

Mădălina Andreea Hodorog

CONTACT

INFORMATION

Johann Radon Institute
Austrian Academy of Sciences
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PERSONAL DATA

Date of Birth: 7th of January 1983.

Place of Birth: Deva, Romania.

Home Address: Aleea Crizantemelor, Bl. M1, sc. 1, ap. 56, Deva, Romania.

Current Address: Julius Raab Strasse 5-7, 4040, Linz, Austria.

CITIZENSHIP

Romanian

RESEARCH INTERESTS

Computational geometry, Knot theory, Algebraic geometry, Topology, Approximate algebraic computation, Combinatorial geometry and algorithms, Numerical analysis, Data structures and algorithms, Graph theory, Mathematical logic, Basics of computer science

CURRENT POSITION

Johann Radon Institute for Computational and Applied Mathematics
Austrian Academy of Sciences
Johannes Kepler University
Research Institute for Symbolic Computation
Linz, Austria
Ph.D. student in the Doctoral Program "Computational Mathematics" (DK) with
Ph.D. topic: Symbolic-numeric algorithms for genus computation using combinatorial and algebraic methods from knot theory.
Ph.D. Advisor: Prof. Dr. Josef Schicho, *Ph.D. Co-Advisor:* Bernard Mourrain
October 2008-Present

PREVIOUS POSITION

Research Institute for Symbolic Computation
Hagenberg, Austria
Ph.D. student, First Year of Ph.D. Studies in Computer Science
October 2007-September 2008

Institute e-Austria Timișoara
Timișoara, Romania
Junior Researcher
July 2005-September 2007

EDUCATION

West University of Timișoara
Faculty of Mathematics and Computer Science
Department of Computer Science
Timișoara, Romania
Master Studies, Computer Science, October 2005 - July 2007

- Thesis Topic: *A Case Study in Systematic Theory Exploration: Natural Numbers.*
- Advisors: Professor Dr. Tudor Jebelean, Lecturer Dr. Adrian Crăciun.
- Areas of Study: Computer Science and Mathematical Logic.

Bachelor Studies, Mathematics and Computer Science, October 2001 - July 2005

- Thesis Topic: *Numerical methods for solving nonlinear systems of partial differential equations-Parallel Calculus.*
- Advisor: Professor Dr. Dana Petcu.
- Areas of Study: Computer Science and Numerical Analysis.

Baccalaureate Diploma, Deva, Romania, **June 2001**

National College "Decebal", Speciality Mathematics-Physics-English
Deva, Romania, **1997-2001**

RESEARCH
EXPERIENCE

Doctoral Program "Computational Mathematics"
Linz, Austria
Ph.D. Student

DK 9 Project: Symbolic-Numeric Techniques for Genus Computation and Parametrization **October 2008-September 2011**

- The goal of the project is to give symbolic-numerical algorithms that compute the genus, and if applicable to compute an approximate rational parametrization, in the sense of approximate algebraic computation. It represents the core of my Ph.D. thesis.

Institute e-Austria Timișoara
West University of Timișoara
Junior Researcher

SysteMaThEx Project, July 2005-July 2007

- SysteMaThEx refers at systematic mathematical theory exploration with the *Theorema* system. The project provides major case studies of systematic theory exploration using a model for systematic theory exploration based on knowledge schemes. It represented the core support for my Master Thesis.

NanoSim Project, September 2004-June 2005

- NanoSim manages the transport phenomena and structure formation at the micro/nanometer scale in biomedicine and materials science, using GRID networks. It represented the core support for my Bachelor Thesis.

TEACHING
EXPERIENCE

West University of Timișoara
Computer Science Assistant

Laboratories

- Advanced Data Structures (C++) **Summer Semester 2007.**
- Data Structures (C++), **Summer Semester 2007.**
- Object Oriented Programming (C++), **Summer Semester 2006.**

Seminars

- Basics of Computer Science, **Winter Semester 2005-2006.**

RESEARCH
EVENTS

Johan Radon Institute for Computational and Applied Mathematics
Austrian Academy of Sciences Johannes Kepler University
Research Institute for Symbolic Computation

- Status seminar of the Doctoral Program "Computational Mathematics" (Linz), of the Doctoral Program "Confluence of Vision and Graphics" (Graz) and of the Doctoral Program "Numerical Simulation in Technical Sciences" (Graz). Pichl bei Schladming, Austria, **July 2009**. *Talk*: A symbolic-numeric algorithm for genus computation.
- Scientific visits to Galaad research team at INRIA, Sophia-Antipolis.
March 2009-April 2009 and August 2009-September 2009.
 - *Purpose*: Research concerning the theoretical and practical aspects of the Ph.D. topic (i.e. study on the topology of space algebraic curves, implementation issues concerning Axel algebraic geometric modeler). *Talks*: A symbolic-numeric algorithm for genus computation, Why knot? Alternative solution to the genus computation problem.
- Research seminars: Theorema (focused on automated theorem proving, mathematical theory exploration and program verification), Algorithmische Kombinatorik, Symbolic Computation, Algebraic Spline Curves and Surfaces.

