

2003 ANNUAL REPORT

Mathematics and Statistics

Direction of Individual Student Work:

1. Dissertations

[Hattingh] Laura Harris, Aspects of functional variations of domination in graphs

2. Theses

[Chen] Bartholomew K. Abban, Screening Optimally for Chlamydia: A Binary Programming Approach.

[Domke] Syrah O. Paul, A Survey of Gallai-Type Theorems for Domination and Degree Parameters.

[Li] Emmanuel des-Bordes, The Minimum Ranks of Sign Pattern Matrices.

[Qin] Linhui Tian, Interval Estimation for Specificity at a Fixed Level of Sensitivity of a Continuous Scale Diagnostic Test.

Publications:

1. Books

Russian Edition of "Methods of Qualitative Theory for Nonlinear Dynamics, Part I". R&C Dynamics; by **Andrey Shilnikov**, L. Shilnikov, D. Turaev and L. Chua

2. Articles, Essays, and Chapters:

Articles, Essays

[Alexander]

- Developing Assessment Items Using WebCT, World Conference on E-Learning in Corp., Govt., Health., & Higher Ed., 1 (2003), 156-157. (AACE)
- Developing Assessment Items using WebCT in College Algebra. *Proceedings of the ICTCM-16* (2003), Chicago, IL

M. Bakonyi, Nehari and Caratheodory-Fejer Type Extension Results for Operator-Valued Functions on Groups, *Proceedings of the American Mathematical Society*, **131** (11)(2003), 3517-3525.

M. Bakonyi and D. Timotin, The Intertwining Lifting Theorem for Ordered Groups, *J. Functional Analysis*, **199** (2003), 411-426.

G.T. Chen, J. Shen and R. Yuster, Second neighborhood via first neighborhood in digraphs, *Annals of Combinatorics*, **7** (2003) 15-20.

G.T. Chen, R.J. Gould, Florian Pfender, and Bing Wei, Extremal graphs for intersecting cliques, *J. Combin. Theory Ser. B* **89** (2) (2003), 159-171.

G.T. Chen, **F. Hall**, **Z. Li** and B. Wei, On ranks of matrices associated with trees, *Graphs Combin.*, **19**(2003) 323-334

G. Chen, **F. Hall**, **Z. Li** and B. Wei, On Ranks of Matrices Associated with Trees, *Numerical Mathematics: A Journal of Chinese Universities* **12** (Supplement) (2003), 76 – 79.

R. Gould, **G.T. Chen**, and **X. Yu**, Graph connectivity after path removal, *Combinatorica* **23** (2003), no. 2, 185-203

G. Brehm, **S. Datta** and M.W.W. Adams, Whole genome DNA microarray of a hyperthermophile and an archaeon: *Pyrococcus furiosus* grown on peptides and carbohydrate, *Journal of Bacteriology*, **185** (2003), 3935-3947.

S. Datta, Statistical techniques for microarray data: A partial overview, *Communications in Statistics-Theory and Methods*, **32** (2003) 263-280.

S. Datta and S. Datta, Comparisons and validation of statistical techniques for microarray gene expression data, *Bioinformatics*, **19** (2003) 459-466.

P. Ghosh, and R. Khattree, A Bayesian Approach to Average Bioequivalence using Bayes factor, *Journal of Biopharmaceutical statistics*, (2003) 719-734.

F. Hall and **Z. Li**, Sign Patterns, Inverses and generalized Inverses — A Brief Survey, *Numerical Mathematics: A Journal of Chinese Universities* **12** (Supplement) (2003), 8-11.

J.H. Hattingh, M.A. Henning and E. Ungerer, The upper line-distinguishing and upper harmonious chromatic numbers of a cycle, *Journal of Combinatorial Mathematics and Combinatorial Computing*, **45** (2003) 139-146.

J.H. Hattingh, M.A. Henning and E. Ungerer, Graphs with small upper line-distinguishing and upper harmonious chromatic numbers, *Journal of Combinatorial Mathematics and Combinatorial Computing*, **47** (2003) 165-181.

H. He, Unitary representations and theta correspondence for type I classical Groups, *J. Funct. Anal.* **199** (1) (2003), 92-121.

