

2002 ANNUAL REPORT

Mathematics and Statistics

Direction of Individual Student Work:

Theses

[Datta]

Israel Hora, *Time Series Analysis of Georgia Employment Data and Future Prediction of Employment Status*, graduated Fall, 2002.

[Hsu] Wei Xu, Classification Analyses of the Spectroscopic Evaluation of Cervical Cancer.

[Patterson] Tiffany Stembridge, Density Estimation and Bootstrapping.

Publications

Books

M³, Myers' Methods for Mastering the GMAT (second edition), by Carol Myers

Methods of Qualitative Theory for Nonlinear Dynamics, Part I, World Scientific Publ., by **Andrey Shilnikov**, Leonid Shilnikov, Dmitry Turaev and Leon Chua.

Articles, Essays, and Chapters

R.B.Alexeev and **A.B.Smirnova**, Regularization of nonlinear unstable operator equations by secant methods with application to gravitational sounding problem. Inverse problems, image analysis, and medical imaging *AMS Contemporary Mathematics Series*, **313**, (2002) 1-17.

M. Bakonyi, The extension of positive definite operator-valued functions defined on a symmetric subset of an ordered group, *Proceedings of the American Mathematical Society*, **130 (5)** (2002), 1401-1406.

G. Chen, R.J. Faudree and M.S. Jacobson, Fragile graphs with small independent cuts, *Journal of Graph Theory* **41** (2002), 327-341.

G. Chen, A. Saito, B. Wei, and X. Zhang, The hamiltonicity of bipartite graphs involving neighborhood unions, *Discrete Mathematics*, **249** (2002), 45-56.

G. Chen and X. Yu, A note on fragile graphs, *Discrete Mathematics*, **249** (2002), 41-43.

G. Chen and X. Yu, Longest cycles in 3-connected graphs, *Journal of Combinatorial Theory Series B*, **86(1)** (2002), 80-99.

S. Datta and J. Arnold. Some comparisons of clustering and classification techniques applied to transcriptional profiling data. In *Advances in Statistics, Combinatorics and Related Areas*, Eds.: C. Gulati, Y-X. Lin, S. Mishra, and J. Rayner, World Scientific, (200) 63-74.

- G. Davis** and G. Domke, 3-Circulant Graphs, *Journal of Combinatorial Mathematics and Combinatorial Computing*, **40** (2002), 133-142.
- G. Davis, G. Domke** and C. Garner, Jr, 4-Circulant Graphs, *Ars Combinatoria*, **65** (2002), 97-110.
- G.S. Domke, J.H. Hattingh**, L.R. Markus and E. Ungerer, On parameters related to strong and weak domination in graphs, *Discrete Mathematics* **258** (2002) 1 – 11.
- F. Hall, Z. Li** and J. Stuart, Irreducible powerful ray pattern matrices, *Linear Algebra and its Applications*, **342**(2002), 47-58.
- J. D. Hamkins**, Infinite time turing machines, *Minds and Machines*, **12(4)** (2002), 521-539 (Special issue devoted to hypercomputation).
- J. D. Hamkins** and A. W. Apter, Indestructibility and the level-by-level agreement between strong compactness and supercompactness, *Journal of Symbolic Logic*, **67(2)** (2002), 820-840.
- J. D. Hamkins**, D. Fishkind and B. Montero, New inconsistencies in infinite utilitarianism, *Australasian Journal of Philosophy*, **80(2)** (2002), 178-190.
- J. D. Hamkins** and A. Lewis, Post's problem for supertasks has both positive and negative solutions, *Archive for Mathematical Logic*, **1(6)** (2002), 507-523.
- J.H. Hattingh** and D. Rautenbach, Further results on weak domination in graphs, *Utilitas Mathematica* **61** (2002), 193-207.
- H. He**, Unitary Representations and Theta Correspondence for Type I Classical Groups, *Journal of Functional Analysis*, 2002.
- H. He**, Compactification of Classical Groups, *Communications in Analysis and Geometry*, **10(4)** (2002), 709-740.
- Z. Li** and L. Harris, Sign Patterns That Require All Distinct Eigenvalues, *JP Journal of Algebra and Number Theory and Applications* **2 (2)** (2002), 161-179.
- Z. Li, F. Hall** and J. Stuart, Irreducible Powerful Ray Pattern Matrices, *Linear Algebra and its Applications* **342** (2002), 47-58.
- V. Patrangenaru**, On the 3D Riemannian homogeneous spaces of positive curvature, *Algebra Geom. Appl. Semin. Proc.* **2** (2002), 4-11.
- V. Patrangenaru**, Five dimensional strictly locally homogeneous Riemannian manifolds, *Periodica Math. Hungarica*, **45 (1)** (2002), 87-93.
- V. Patrangenaru** and R.N. Bhattacharya, Nonparametric estimation of location and dispersion on Riemannian manifolds, *Journal of Statistical Planning and Inference*, **108** (2002), 23-35.
- V. Patrangenaru** and K.V. Mardia, A bootstrap approach to Pluto's origin , *Journal of Applied Statistics*, **29** (2002), 935-943.