West University of Timișoara, Institute e-Austria Timișoara

- Research stage at Research Institute for Symbolic Computation (Theorema Group).
October 2006-January 2007.
- Special Semester on Gröebner Bases, Linz-Hagenberg-Austria, **March 2006**.

FELLOWSHIPS

West University of Timișoara

- Socrates-Erasmus Scholarship, University Claude Bernard Lyon 1, France, Department of Computer Science, **October 2003-June 2004**.
- West University of Timișoara Scholarship, **2001-2007**.

PUBLICATIONS

Refereed papers in international conferences, book chapters, reports, extended abstracts

Conference Papers

- M. Hodorog, B. Mourrain, J. Schicho. *A Symbolic-Numeric Algorithm for Computing the Alexander Polynomial of a Plane Curve Singularity*. In: Proc. of the 12th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC10), D. Petcu, V. Negru, D. Zaharie, T. Jebelean (eds.), pp. ?-?, September 23-26 2010, to appear. Department of Computer Science, West University of Timișoara, Romania, ISBN:?.
- A. Crăciun, M. Hodorog. *Decompositions of Natural Numbers: From A Case Study in Mathematical Theory Exploration*. In: Proceedings of the 9th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC 2007), D. Petcu, V. Negru, D. Zaharie and T. Jebelean (ed.), pp. 1-8. September 26-29 2007. West University of Timișoara, Romania, ISBN:0-7695-3078-8.
- M. Hodorog, A. Crăciun. *Scheme-Based Systematic Exploration of Natural Numbers*. In: Proceedings of the 8th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC 2006), D. Petcu, V. Negru, D. Zaharie, T. Jebelean (ed.), pp. 23-34. September 26-29 2006. Department of Computer Science, West University of Timișoara, Romania, ISBN:0-7695-2740-X.

Contributions in Collections

- M. Hodorog, B. Mourrain, J. Schicho. *GENOM3CK - A Library for Genus Computation of Plane Complex Algebraic Curves using Knot Theory*. In ACM SIGSAM Communications in Computer Algebra, vol. 44, No. 4, December 2010, Issue 174. Software Presentations at the 35th International Symposium on Symbolic and Algebraic Computation (ISSAC 2010), July 25-28 2010, Munich, Germany.

Book Chapters

- M. Hodorog, J. Schicho, *A Symbolic-Numeric Algorithm for Genus Computation*, 2010/2011, to appear. SFB/DK Book. In: Texts and Monographs in Symbolic Computation. Johannes Kepler University, Linz-Austria.

Technical Reports

- M. Hodorog, J. Schicho, *A Symbolic-Numeric Algorithm for Genus Computation*. DK Report 2010-06, 31 pp., Johannes Kepler University, Linz-Austria.
- M. Hodorog, J. Schicho, *Computational Geometry and Combinatorial Algorithms for the Genus Computation Problem*. DK Report 2010-07, 30 pp., Johannes Kepler University, Linz-Austria.
- M. Hodorog, A. Crăciun. *A Case Study in Systematic Theory Exploration: Natural Numbers*. Technical report no. 07-18 in RISC Report Series, 38 pp., University of Linz, Austria. October 2007. RISC, University of Linz, Austria.

Extended Abstracts

- M. Hodorog, B. Mourrain, J. Schicho. *Topology Analysis of Complex Curves Singularities Using Knot Theory*, June 24-30, 2010. Seventh International Conference on Curves and Surfaces, Avignon-France.
- M. Hodorog, B. Mourrain, J. Schicho. *The Genus Computation Problem: Symbolic-Numeric Solutions and Beyond*, March 15-19, 2010. Second SAGA winter workshop, Auron-France.
- A. Crăciun, M. Hodorog. *The Quotient-Remainder Theorem for Natural Numbers: Discovery by Lazy Thinking*. University of Pecs, Hungary, June 21, 2007. At: First Central and Eastern European Conference on Computer Algebra and Dynamic Geometry Systems in Mathematics Education (CADGME).

Conference Talks

- **M. Hodorog**, B. Mourrain, J. Schicho. *A Symbolic-Numeric Algorithm for Computing the Alexander Polynomial of a Plane Curve Singularity*. At the 12th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC10), September 23-26 2010, Timișoara, Romania.
- **M. Hodorog**, B. Mourrain, J. Schicho. *GENOM3CK - A Library for Genus Computation of Plane Complex Algebraic Curves using Knot Theory*. Software Presentation at the 35th International Symposium on Symbolic and Algebraic Computation (ISSAC 2010), July 25-28 2010, Munich, Germany.
- **M. Hodorog**, B. Mourrain, J. Schicho. *Topology Analysis of Complex Curves Singularities Using Knot Theory*. At the 7th International Conference on Curves and Surfaces, June 24-30 2010, Avignon, France.
- **M. Hodorog**, B. Mourrain, J. Schicho. *The Genus Computation Problem: Symbolic-Numeric Solutions and Beyond*. At the Second Winter SAGA Workshop, March 15-19 2010, Auron, France.
- **M. Hodorog**, A. Crăciun. *Scheme-Based Systematic Exploration of Natural Numbers*. At: The 8th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC 2006), September 2006. Department of Computer Science, West University of Timișoara, Romania.

