students who helped with the numerous small details involved with organizing a conference.

For their efforts, we are grateful to the referees of the manuscripts submitted to these proceedings, and the invaluable suggestions they made to the authors.

Finally, and importantly, the organizers would like to thank all the participants of the conference and especially those who contributed to this volume.

The organizers and proceedings editors,

Estela A. Gavosto, Marianne K. Korten, Charles N. Moore and Rodolfo H. Torres
Manhattan and Lawrence, Kansas
August 2006

Program of the Fifth Prairie Analysis Seminar

Friday, October 14

12:00-12:25 Registration

12:25-12:30 Welcome Remarks

12:30-12:50 *Global solutions for a class of 2D NLS equations,*
Slim Ibrahim, McMaster University

12:55-1:15 *Bellman function method: sharp constants in the John-Nirenberg inequality and other recent developments,*
Leonid Slavin, University of Connecticut

1:20-1:40 *On the p-dependence property of Calderón-Zygmund theory,*
Loukas Grafakos, University of Missouri

1:45-2:05 *Failure of an endpoint inhomogeneous Strichartz estimate,*
Virginia Naibo, Rose-Hulman Institute of Technology

2:20-3:20 *Quantitative unique continuation theorems for dispersive equations I,*
Carlos Kenig, University of Chicago

3:20-3:40 Tea Time

3:40-4:40 *On the blowup solutions of the nonlinear Schrödinger equation with low regularity initial data,*
James Colliander, University of Toronto

4:55-5:15 *Quasi-conformal maps with convex potentials,*
Diego Maldonado, University of Maryland

5:20-5:40 *Improved Painlevé removability for bounded quasiregular mappings in the plane,*
Ignacio Uriarte-Tuero, University of Missouri

5:45-6:05 *Dissipative 2D quasi-geostrophic equations,*
Ning Ju, Oklahoma State University

6:10-6:30 *Volterra integral inclusions: existence of solutions,*
Priscilla Macansantos, University of the Philipines

8:00 Reception at Marianne Korten's home

Saturday, October 15

8:00-8:20 *An efficient method for band-limited extrapolation by regularization*
Weidong Chen, Kansas State University

8:25-8:45 *On the 3n+1 conjecture,*
Mohammad Riazi-Kermani, Fort Hays State University

8:50-9:10 *An almost-orthogonality principle for directional maximal functions,*
Maria Alfonseca, Kansas State University

9:15-9:35 *Cluster points and asymptotic values of planar harmonic functions,*
Genevra Neumann, Kansas State University

9:40-10:00 *Operator theory on the Hardy space over the polydisc,*
Xiang Fang, Kansas State University

10:05-10:30 Coffee Break

10:30-10:50 *Cosine expansions with nonnegative coefficients,*
Anatolii Grinshpan, Oklahoma State University

10:55-11:15 *Hankel operators and product VMO,*
Erin Terwilleger, University of Connecticut

11:20-11:40 *Weights and integrability for parabolic and elliptic gradients,*
Caroline Sweezy, New Mexico State University

11:45-12:05 *A_p weights on domains and an extrapolation theorem,*
Ryan Berndt, Ohio State University

12:10- 1:10 Lunch provided by the Department of Mathematics

1:10-1:30 *The Hele-Shaw problem as a mesa limit of Stefan problems: existence, uniqueness and regularity of the free boundary,*
Ivan Blank, Worcester Polytechnic Institute

1:35-1:55 *Blowup solutions of some nonlinear elliptic equations involving exponential nonlinearities,*
Lei Zhang, University of Florida

2:00-3:00 *Quantitative continuation theorems for dispersive equations II,*
Carlos Kenig, University of Chicago

3:00-3:20 Tea Time

3:30-4:20 *Low regularity solutions of the Benjamin-Ono and KP-I equations,*
Alexandru Ionescu, University of Wisconsin

4:30-4:50 *The Dirichlet problem for infinitely degenerate quasilinear equations,*
Cristian Rios, Trinity College

4:55-5:15 *Applications of nonsmooth analysis to optimal control,*
Lianwen Wang, Central Missouri State University

5:20 Discussion and Open Problems

This collection of contributed articles comprises the scientific program of the fifth annual Prairie Analysis Seminar. All articles represent important current advances in the areas of partial differential equations, harmonic analysis, and Fourier analysis. A range of interrelated topics is presented, with articles concerning Painlevé removability, pseudodifferential operators, A_p weights, nonlinear Schrödinger equations, singular integrals, the wave equation, the Benjamin–Ono equation, quasi-geostrophic equations, quasiconformal mappings, integral inclusions, Bellman function methods, weighted gradient estimates, Hankel operators, and dynamic optimization problems.

Most importantly, the articles illustrate the fruitful interaction between harmonic analysis, Fourier analysis, and partial differential equations, and illustrate the successful application of techniques and ideas from each of these areas to the others.

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