

Agnes Szanto

CONTACT INFORMATION

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RESEARCH INTERESTS

Computer algebra, symbolic-numeric computation, solution of polynomial systems, differential algebra

EDUCATION

1993-1998 **CORNELL UNIVERSITY**, Ithaca, NY

Department of Applied Mathematics

Master's Degree, September 1996

Ph.D. in Applied Mathematics, 1999

Advisor: Dexter Kozen

1986-1991 **EÖTVÖS LÓRÁND UNIVERSITY**, Budapest, Hungary

Department of Mathematics

Diploma in Mathematics, 1991

Advisor: Lajos Rónyai

ACADEMIC EXPERIENCE

2002-present **NORTH CAROLINA STATE UNIVERSITY**, Raleigh

Department of Mathematics

Assistant Professor of Mathematics

2000-2002 **UNIVERSITY OF KENT**, Canterbury

Institute of Mathematics and Statistics

EPRSC postdoctoral fellowship

supervisor: Elizabeth L. Mansfield

Project: *Moving frames, resultants and differential systems*

1999/2000 **CECM, SIMON FRASER UNIVERSITY**, Vancouver

PIMS postdoctoral fellowship

supervisor: Peter Borwein

Project: *Multivariate subresultant methods*

1998/1999 **MATHEMATICAL SCIENCES RESEARCH INST**, Berkeley

Special year in symbolic computation

Postdoctoral fellowship

Project: *Algorithms for the solution of polynomial systems exploiting finite precision techniques and the sparseness of the polynomials*

1995/1996 **UCLA**, Los Angeles
Department of Mathematics
Research assistantship
supervisor: Paul Pedersen
Project: *Implementation of distributed Gröbner basis algorithms*

1991-1993 **HUNGARIAN ACADEMY OF SCIENCES**, Budapest, Hungary
Computer and Automation Institute
Research assistantship
supervisor: Lajos Rónyai
Project: *LLL lattice basis reduction algorithm for indefinite forms;
Multivariate polynomial factorization algorithm over finite fields*

HONORS AND AWARDS

2004-2009 CAREER Award, National Science Foundation, PI
2005-2008 SCREMS Grant, National Science Foundation, co-PI
2005-2007 NCSU/China Partnership Grant, National Science Foundation, co-PI
2003-2006 Research Grant, National Science Foundation, PI
2004 Best poster award, ISSAC '04
2000-2002 EPSRC postdoctoral fellowship
1999-2000 PIMS postdoctoral fellowship
1998-1999 Postdoctoral fellowship at MSRI, Berkeley
1992 Research grant, Hungarian Foundation for Scientific Research, co-PI
1991 Tempus fellowship, University “La Sapienza”, Rome
1986 Award at the “Riesz Frigyes Memorial Competition in Mathematics”

PEER-REVIEWED PUBLICATIONS

1. G. Ivanyos, L. Rónyai, and Á. Szántó, *Decomposition of algebras over $F_q(x_1, \dots, x_n)$* , *Applicable Algebra in Engineering, Communication and Computing*, **5** (2): 71–90, 1994.
2. G. Ivanyos and Á. Szántó, *Lattice basis reduction for indefinite forms and an application*, *Discrete Mathematics*, 153: 177–188, 1996.
3. L. Rónyai and Á. Szántó, *Prime-field-complete functions and factoring polynomials over finite fields*, *Comput. Artificial Intelligence*, **15** (6): 571–577, 1996.
4. A. Szanto. *Complexity of the Wu-Ritt decomposition*, In *Proceedings of PASCO'97*, pages 139–149. ACM Press, 1997.
5. E. L. Mansfield and A. Szanto, *Elimination theory for differential-difference polynomials*. *Proceedings of the 2003 International Symposium on Symbolic and Algebraic Computation*, **191–198**, ACM, New York, 2003.
6. C. D'Andrea, T. Krick, A. Szanto, *Multivariate Subresultants in Roots*, *Journal of Algebra* **302** (2006), no. 1, **16–36**,