- **M. Hodorog**, A. Crăciun, T. Jebelean. *Systematic Exploration of Mathematical Theories*. July 27-30, 2008. Contributed talk at Applications of Computer Algebra, Session Symbolic Computation and Deduction in System Design and Verification.

Submitted papers, extended abstracts

- M. Hodorog, B. Mourrain, J. Schicho. *Topology Analysis of Complex Curves Singularities Using Knot Theory*. Submitted Paper. In Springer's Book Series Lecture Notes in Computer Science: Proceedings of the Seventh International Conference on Curves and Surfaces, Avignon-France, June 24-30, 2010.

CONFERENCE
ORGANIZER

Research Institute for Symbolic Computation, Linz, Austria

RISC (Research Institute for Symbolic Computation) Summer 2009

- FPSAC 2009, The 21st International Conference on Formal Power Series and Algebraic Combinatorics, **July 2009**.

RISC (Research Institute for Symbolic Computation) Summer 2008

- SCSS 2008, Symbolic Computation in Software Science, **July 2008**.
- RTA 2008, International Conference on Rewriting Techniques and Applications, **July 2008**.

West University of Timișoara, Institute e-Austria Timișoara

- SYNASC 2007, Timișoara, Romania, (The 9th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing), **September 2007**.
- SYNASC 2006, Timișoara, Romania, (The 8th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing), **September 2006**.
- ISPDC 2006, Timișoara, Romania, (The 5th International Symposium on Parallel and Distributed Computing), **July 2006**.
- SYNASC 2005, Timișoara, Romania, (The 7th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing), **September 2005**.

COMPUTER
SKILLS

Software experience in programming

Programming Languages

- C, C++, Pascal, Basic, Java.
- Mathematica.
- Theorema.
- Maple, Matlab, Mathcad, Scilab.
- Prolog, Lisp, DrScheme.
- Macro Assembler-Version 6.0.
- OpenGL.
- Parallaxis.
- Jade (Java Agent Development Framework).

Programming Utilities

- Borland C++, Borland Pascal, Visual Basic.
- Visual Studio, Visual .Net.
- SQL, Oracle.
- HTML, PHP.
- Qt Script for Applications.

Scientific packages

- Axel.
- Mathemagix.
- TeXmacs.
- Singular.
- CoCoA.
- Bertini.

Operating Systems

- Mac.
- UNIX.
- Windows.

Standard Programs

- Latex.
- MS Office.
- Xfig.

MATHEMATICAL
EXPERTISE

Knowledge in Mathematics and Applied Mathematics

Analysis

- Topology and real functions.
- Complex Analysis.
- Numerical Analysis.
- Nonlinear equations.
- Ordinary Differential Equations.
- Partial Differential Equations.
- Analysis in \mathbb{R} and \mathbb{R}^n .

Computational Algebra

Computational Geometry

Computational Mathematics

Mathematical Logic

Advanced Logic and Functional Programming

Algebra

Geometry

Probabilities and Statistical Processes

Optimal Control

Approximation and Optimization

Calculability and Turing Machines

Mathematical Models in Economy

Operational Researches

Fundamentals of Numerical Analysis and Symbolic Computation

Computer-Based Working Environments

Thinking, Speaking, Writing (Proving Techniques and Communication Skills)

Computer Algebra

Programmierprojekt Symbolisches Rechnen

Analytik Combinatorics

Algorithmic Combinatorics

Introduction to Unification Theory

Automated Theorem Proving

REFERENCES

Please contact the following referees for further information

Prof. Dr. Josef Schicho. Group Leader Symbolic Computation, Johann Radon Institute for Computational and Applied Mathematics, Austrian Academy of Sciences, Altenbergerstrasse 69, 4040, Linz, Austria. Email: josef.schicho@oeaw.ac.at

Bernard Mourrain. Research Director Galaad Project, INRIA Sophia-Antipolis, 2004 route des Lucioles, B.P. 93, 06902 Sophia-Antipolis, France.
Email: Bernard.Mourrain@inria.fr

Dr. Adrian Crăciun. Lecturer at the Department of Computer Science, Faculty of Mathematics and Computer Science, West University Timișoara. Room 050b, Blvd. V. Parvan 4, 300223 Timișoara, Romania. Email: acraciun@info.uvt.ro

Dr. Gabriel Istrate. Centre for the Study of Complexity, Babes Bolyai University, Str. Fantanele 33, Cluj-Napoca, Romania. Email: gabriel.istrate@gmail.com

FOREIGN
LANGUAGES

English, French, German, Italian (low level), Spanish (low level)

Certificates

- TOEFL certificate (Test of English as a Foreign Language), **November 2005.**
- DALF certificate (Diploma of French Advanced Studies), **June 2005.**

PASSIONS

Art, Fashion, Swimming, Dancing