

## Curriculum Vitae, Mark van Hoeij

- **Address:**

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- **Education:**

- PhD Mathematics, University of Nijmegen, The Netherlands, 11/1996.
- M.A Mathematics, University of Nijmegen, The Netherlands, 11/1992.

- **Academic appointments:**

- Associate Professor, Florida State University (08/2002 – present)
- Assistant Professor, Florida State University (08/1997 – 07/2002).
- ORCCA research chair, Ontario Research Centre for Computer Algebra (07/2001 and 06/2002).
- Professeur Invité, University of Limoges, France (06/2001).
- Mathematical Sciences Research Institute in Berkeley, CA (Fall 1998).
- Research fellow, University of Nijmegen (11/1996 — 08/1997).
- Ph.D student, University of Nijmegen (11/1992 — 11/1996).

- **Grants and awards:**

- NSF grant 0511544, PI, \$90K, Simplifying Algebraic Numbers and Algebraic Functions (2005).
- FSU grant CRC/COFRS, PI, \$8K, (2005).
- Research Fellowship from the Alexander von Humboldt Foundation (2004).
- NSF grant 0098034, PI, \$152K, Algorithms for Linear Differential Equations and Algebraic Functions (2001-2004).
- NSF grant 0112495, PI, \$9K, East Coast Computer Algebra Day 2001 (2001).
- NSF grant 9805983, PI, \$42K, Algorithms for Solving Linear Recurrence Equations (1999-2000, awarded in 1998).
- FSU grant CRC/FYAP 132859548, PI, \$10K, First Year Assistant Professor (1998).
- Bronze medal at the International Mathematics Olympiad in 1987 (to participate one must be in the top 6 of the country).

- **Activities:**

- Co-organizer of AIM workshop on Polynomial Factorization in Palo Alto, May 15-19, 2006.
- Member of the advisory board and program committee for MEGA'2003 and MEGA'2005 (Effective Methods in Algebraic Geometry) conference. Note: ISSAC and MEGA are the two largest conferences on symbolic computation.
- Member of the program committee for the ISSAC (International Symposium on Symbolic and Algebraic Computation) conferences in 1999, 2001, 2002, and 2006. Note: ISSAC and MEGA are the two largest conferences on symbolic computation.
- Sole organizer of ECCAD'01, the East Coast Computer Algebra Day, held at Florida State University on May 5, 2001.

- **Recent invited talks:**

- Sep 2006: Minnesota, IMA workshop Algorithms in Algebraic Geometry.
- Jul 2006: Nice, France. Conference in memory of Manuel Bronstein.
- May 2006: Palo Alto, ARCC workshop on polynomial factorization.
- Jan 2006: San Antonio. AMS meeting, Special Session on Field Extensions and Algorithms.
- Oct 2005: Banff, Canada. BIRS Workshop Challenges in Linear and Polynomial Algebra in Symbolic Computation Software.
- Jul 2005: Munich, Germany. Int. Conference on Difference Equations, Special Functions and Applications.
- Jul 2005: Oberwolfach, Germany. Explicit Methods in Number Theory.
- Jun 2005: Kassel, Germany, Computeralgebra Tagung 2005.
- Dec 2004: IHP, Paris, France. Workshop Explicit Arithmetic Geometry.
- Oct 2004: U. of Groningen, number theory seminar.

Received 4 invitations to speak in 2007, three of which (Newark NJ, Edinburgh UK, Groningen Netherlands) offer full support (travel and local expenses) and one (Oberwolfach Germany) offers partial support (local expenses only).

- **Software:**

The following software is freely available through the web or e-mail, including source code. Much of this was written under the support of NSF grants.

1. Developed a new algorithm for computing hypergeometric solutions of difference equations that can handle much harder equations by avoiding splitting fields.

2. Solved the combinatorial problem that occurs for factoring polynomials with rational coefficients, which resulted in a much improved algorithm that has been adopted by computer algebra packages such as Maple, NTL, Pari, MuPAD, and Magma.
3. An algorithm for evaluating Riemann Theta functions (joint work).
4. Wrote the diffop package in Maple, which includes: DFactor (factorizer for differential operators), exponential solutions, formal solutions and generalized exponents, endomorphism ring, and many other tools for solving linear differential equations.
5. Liouvillian solutions for second and third order differential equations.
6. Several methods to reduce differential equations to second order equations.
7. Integration algorithm for solutions of differential equations.
8. Solving conics over  $\mathbb{Q}(t_1, \dots, t_k)$ .
9. Maple's algebraic curves package.