G. Qin and M. Tsao, Empirical likelihood ratio confidence interval for the trimmed mean. *Commun. in Statist., Theory and Methods*, **31** (2002), 2197–2208.

A.Smirnova and A.G.Ramm, Continuous regularized Gauss-Newton-type algorithm for nonlinear ill-posed equations with simultaneous updates of inverse derivative. *Intern. Journal of Pure and Appl. Math.*, **2(1)** (2002), 23-34.

Y. Zhao and I.W. McKeague, Simultaneous inference for ratios of survival functions via empirical likelihood, *Statistics and Probability Letters* **60** (2002), 405-415.

Chapters

J. D. Hamkins, How tall is the automorphism tower of a group?, *Logic and Algebra*, AMS Contemporary Mathematics Series, **302** (2001).

Presentations at Professional Meetings

[Bakonyi]

- The Commutant Lifting Theorem for Ordered Groups, International Conference on Factorization, Singular Operators, and Related Topics, Madeira, Portugal, January 2002 (contributed).
- The Commutant Lifting Theorem for Ordered Groups, Third Linear Algebra Workshop, Bled, Slovenia, June 2002.
- The Commutant Lifting Theorem for Ordered Groups, Belfast Day In Functional Analysis, Queens University, Belfast, Northern Ireland, November 2002 (contributed).

[Chen]

- Graph minors and linkages, 15th Cumberland Conference on Graph Theory, Combinatorics, and Computing, Oxford, MS, May 2002.
- Cycles in Digraphs, 982 AMS Southeastern Section Meeting, Orlando, FL, November 2002.

[Datta]

- SCRA 2002-FIM IX: Ninth International Conference of Forum for Interdisciplinary Mathematics on Statistics, Combinatorics and Related Areas, Department of Statistics and Department of Mathematics: University of Allahabad, Allahabad, UP 211 002, India, Comparisons of clustering algorithms for grouping genes based of expression profiles, December 21-23, 2002.
- Applying Bioinformatics, from Genes to Systems: The University System of Georgia Research Symposium, Georgia State University, Atlanta, GA, Statistical Techniques to Analyze Microarray Data: A Partial Overview, October 3-4, 2002.
- International Conference on Current Advances and Trends in Nonparametric Statistics, Crete, Greece, Clustering algorithms for microarray data: overview and comparative studies, July 2002.

- IISA International Conference on Statistics, Probability and Related Areas, Dekalb, Illinois, Clustering algorithms for microarray data: overview and comparative studies, June 2002.

[Ding] Kaplansky's Lemma and New Proofs, International Conference on Matrix Theory and Applications, 5th China Conference on Matrix Theory, Shanghai, China, August 2002.

[Domke] The induced path number of graphs and their complements, invited presentation at the Fifteenth Cumberland Conference on Combinatorics, Graph Theory and Computing, Oxford, MS, May 18, 2002.