7. I. Janovitz-Freireich, L. Rónyai, A. Szanto, *Approximate Radical of Ideals with Clusters of Roots*, Proceedings of the 2006 International Symposium on Symbolic and Algebraic Computation, **146–153**, ACM, New York, 2006
8. C. D’Andrea, H. Hong, T. Krick, A. Szanto, *A Simple Proof of Sylvester’s Double Sums for Subresultants*, Journal of Symbolic Computation, **42** (2007) **290–297**,
9. I. Janovitz-Freireich, L. Rónyai, A. Szanto, *Approximate radical for clusters: a global approach using Gaussian elimination or SVD*, to appear in the Journal of Mathematics in Computer Science, **1**, no. 2, (2007), 33 pages, http://arxiv.org/PS_cache/math/pdf/0702/0702430v1.pdf
10. A. Szanto, *Multivariate subresultants using Jouanolou’s resultant matrices*, accepted in the Journal of Pure and Applied Algebra, 46 pages, <http://www4.ncsu.edu/~aszanto/Jouan.Revised.pdf>,
11. O. Ruatta, M. Sciabica, A. Szanto, *Over-constrained Weierstrass iteration and the nearest consistent system*, accepted to the Journal of Theoretical Computer Science, 17 pages, <ftp://ftp-sop.inria.fr/galaad/oruatta/RR-5215.pdf>,
12. C. D’Andrea, H. Hong, T. Krick, A. Szanto, *Sylvester’s Double Sums: the general case*, Electronic Proceedings of the Conference on Effective Methods in Algebraic Geometry (MEGA 2007), 14 pages, <http://www.ricam.oeaw.ac.at/mega2007/electronic/36.pdf>
13. I. Janovitz-Freireich, B. Mourrain, L. Rónyai, A. Szanto, *Computing Approximate Radicals using Bezoutians (extended abstract)*, Electronic Proceedings of the Conference on Effective Methods in Algebraic Geometry (MEGA 2007), 12 pages, <http://www.ricam.oeaw.ac.at/mega2007/electronic/E.pdf>
14. A. Szanto (with an appendix by M. Chardin), *Solving over-determined systems by subresultant methods*, preliminarily accepted to the Journal of Symbolic Computation, 35 pages, <http://www.math.ncsu.edu/~aszanto/SymAppendix.pdf>.
15. S. Pope, A. Szanto, *Nearest Multivariate System with Given Root Multiplicities*, submitted for publication, 25 pages, <http://www.math.ncsu.edu/~aszanto/PopeSzanto5-14-07.pdf>

WORK IN PROGRESS

1. C. D’Andrea, H. Hong, T. Krick, A. Szanto, *Multivariate Resultants in Roots*, in preparation.
2. A. Szanto, *General Theory of Subresultants*, in preparation.
3. I. Janovitz-Freireich, B. Mourrain, L. Rónyai, A. Szanto, *Computing Radicals using Bezoutians: Exact and Approximate Case*, in preparation.

PRESENTATIONS

Last 5 years in reverse chronological order:

- Fall AMS Central Section Meeting, DePaul University (Chicago, IL), October 5-6, 2007, invited to talk in special session on Numerical and Symbolic Techniques in Algebraic Geometry and its Applications.

- Conference on Effective Methods in Algebraic Geometry (MEGA 2007), Strobl, Austria, June 2007. Two papers I co-authored were presented at the conference.
- East Coast Computer Algebra Day (ECCAD'07), Chestertown, MD, April 2007, Presented poster entitled: "Approximate radicals for clusters: an approach based on Gaussian elimination or SVD".
- Workshop for NCSU/China Research and Educational Partnership in Symbolic Computation, Hangzhou, China, March 5-9, 2007. Our work was presented by my student: "Computing Approximate Radical for Ideals with Clusters of Roots".
- Workshop on Algorithms in Algebraic Geometry, IMA, Minneapolis, September 2006. Presented poster entitled: "Approximate radicals for clusters: an approach based on Gaussian elimination or SVD".
- International Symposium on Symbolic and Algebraic Computation (ISSAC'06), Genoa, Italy, July 9-12, 2006. Our paper was accepted in the Conference the Proceedings, and my student gave a talk entitled: "Approximate Radical of Ideals with Clusters of Roots".
- Conference on Elimination Theory and Applications, in honor of Jean-Pierre Jouanolou, CIRM in Luminy (France), May 2006, invited talk entitled: "Subresultants 'a la Jouanolou".
- Workshop for NCSU/China Research and Educational Partnership In Symbolic Computation, October, 2005, talk entitled: "The nearest multivariate system with given root structure - overconstrained case".
- Symbolic computation seminar, NCSU, September 2005, talk entitled "Multivariate Subresultants in Roots".
- Foundations of Computational Mathematics Conference, Santander, Spain, July, 2005, invited talk entitled "The nearest multivariate system with given root structure".
- Seminar, Department of Mathematics, Universidad de Buenos Aires, Argentina, April, 2005, invited talk, "The Nearest Multivariate System with Given Root Structure". This was part of a collaborative visit.
- Colloquium, Department of Mathematics, Florida State University, November 2004, invited talk, "Over-constrained Weierstrass iteration the nearest consistent system"
- Algebra Seminar, Department of Mathematics, UC Berkeley, October 2004, invited talk, "Over-constrained Weierstrass iteration the nearest consistent system". This was part of a collaborative visit.
- International Symposium on Symbolic and Algebraic Computation (ISSAC'04), Santander, Spain, July 2004, poster entitled "Over-constrained Weierstrass iteration and the nearest consistent system" won best poster prize.
- Encounters of Computer Algebra and Applications (EACA'04), Santander, Spain, July 2004, contributed talk entitled "Over-constrained Weierstrass iteration and the nearest consistent system".
- Algorithms Seminar, INRIA-Rocquencourt, France, May 2004, invited talk entitled "Elimination Theory for Large Differential-Difference Polynomials".