• **Refereed Journal Publications:**

1. M. van Hoeij, *An algorithm for computing an integral basis in an algebraic function field*, J. Symb. Comput., 18, 353-363 (1994).
2. M. van Hoeij, *Rational Parametrizations of Algebraic Curves using a Canonical Divisor*. J. Symb. Comput., 23, 209-227 (1997).
3. M. van Hoeij, *Formal Solutions and Factorization of Differential Operators with Power Series Coefficients*. J. Symb. Comput., 24, 1-30 (1997).
4. M. van Hoeij, *Factorization of Differential Operators with Rational Functions Coefficients*, J. Symb. Comput., 24, 537-561 (1997).
5. M. van Hoeij, J-A. Weil, *An algorithm for computing invariants of differential Galois groups*. J. Pure Appl. Algebra, 117&118, 353-379 (1997).
6. M. van Hoeij, J.F. Ragot, F. Ulmer and J.A. Weil, *Liouvillian solutions of linear differential equations of order three and higher*. J. Symb. Comput., 28, 589-609 (1999). can be obtained from the dual first integral of an invariant that factors into linear forms.
7. M. van Hoeij, *Finite Singularities and Hypergeometric Solutions of Linear Recurrence Equations*, J. Pure Appl. Algebra, 139, 109-131 (1999).
8. S.A. Abramov, M. van Hoeij, *Integration of solutions of linear functional equations*. Integral Transforms and Special Functions, Vol.8, No 1-2, pp. 3-12. (1999).
9. B. Deconinck, M. van Hoeij, *Computing Riemann matrices of algebraic curves*. PhysicaD, 152, 28-46 (2001).
10. M. van Hoeij, *Factoring polynomials and the knapsack problem*, J. of Number Theory, 95, 167-189, (2002).

11. M. van Hoeij, *Decomposing a 4'th order linear differential equation as a symmetric product*, Banach Center Publications, **58**, 89-96, (2002).
12. S. Abramov, M. van Hoeij, *Set of Poles of Solutions of Linear Difference Equations with Polynomial Coefficients*. Computational Mathematics and Mathematical Physics, Vol. 43, No. 1, 57-62, (2003).
13. B. Deconinck, M. Heil, A. Bobenko, M. van Hoeij, M. Schmies. *Computing Riemann Theta Functions*, Math. Comp. **73**, 1417-1442, (2004).
14. T. Cluzeau, M. van Hoeij *A Modular Algorithm to Compute the Exponential Solutions of a Linear Differential Operator*, J. Symb. Comput., 38, 1043-1076 (2004).
15. M. van Hoeij, M. van der Put, *Descent for differential modules and skew fields*. Journal of Algebra, **296**, 18-55 (2006).
16. T. Cluzeau, M. van Hoeij, *Computing Hypergeometric Solutions of Linear Recurrence Equations*, AAECC, **17**, 83-115 (2006).
17. S. Abramov, M. Barkatou, M. van Hoeij, *Apparent Singularities of Linear Difference Equations with Polynomial Coefficients*, AAECC, **17**, 117-133 (2006).

• **Submitted**

1. M. van Hoeij, J. Cremona, *Solving conics over function fields*, accepted for publication in JNTB.
2. M. van Hoeij, *Solving Third Order Linear Differential Equations in Terms of Second Order Equations*, submitted to ISSAC'2007,
3. A. Galligo and M. van Hoeij, *A Geometric Approach to Factoring Bivariate Approximate Polynomials*, submitted to ISSAC'2007.

• **Refereed Publications in Conference Proceedings:**

1. M. van Hoeij, *Computing parametrizations of rational algebraic curves*, ISSAC '94 Proceedings, 187-190 (1994).
2. M. van Hoeij, *An algorithm for computing the Weierstrass normal form*, ISSAC '95 Proceedings, 90-95 (1995).
3. M. van Hoeij, *Rational Solutions of the Mixed Differential Equation and its Application to Factorization of Differential Operators*, ISSAC '96 Proceedings, 219-225 (1996).
4. S. A. Abramov, M. van Hoeij, *A method for the Integration of Solutions of Ore Equations* ISSAC '97 Proceedings, 172-175 (1997).
5. M. van Hoeij, *Rational Solutions of Linear Difference Equations*. ISSAC'98 proceedings. 120-123 (1998).

6. S.A. Abramov, M. van Hoeij, *Desingularization of linear difference operators with polynomial coefficients*, ISSAC '99 Proceedings, 269-275 (1999).
7. R. M. Corless, M. W. Giesbrecht, M. van Hoeij, I. S. Kotsireas, S. M. Watt, *Towards Efficient Factorization of Bivariate Approximate Polynomials*, ISSAC'01 proceedings. 85-92 (2001).
8. M. van Hoeij, *Factoring Polynomials and 0-1 Vectors*. CaLC'2001 proceedings, Lect. Notes in Comp. Science, 2146, p. 45-50, (2001).
9. M. van Hoeij, M. Monagan, *A Modular GCD algorithm over Number Fields presented with Multiple Extensions*, ISSAC'02 Proceedings, (2002).
10. M. van Hoeij, M. Monagan, *Algorithms for Polynomial GCD Computation over Algebraic Function Fields*. ISSAC'04 Proceedings, 297-304, (2004).
11. R. Burger, G. Labahn, M. van Hoeij, *Closed form solutions of linear odes having doubly periodic coefficients*. ISSAC'04 Proceedings, 58-64, (2004).
12. M. van Hoeij, J-A. Weil, *Solving Second Order Linear Differential Equations with Klein's Theorem*. ISSAC'05 Proceedings, 340-347, (2005)