H. Fung, **Y. Hsu**, C. Pei and J. Shen, Are China's Trade Policies Effective? Time Series Analysis, *Journal of China & World Economy*, **1** (2003) 48-56.

G.S. Qin, and M. Tsao, Empirical likelihood inference for median regression models of censored survival data, *J Multi Anal*, **85**(2003), 416-430.

G.S. Qin, and B.-Y. Jing, Edgeworth expansion in censored linear regression model, *Ann Inst Stat Math*, **55**(2003), 597-617.

N.F. Rulkov, M.V. Bazhenov and **A.L Shilnikov**, Modeling of spiking-bursting neural activity using map-based models, Proc. Topical Problems of Nonlinear Wave Physics (NWP-2003)

G. Cymbaluyk, R. Calabrese and **A. Shilnikov**, Yin and yang of leech heart central pattern generator: endogenously bursting neurons yoked together into a half-center oscillator. Proc. of the Annual Computational Neuroscience Meeting (CNS-2003) Alecante, Spain, July 5-9, 2003

A.L. Shilnikov, G. Cymbaluyk and R. Calabrese, Multistability and infinite cycles in a model for the leech heart interneuron, IEEE Proc NDES 2003, Scuol, Switzerland, 2003, 241-245

A. L. Shilnikov and N.F. Rulkov, Origin of chaos in a two-dimensional map modeling spiking bursting neural activity, *Bifurcations and Chaos*, **13(11)** (2003) 3325-3340.

A.L Shilnikov and N.F. Rulkov, Chaos in 2D slow-fast maps for spiking-bursting neural activity, IEEE Proc.NDES 2003, Scuol, Switzerland, 2003, pages 245-248.

A.G.Ramm and **A.Smirnova**, Stable Numerical Differentiation: when is it possible?, *Journal of Korean SIAM*, **7 (N1)** (2003) 47-61.

A.G.Ramm, **A.B.Smirnova**, A.Favini, Continuous modified Newton's - type method for nonlinear operator equations, *Annali di Matematica*, **182** (2003) 37-52.

M. Stewart, A Superfast Toeplitz Solver with Improved Numerical Stability, *SIAM Journal on Matrix Analysis and Applications*, **25 (3)** (2003) 669-693.

D. Vidakovic, J. Bevis and **M. Alexander**, Precalculus with WebCT Support: Using Bloom's Taxonomy in Developing Assessment Items, *Journal of Online Mathematics and its Applications*, **3** (2003).

Chapters

J. Arnold, H. B. Schuttler, D. Logan, J. Griffith, B. Arpinar, **S. Datta**, K. J. Kochut, E. Kraemer, J. A. Miller, A. Sheth, B. Aleman-Meza, J. Doss, L. Harris and A. Nyong. Metabolomics, In *Handbook of Industrial Mycology*, Chapter 23. Marcel-Dekker, New York, NY (2003).

Presentations at Professional Meetings

[Alexander]

- Developing Assessment Items Using WebCT, AACE, E-Learn 2003, November, 2003, Hyatt Regency, Phoenix, AZ
- Developing Assessment Items using WebCT in College Algebra, The Sixteenth Annual Conference on Technology in Collegiate Mathematics, November, 2003, Hyatt Regency, Chicago, IL.

[Arav]

- The Recursive Inverse Eigenvalue Problem, SIAM and MAA Southeast-Atlantic Section – JointRegional Meeting, Matrix Theory and Numerical Linear Algebra Session, Clemson University, SC, March 21-22, 2003, invited talk.
- Inequalities for Matrix Splittings using General Cones, *The International Conference on Matrix Analysis and Applications*, Nova Southeastern University, FL, December 14-16, 2003, invited talk.
- Inverse Spectrum Problem, Linear Algebra Seminar, December 30, 2003 during the International Conference on Geometry and Spectral Theory, Technion, Haifa, Israel, December 29, 2003-January 2, 2004, contributed talk.

[Bakonyi] The Commutant Lifting Theorem for Ordered Groups, Wabash Modern Analysis Conference, Indianapolis, November 2003, contributed talk.