[Hall]

- On ranks of matrices associated with trees, contributed presentation given at the joint American Mathematical Society and Mathematical Association of America Sectional Meeting, March 9, 2002, Atlanta, GA.
- Irreducible powerful ray pattern matrices, contributed presentation given at the Tenth Conference of The International Linear Algebra Society, June 13, 2002, Auburn, AL.
- On ranks of matrices associated with trees, invited plenary talk given at the Matrix Theory and Its Applications conference, August 14, 2002, Shanghai, China.
- Ray patterns of matrices, contributed presentation given at the Mid-Atlantic Algebra Conference, November 9, 2002, Raleigh, NC.

[Hattingh]

- Graphs with two disjoint total dominating sets, invited presentation at the Regional meeting of the AMS, Atlanta, GA USA, March 8-10, 2002.
- The algorithmic complexity of certain functional variations of total domination in graphs, invited presentation at DIMACS, Rutgers University, Piscataway, NJ, USA, July 14-21, 2002.

[Hamkins]

- Supertask Computation, British Logic Colloquium, Birmingham, U.K., September 2002 (invited major address).
- The Automorphism tower of a group, Conference on Set Theory, Oberwolfach, Germany, January 2002. (invitation-only meeting).

[He]

- Quantum Induction, International Congress of Mathematicians, Beijing, August 2002.
- Some Inequalities on AB for Classical Groups, American Mathematical Society and Mathematical Association of America Southeastern Section Meeting, Atlanta, March 2002.

[Hsu] Analysis of China's Exports, Imports and Production Relationship (Presented at the Conference of China's Accession to WTO and Global Economy, Beijing, China, May 16, 2002)

[Li]

- Inertia Sets of Symmetric Sign Pattern Matrices, refereed contributed talk, Mid Atlantic Algebra Conference, Raleigh, November 2002.
- Sign Patterns, Inverses, and Generalized Inverses, refereed contributed talk, Fifth China Matrix Theory Conference, Shanghai, August 2002.
- Sign Patterns That Require All Distinct Eigenvalues, refereed contributed talk, Tenth ILAS conference, Auburn, June 2002.
- Sign Patterns That Require All Distinct Eigenvalues, invited talk at the 2002 Southeastern Regional Conference of the American Mathematical Society, Atlanta, March 2002.
- On the Inertia Sets of Symmetric Sign Pattern Matrices, invited 40 minute talk at the International Conference on Combinatorial Matrix Theory, Pohang, January 2002.

[Myers]

- Closing the Divide Between Technology and Pedagogy: Collaboration for the Creation of an Online Math Course, The International Conference on College Teaching and Learning, Jacksonville, Florida, April 2002.
- Technology Meets Pedagogy: Collaborating to Create an Online Math Course, 4th Annual WebCT Users Conference, Boston, Massachusetts, July, 2002
- Myers' Methods for the GMAT – An Online Math Course, 4th Annual Webct Users Conference, Boston, Massachusetts, July 2002

[Miller]

- Quality in Undergraduate Education - QUE, AAHE Faculty Roles and Rewards Conference, January 2002.
- Do Course Grades and Praxis II Scores Correlate?, University System of Georgia
- Follow the Data Conference, April 2002. Strategies for Raising Mathematics Teachers' Content Knowledge, University System of Georgia.

[Patrangenaru]

- AMS Meeting, Atlanta, Georgia; March 8-10, 2002, contributed.
- Fourth Biennial International Conference on Statistics, Probability and Related Areas, June 14-16, 2002, invited.
- 3. Fourth Conference of the Balkan Society of Geometres, Thessaloniki, Greece, June 21-27, 2002, contributed.

- Second Southeast Geometry Seminar, Georgia Tech, December 10, 2002, invited.

