

# Curriculum Vitæ of Anton Leykin

---

IMA, University of Minnesota    *web:*    [www.ima.umn.edu/~leykin](http://www.ima.umn.edu/~leykin)  
400 Lind Hall                    *e-mail:*    [leykin@ima.umn.edu](mailto:leykin@ima.umn.edu)  
207 Church Street S.E.        *phone:*    (612) 625-3627  
Minneapolis, MN 55455-0436    *fax:*        (612) 996-1491

---

## RESEARCH INTERESTS

Numerical and symbolic algebraic computation, algorithms in algebraic analysis, parallel algorithms.

## EDUCATION

**1997/2003** Ph.D., School of Mathematics, University of Minnesota, Minneapolis.

*Dissertation Title* : “Algorithms in computational algebraic analysis.”

*Advisor* : Gennady Lyubeznik.

**1992/1997** Diploma with Honors, Department of Mathematics and Mechanics, Kharkov State University, Kharkov, Ukraine.

## EMPLOYMENT

**2006/now** *Postdoctoral Associate*, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis.

**2003/2006** *Research Assistant Professor*, Department of Mathematics, Statistics and Computer Science, University of Illinois at Chicago.

**2001/2003** *Internship (mathematical software developer)*, Cardinal IG, Minneapolis.

**1997/2001** *Teaching Assistant*, School of Mathematics, University of Minnesota, Minneapolis.

**1994/1997** *Research Assistant*, Department of Mathematics and Mechanics, Kharkov State University, Kharkov, Ukraine.

## AWARD

**2003** University of Minnesota Excellent Thesis Award.

## PUBLICATIONS

Chapters in books: [4, 5]. Submitted for publication: [1, 2, 3].

The rest are refereed papers either published or “to appear”.

- [1] Anton Leykin. Numerical primary decomposition. Preprint.
- [2] Anton Leykin and Frank Sottile. Galois groups of Schubert problems via homotopy continuation. Preprint.
- [3] Matthias Aschenbrenner and Anton Leykin. Degree bounds for Gröbner Bases in algebras of solvable type. Preprint.
- [4] M.A.H. MacCallum and A.V. Mikhailov, editors. *Algebraic theory of differential equations*. Cambridge University Press. To appear in Cambridge Lecture Notes in Mathematics.

- [5] Srikanth Iyengar, Graham J. Leuschke, Anton Leykin, Claudia Miller, Ezra Miller, Anurag K. Singh, and Uli Walther. *Twenty-four hours of local cohomology*, volume 87 of *Graduate Studies in Mathematics*. American Mathematical Society, Providence, RI, 2007.
- [6] Anton Leykin, Jan Verschelde, and Ailing Zhao. Higher-order deflation for polynomial systems with isolated singular solutions. In Alicia Dickenstein, Frank-Olaf Schreyer, and Andrew J. Sommese, editors, *Algorithms in Algebraic Geometry*, volume 146 of *The IMA Volumes in Mathematics and its Applications*. Springer, 2008.
- [7] Josep Àlvarez Montaner and Anton Leykin. Computing the support of local cohomology modules. *J. Symbolic Comput.*, 41(12):1328–1344, 2006.
- [8] Anton Leykin, Jan Verschelde, and Ailing Zhao. Newton’s method with deflation for isolated singularities of polynomial systems. *Theoretical Computer Science*, 359(1-3):111–122, 2006.
- [9] Anton Leykin and Jan Verschelde. Interfacing with the numerical homotopy algorithms in PHCpack. In Nobuki Takayama and Andres Iglesias, editors, *Proceedings of ICMS 2006*, pages 354–360, 2006.
- [10] Anton Leykin, Verschelde Jan, and Yang Zhuang. Parallel homotopy algorithms to solve polynomial systems. In Nobuki Takayama and Andres Iglesias, editors, *Proceedings of ICMS 2006*, pages 225–234, 2006.
- [11] Anton Leykin and Jan Verschelde. Decomposing solution sets of polynomial systems: A new parallel monodromy breakup algorithm. To appear in *Int. Journal of Comp.Science and Eng.*
- [12] Anton Leykin and Jan Verschelde. Factoring pure dimensional solution sets of polynomial systems in parallel. In *Proceedings of the 2005 International Conference on Parallel Processing Workshops*, pages 173–180, 2005.
- [13] Anton Leykin, Jan Verschelde, and Ailing Zhao. Evaluation of Jacobian Matrices for Newton’s Method with Deflation to approximate Isolated Singular Solutions of Polynomial Systems. In Dongming Wang and Lihong Zhi, editors, *Symbolic-Numeric Computation*, pages 269–278, 2007.
- [14] Anton Leykin and Jan Verschelde. PHCmaple: A Maple Interface to the Numerical Homotopy Algorithms in PHCpack. In *Proceedings of ACA’2004*, 2004.
- [15] Anton Leykin. On parallel computation of Gröbner bases. In *Proceedings of ICCP 2004 workshops*, High Performance Scientific and Engineering Computing, pages 160–164. IEEE Computer Society, 2004.
- [16] Anton Leykin. Algorithmic proofs of two theorems of Stafford. *Journal of Symbolic Computation*, 38(6):1535–1550, 2004.
- [17] Anton Leykin.  $D$ -modules for Macaulay 2. In *Mathematical Software: ICMS 2002*, pages 169–179. World Scientific, 2002.
- [18] Anton Leykin. Computing local cohomology in Macaulay 2. In Gennady Lyubeznik, editor, *Local cohomology and its applications*, volume 226 of *Lecture Notes in Pure and Applied Mathematics*, pages 195–206. Marcel Dekker, 2001.