[Chen]

- Circumference of 3-connected graphs, SIAM/MAA at Clemson, Clemson University, SC, March 2003.
- Longest cycles in 3-connected graph without K_3 -minor, AMS 2003 Spring Central Section Meeting, AMS 985, Bloomington, IN, April 2003.
- Cycle extendabilities for special graphs, AMS 2003 Joint Central and Western Section Meeting Boulder, AMS 989, CO, October 2003.

[Datta] Digital Biology: The Emerging Paradigm, NIH/BISTI, Bethesda, Maryland, November 2003.

[Davis] Ranks of Line Graphs of Regular Graphs, with G. Domke and C. Garner, Jr., 16th Cumberland Conference on Combinatorics, Graph Theory and Computing, Atlanta, 15-17 May 2003.

[Ghosh] Bayesian Approach to Average Bioequivalence, NIHES, North Carolina, May 2003.

[Hall]

- Inertia sets of symmetric sign pattern matrices, contributed presentation given at the joint Mathematical Association of America and Society for Industrial and Applied Mathematics Sectional Meeting, March 21, 2003, Clemson, SC.
- From Boolean to sign pattern matrices, invited talk given at the International Conference on Matrix Analysis and Applications, December 15, 2003, Fort Lauderdale, FL.

[Hattingh]

- Total k -subdominating functions on graphs, invited presentation at the Joint MAA-SAIM Meeting at Clemson University, Clemson, SC, USA, 2003.
- Algorithmic aspects of total k -subdomination in graphs, contributed presentation at the 19th British Combinatorial Conference, Bangor, UK, 2003

[Li]

- Reducible and Irreducible Ray Pattern Matrices, invited talk at 2003 Integers Conference, Carrolton, October 2003.
- Reducible Ray Pattern Matrices, invited talk at International Conference on Matrix Theory and Applications, Fort Lauderdale, December 2003.

[N. Patterson]

- Hands-on Activities with Handheld Technology, contributed workshop presentation at the 2003 Georgia Mathematics Conference, Georgia Council of Teachers of Mathematics, Eatonton, Georgia (refereed).
- Getting in the Swing of Things: The Concept of a Pendulum in Middle School Math, contributed workshop presentation at the 2003 Georgia Mathematics Conference, Georgia Council of Teachers of Mathematics, Eatonton, Georgia (refereed).

[Qin]

- Censored regression models with empirical likelihood, invited talk at Bernoulli Society East Asian and Pacific Regional Conference 2003, Hong Kong, December 18-20, 2003.
- Empirical likelihood for Cox regression model, contributed presentation at ICRSA 2003, International Conference on Reliability and Survival Analysis, Columbia, South Carolina, USA, May 21-24, 2003

[Shilnikov]

- Symmetry and Bifurcation in Biology, Banff International Research Station, Canada, May 31-June 05, 2003.
- Workshop II: Chaotic Dynamics and Transport, UCLA, May 19 - 23, 2003.
- 2003 SIAM Conference on Applications of Dynamical Systems, Bursting in Mappings, May 27-31, 2003.
- 11th IEEE Workshop on Nonlinear Dynamics of Electronic Systems, Scuol, Switzerland, May 18-21, 2003.

[Smirnova]

- One Dimensional Inverse Problem In Diffusion Based Optical Tomography Using Gauss-Newton-Type Algorithm For Nonlinear Ill-Posed Problems, Workshop on Inverse Problems and Medical Imaging, August 4-8, 2003, Vancouver, Canada (contributed talk).
- Iterative Gauss-Newton-type algorithm for nonlinear unstable operator equations with simultaneous updates of the regularized Frechet derivative, VIII Conference on Inverse and Ill-Posed Problems, June 9-11, 2003, Moscow, Russia (invited talk).
- Iterative inversion of the Frechet derivative in the regularized Quasi-Newton methods, Sixth IMACS International Symposium on Iterative Methods in Scientific Computing, March 27-30, 2003, Denver, CO (contributed talk).
- Numerical Techniques for Solving Irregular Operator Equations, SIAM Southeast-Atlantic Section Regional Meeting, March 21-22, 2003, Clemson, SC (contributed talk).

[Stewart]

- Numerical Properties of a Unitary Hessenberg QR Algorithm, SIAM Conference on Applied Linear Algebra, 2003 (invited talk).
- Stable Superfast Algorithms for Toeplitz Systems, Electronic Transactions on Numerical Analysis Conference, 2003 (invited talk).