[Qin]

- Improved confidence intervals for the sensitivity of a continuous-scale test at a fixed level of specificity, *invited talk* (with X. Zhou) at JSM 2002, American Statistical Association, New York, August 11-15, 2002.
- Empirical likelihood inference for median regression, *Contributed presentation* at JSM 2002, American Statistical Association, New York, August 11-15, 2002.
- A better confidence interval for the difference between two binomial proportions of paired data, *Contributed presentation* at SSC 2002, Statistical Society of Canada, Hamilton, Canada, May 26-29, 2002.
- Recent development in censored regression analysis, Sichuan University, Chengdu, China, June 7, 2002.

[Shilnikov] Two time scale model mapping, NATO Advanced Study Institute Synchronization: Theory and Application, Ukraine, May 2002

[Smirnova]

- Annual Southeastern-Atlantic Regional Conference on Differential Equations, October, 2002, Knoxville, TN, contributed talk.
- NSF/CBMS Regional Research Conference "Mathematical Methods in Nonlinear Wave Propagation", May 15-19, 2002, Greensboro, NC, poster.
- The 2002 International Conference on Differential Equations and Mathematical Physics, March 26-30, 2002, Birmingham, AL, contributed talk.
- The First SIAM Conference on Imaging Science, March 4-6, 2002, Boston, MA, Chair of the session on inverse problems, contributed talk.
- AWM-NSF Workshop for women recent Ph.D.'s, January 9, 2002, San Diego, CA, invited talk.

[Stewart]

- Invited special session talk, A More Stable Superfast Toeplitz Solver, AMS Spring 2002 Southeastern section meeting, March 8-10, Atlanta.
- Invited special session talk, Stable Superfast Algorithms for Toeplitz Systems, ILAS meeting, June 10-13, Auburn.
- Invited special session talks, Orthogonalization of Structured Matrices Using Inner Products, International Workshop on Operator Theory and Applications, August 6-9, Blacksburg.

[Zhao]

- Empirical likelihood methods for comparison of survival functions , Joint Statistical Meeting, American Statistical Association, New York City, August 2002, contributed paper.
- Goodness-of-fit test for the proportional hazards assumption via empirical likelihood, ICSA 2002 Applied Statistics Symposium, International Chinese Statistical Association, Greater Philadelphia, June 2002, contributed paper.
- Empirical likelihood methods for comparison of survival functions, Summer Research Conference in Statistics, SRCOS/ASA, Natchez, MS, June 2002, contributed paper.
- Empirical likelihood methods for comparison of survival functions, Spring Research Conference on Statistics in Industry and Technology, IMS and SPES section of ASA, University of Michigan, Ann Arbor, May 2002, contributed paper.
- Empirical likelihood methods for comparison of survival functions, Florida Chapter of the American Statistical Association Annual Meeting, University of West Florida, February 2002, contributed paper.

Colloquia and Seminar Presentations

[Alexander] D. Vidakovic, D Alexander, M., Bevis, J. &. (2002). Developing assessment items using WebCT. Presented at the ICTCM-15, October 31-November 3, Orlando, FL.

[Arav]

- Inverse Eigenvalue Problems, Matrix Theory Seminar, Monmouth University, NJ, April 18, 2002
- Special Algebra Seminar, St. Mary's College, MD, May 24, 2002
- Splittings of Matrices over arbitrary cones, Algebra Seminar, Iona College, NY, May 28, 2002
- The Recursive Inverse Eigenvalue Problem, Georgia State University, GA, June 18, 2002
- Splittings of Matrices over Arbitrary Cones, Linear Algebra Seminar, Technion, Haifa, Israel, July 10, 2002.

[Chen]

- Long Cycles in 3-connected Graphs, VIGRE Seminar, Department of Mathematics, University of Georgia, Athens, GA, October 2002.
- Circumferences of 3-connected Graphs, Colloquium, Department of Mathematics, Middle Tennessee State University, Murfreesboro, TN, November 2002.