- [19] Anton Leykin. Constructibility of the Set of Polynomials with a Fixed Bernstein-Sato Polynomial: an Algorithmic Approach. *Journal of Symbolic Computation*, 32(6):663–675, 2001.

## SOFTWARE PACKAGES

- *PHCmaple* (with Jan Verschelde). Provides an interface for the homotopy continuation algorithms of PHCpack in Maple.
- *D-modules for Macaulay 2* (with Harrison Tsai). Based on the computer algebra system *Macaulay 2*, this package implements a number of algorithms coming from the theory of D-modules.

## CONFERENCE PRESENTATIONS AND LECTURES

- *Special Session on Numerical and Symbolic Techniques in Algebraic Geometry and its Applications* (AMS sectional meeting at DePaul University, Chicago IL), October 2007.
- *PASCO (Parallel Symbolic Computation)* (UWO, London, Canada), July 2007.
- *ACA (Applications of Computer Algebra)* (Oakland University, MI), July 2007.
- *Workshop on Interactive Parallel Computation in Support of Research in Algebra, Geometry and Number Theory* (MSRI, Berkeley, CA), January 2007.
- Invited speaker at the RIMS international conference on *Theoretical Effectivity and Practical Effectivity of Gröbner Bases* (Kyoto, Japan), January 2007.
- *Workshop on Software for Algebraic Geometry* (IMA, Minneapolis, MN), October 2006.
- *The second International Congress of Mathematical Software* (Castro Urdiales, Spain), August 2006.
- Lecture series at the *Summer School on the Algebraic Theory of Differential Equations* (Edinburgh, Scotland).
- *Workshop on the Algebraic Theory of Differential Equations*, (Edinburgh, Scotland), August 2006.
- *Workshop on Gröbner bases in symbolic analysis*, (Linz, Austria), May 2006.
- *Special Session on Numerical Solution of Polynomial Systems at AMS Sectional Meeting*, (Notre Dame, IN), April 2006.
- *Special session on Symbolic-Numeric Computation and Applications at AMS Joint Meetings*, (San Antonio, TX), January 2006.
- Invited speaker at the international meeting on *Theoretical Effectivity and Practical Effectivity of Gröbner Bases* (Tokyo, Japan), August 2005.
- *FoCM (Foundations of Computational Mathematics)* (Santander, Spain), July 2005.
- Lecture series at *Summer School in Commutative Algebra* (Snowbird, Utah), June 2005.
- *2nd Latin American School and Workshop on Polynomial Systems* (Angra dos Reis, Brazil), February 2005.
- *Joint Mathematics Meeting* (Atlanta, GA), January 2005.
- *AMS sectional meeting* (Pittsburgh, PA), November 2004.
- *ICPP (International Conf. on Parallel Processing)* (Montreal, Canada), August 2004.

- *ACA (Applications of Computer Algebra)* (Beaumont TX), July 2004.
- *First Joint International Meeting between the AMS and the Real Sociedad Matematica Espanola (RSME)* (Seville, Spain), June 2003.
- *MEGA (Effective Methods in Alg. Geometry)* (Kaiserslautern, Germany), June 2003.
- Semi-invited speaker at *International Congress of Mathematical Software* (Beijing, China), August 2002.
- *Foundations of Computational Mathematics*, University of Minnesota (Minneapolis MN), August 2002.
- *Symbolic Computational Algebra*, University of Western Ontario (London, Ontario, Canada), July 2002.
- *AMS Joint Mathematics Meetings* (San Diego CA), January 2002.
- *International Workshop and AMS Special Session on Differential Algebra and Related Topics*, Rutgers University (Newark NJ) and Columbia University (New York NY), November 2000.
- *2000 AMS-IMS-SIAM Summer Research Conference in the Mathematical Sciences*, Mount Holyoke College (Mount Holyoke MA), June 2000.
- *Computational Algebraic Analysis Workshop*, MSRI (Berkeley CA), January 2000.
- *The Local Cohomology Workshop*, CIMAT (Guanajuato, Mexico), December 1999.

## RESEARCH STAYS

**January-June 2002** - University of California at Berkeley (contact: Bernd Sturmfels)

**August 1999 and August 2000** - Cornell University (contact: Mike Stillman)

## PROFESSIONAL SERVICE

**2007** - Member of the program committee of PASCO 2007 (University of Western Ontario, London, Canada).

**2006-2007** - Organizer of the *IMA Postdoc Seminar* (Institute of Mathematics and its Applications, Minneapolis).

**August 2006** - Lecturer at the *Summer School on the Algebraic Theory of Differential Equations* (Edinburgh, Scotland).

**June 2005** - Lecturer at the *Summer School in Commutative Algebra* (Snowbird, Utah).

**Spring 2005** - Organizer of the *Graduate Student Seminar on Computational Commutative Algebra* (University of Illinois at Chicago).

**October 2004** - Organizer of the *AMS Special Session on Solving Polynomial Systems*, Northwestern University (Evanston, IL)

**Since 2002** - Referee for Journals of Symbolic Computation, Experimental Mathematics, Mathematics of Computation, Mathematical Analysis and Applications, as well as for several conference proceedings.