- Seminar, INRIA-Sophia Antipolis, May 2004, invited talk entitled “Weierstrass iteration for approximate GCD and distance to consistent systems”. This was part of a collaborative visit.
- Mathematics of Computer Algebra and Analysis Meeting (MOCAA), Waterloo, Ontario, May 2004, invited talk entitled: “Over-constrained Weierstrass iteration and the nearest consistent system”.
- East Coast Computer Algebra Day (ECCAD’04), Waterloo, Ontario, May 2004, poster entitled: “Over-constrained Weierstrass iteration and the nearest consistent system”.
- Symbolic computation seminar, NCSU, March 2004, talk entitled “Over-constrained Weierstrass iterations computes the distance to consistent systems”.
- Algebra seminar, NCSU, October 2003, talk entitled: “Subresultants and the solution of over-constrained multivariate polynomial systems”.
- International Symposium on Symbolic and Algebraic Computation (ISSAC’03), August 2003, Philadelphia, talk entitled: “Elimination Theory for Differential Difference Polynomials”.
- International Conference on Applications of Computer Algebra (ACA ‘2003), July 2003, Raleigh, invited talk entitled: “Finite Groebner bases for Lie invariant differential systems”.
- Foundations of Computational Mathematics Conference, Minneapolis, August, 2002, invited talk entitled “Solving over-determined systems by subresultant method”.
- International Conference on Applications of Computer Algebra (ACA ‘2002), June 2002, Volos, Greece, invited talk entitled: “Solving systems by subresultant method”.
- Computational Algebra Seminar, Sydney University, School of Mathematics and Statistics, March 2002, invited talk entitled: “Solving over-determined systems by the subresultant method”. This was part of a collaborative visit.

CONFERENCE ORGANIZATION

- Program Committee Member of the International Symposium on Symbolic and Algebraic Computations (ISSAC’07), Waterloo, Canada, July 2007.
- Co-organizer of the Symbolic-Numeric Computations special session of the AMS Joint Winter Meeting, San Antonio, TX, January 2006.
- Organizer, Workshop on Differential Algebra and Symbolic Computation, Raleigh, April 2004.
- Exhibitions Chair, International Symposium on Symbolic and Algebraic Computation (ISSAC ‘03), Philadelphia, August 2003.
- Co-Chair, International Conference on the Applications of Computer Algebra (ACA ‘03), Raleigh, July 2003.

TEACHING SUMMARY

		# Sections	# Students
MA 141	Calculus I	4	109
MA 225	Foundations of Advanced Mathematics	1	16
MA 231	Calculus for Life and Management Sciences B	2	136
MA 405	Introduction to Linear Algebra and Matrices	3	92
MA 522	Computer Algebra	1	6
MA 792K	Special Topics in Computer Algebra	2	12

GRADUATE STUDENTS

- Itnuit Janovitz Freireich, Ph.D. student, expected graduation Spring 2008.
- Mark Sciabica, graduated with a Masters degree, Fall 2006.
Thesis: *A Comparative Analysis of a New Algorithm for Solving Overconstrained Polynomial Systems.*