[Hamkins]

- A class of strong diamond principles, CUNY Logic Workshop, December, 2002.
- A new forcing axiom, CUNY Logic Workshop, April, 2002.
- How tall is the automorphism tower of a group?, Georgia State University Mathematics Department, March, 2002 (Job interview talk).
- Mathematical Universes, Connecticut Valley Mathematics Colloquium (Smith College, Amherst, Mt. Holyoke, U. Mass. Amherst), March, 2002. (invited address)

[He] Introduction to Dual Pairs, Georgia Institute of Technology, November 2002.

[Myers] Technology Meets Pedagogy: Collaborating on Developing Math Online, Teaching and Learning Expo, Georgia State University, Atlanta, Georgia. March 2002

[Shilnikov] Curious effects in slow-fast flows and maps, WIAS, Berlin, Germany, Dept. of Physics, University of Potsdam, Germany, and the Institute for Applied Mathematics, Nizhniy, Novgorod, Russia, June 2002

[Smirnova] The Dynamical System Method for Solving Ill-Posed Problems: Numerical Aspects, University of West Georgia, Carrollton, GA, November 20, 2002.

[Vidakovic]

- Incorporating technology into undergraduate mathematics classrooms, seminar talk at Morris Brown College, Atlanta (4/19/02)
- D. Vidakovic, D Alexander, M., Bevis, J. &. (2002). Developing assessment items using WebCT. Presented at the ICTCM-15, October 31-November 3, Orlando, FL.

[Zhao] Empirical likelihood methods for comparison of survival functions, at various institutions.

Internal Grants

[Ding, L., Patrangenaru, V] GSU FY03 Research Team Grant on Image Analysis. Total Amount: \$15,000.00.

[Smirnova] Georgia State University Research Initiation Grant, \$4,700, (2001-2002).

External Grants

[Arav] Funding from University of Wisconsin - Madison for travel and local expenses to attend AMS meetings at San-Diego, CA, January 6-9, 2002, (\$1000)

[Chen]

- Circumferences and Graphic Ramsey Theory, National Science Foundation Grant DMS-0070059, 00-03.

- The 16th Cumberland Conference on Graph Theory, Combinatorics, and Computing, The Office of Naval Research, 02-03.

[Hawkins]

- Principal Investigator, NSF Research Grant, Indestructibility Phenomenon of Large Cardinals, grant period 1999-2003, \$74,400 total, administered by the CUNY Research Foundation.
- CUNY Research Foundation Collaborative Incentive Grant, Collaborative Research in Logic at CUNY, 2001-2003, with Arthur Apter, Ilijas Farah, Roman Kossak and Dorshka Wylie. \$24000 total, administered by the CUNY Research Foundation.
- PSC-CUNY Research Grant, the City University of New York, Research in Set Theory, 2001-2002, \$4500, administered by the CUNY Research Foundation.
- PSC-CUNY Research Grant, the City University of New York, Research in Set Theory, 2002-2003, \$4200, administered by the CUNY Research Foundation.

[Patrangenaru] National Security Agency, Grant MDA 904-02-1-0082, Statistical Analysis-Manifolds, \$35,420, 2002-2004.

[Smirnova]

- NSF Grant “Theoretical and Numerical Investigation of dynamical systems method for solving linear and nonlinear ill-posed problems”, DMS Computational Mathematics, \$72,300 (2002-2005).
- NSF support in the amount of \$500 to attend NSF/CBMS Regional Research Conference "Mathematical Methods in Nonlinear Wave Propagation", May 15-19, 2002, Greensboro, NC.

[Vidakovic and R. Patterson (Co-PI)], “Teaching and Learning with Technology: Probability and Statistics for High School Teachers”, continuing from last year (1/6/01 – 5/31/02), 20,733; Eisenhower Grant; Purpose: to conduct a professional development course with high school teachers from Atlanta Public School System.

[Vidakovic] ExxonMobile support for travel to RUMEC meetings, (over \$500.00)

[Zhao] Dissertation Research Grant, Florida State University, 2001--2002. \$500.