[Vidakovic]

- Discourse created by students' homework presentation. Presented at the SIGMAA on RUME conference, Scottsdale, AZ, October 23-26 (peer reviewed).
- Precalculus students' difficulties with mathematical notation: An example. Presented at the Joint Mathematics Meetings (MAA/AMS), Baltimore, MD, January 15-18 (peer reviewed).

[Zhao]

- Width-scaled simultaneous confidence bands for survival functions, Annual Meeting of the American Statistical Association, San Francisco, August 2003, contributed talk.
- Statistical Inference for Competing Risks Model via Empirical Likelihood, International Conference on Reliability and Survival Analysis, University of South Carolina, Columbia, May 2003, contributed talk.

Colloquia and Seminar Presentations

[Alexander] Using Electronic Portfolios Across Disciplines, Teaching and Learning Expo, Georgia State University, Atlanta, Georgia. March 2003

[Chen] Long cycles in graphs without K_3 -minors, School of Mathematics, Georgia Institute of Technology, February 2003.

[Ghosh]

- Bayesian approach to IBE and PBE, Department of statistics, Purdue University, June 2003.
- Some contribution to Bioequivalence trials, Department of Biostatistics, University of Alabama at Birmingham, July 2003.

[He] Compactification of General Linear Group, Auburn University, Feb 2003.

[Shilnikov]

- Bistability and global saddle-nodes in neuron models, UC San Diego, August 2003.
- Saddle-node periodic orbits in two time scale systems. The ghosting effect in neurobiology, Gatech, September 2003.

[Smirnova] Regularized continuous methods for nonlinear ill-posed problems, Clemson University, Clemson, SC, November 14, 2003.

[Vidakovic] Moving toward standard-based teaching, learning, and assessment in collegiate mathematics (the QUE project), University of Puerto Rico at Rio Piedras, San Juan, Puerto Rico, July 2003.

[Zhao]

- Comparison of Survival Functions and its Application, Department of Biostatistics, Emory University, Atlanta, October 2003.
- Empirical Likelihood Based Confidence Bands for Survival Functions and Ratios of Survival Functions, School of Mathematics, Georgia Institute of Technology, Atlanta, March 2003.

NAME	GRANT	TYPE
M. Alexander	PEF Content Knowledge Grant	Internal
M. Alexander	Center for Proficiency in Teaching Mathematics at UGA	Internal
M. Bakonyi	Factorization, Extension, and Interpolation Problems for Operator-Valued Functions on Groups	External
G. Chen	Problems Surrounding Graph Minors and Connectivities	External
G. Chen	Circumferences and Graphic Ramsey Theory	External
G. Chen	16 th Cumberland Conf on Combinatorics, Graph Theor, and Computing	External
G. Chen	Purchasing Campus-Wide Mathematics and Statistics Software Licenses	Internal
G. Davis	New Retrieval and Classification Techniques In High and Low Level Image Analysis (co-investigator)	Internal
S. Datta	Research Program Enhancement	Internal
S. Datta	Purchasing Campus-Wide Mathematics and Statistics Software Licenses	Internal
S. Datta	Biomedical Computing Center Seed Grant	External
S. Datta	Consultant on a NSF funded project in Structural Biology	External
S. Datta	Genomics and Computational Biology: A REU Site, National Science Foundtion, Joint Program between UGA, GSU and CAU	External
S. Datta	Student & Travel Suport for five years, Georgia Cancer Coalition	External
H. He	Factorization, Extension, and Interpolation Problems for Operator-Valued Functions on Groups	External
V. Miller	Purchasing Campus-Wide Mathematics and Statistics Software Licenses	Internal
R. Patterson	Teaching and Learning with Technology: Probability and Statistics for High School Teachers	External
A. Smirnova	Theoretical and Numerical Investigation of dynamical systems method for solving linear and nonlinear ill-posed problems	External
A. Smirnova	Applied Inverse Problems: Theoretical and Computational Aspects	External
D. Vidakovic	Probability and Statistics for Middle School Teachers and their Students: A Quantitative Approach	External
D. Vidakovic	ExxonMobile Travel Support for RUMEC and ARUME meetings & conferences	External