Rémi Imbach

Curriculum Vitæ

Civil Status: born December 7, 1985 in Strasbourg, France.
French citizen.
Married with Zahra Poonawala.

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Research interest

Symbolic computation, Root finding, Computational algebraic geometry, Certified and numerical approximation of algebraic or analytic sets, Interval computation, Geometric constraint solving problems

Current position

Since June 2018	**Assistant Professor** (without tenure), Courant Institute of Mathematical Sciences (CIMS), New York University (NYU) Researches in association with Pr. Chee K. Yap, NYU, and Pr. Victor Y. Pan, City University of New York (CUNY)

Teaching

Since June 2018	**Responsible and main instructor** for course *Mathematical Techniques for Computer Sciences Applications*, for Master students in Computer Sciences (CS), 125 hours lectures.

Education

October 2013	**PhD** in CS, Université de Strasbourg (UDS), France
September 2008	**Master**'s degree in Mathematics, UDS, France

Software development

`Ccluster`	**Designer and developer**; `C` library for root clustering; `Julia` interface: `https://github.com/rimbach/Ccluster.jl`

1. Resume

Academic positions

Since June 2018	**Assistant Professor** (without tenure), CIMS, NYU Researches with Pr. Chee K. Yap and Pr. Victor Y. Pan Teaching: 125 hours
2017-2018 10 months	**Scientific assistant**, Technische Universität Kaiserslautern (TUK), Germany Part of AGAG team, headed by Pr. Wolfram Decker, TUK
2014 - 2016 24 months	**Postdoctoral Researcher**, National Institute for Research in Computer Science and Control (INRIA) Nancy - Grand Est, France Advisors: Guillaume Moroz and Marc Pouget, INRIA
2013 - 2014 11 months	**Research and teaching fellow**, UDS, ICube laboratory, France Advisors: Pascal Mathis and Pr. Pascal Schreck, UDS Teaching: 180 hours
2010 - 2013 36 months	**PhD candidate**, Université de Strasbourg, ICube lab., France Advisor: Pascal Mathis; Supervisor: Pr. Pascal Schreck Teaching: 64 hours each year

Other research experiences

Nov. 2016 2 weeks	**Invited Researcher**, at Automation & Computer Science Dept., École des Mines de Nantes, France. Collaborative work with Alexandre Goldstejn, CNRS, and Pr. Christophe Jermann, Université de Nantes
Jan - June 2010	**Master's thesis**, UDS, ICube lab., France Advisors: Pascal Mathis and Pr. Pascal Schreck
Summer 2007	**Internship**, UDS, ICube lab. Supervisor: Alain Daurat, UDS

Teaching experiences

Since June 2018	**Responsible and main instructor** for course *Mathematical Techniques for Computer Sciences Applications*, for Master's students in CS, CIMS, NYU, CS Dept, 125h lectures. Syllabus: Linear algebra, probability, numeric methods and their applications to signal processing, computer graphics and machine learning.
2013 - 2014	**Teaching fellow**, UDS: 170h exercises sessions, 10h lectures Responsible for the course *Algorithm and Coding* for under-graduate students in mathematics, physics and chemistry; 10h lectures in this course unit. Exercises sessions in *graph theory, computers architecture, ...*
2010 - 2014	**Adjunct professor**, UDS: 3×64h exercises sessions in *theory of operating systems*, *computers architecture*, *graph theory*, *algorithms and coding*, ...

Software development

2017 - now	`Ccluster`: a software for clustering roots of univariate polynomials and triangular algebraic sets. **Main designer and developer**. Written in `C`, an interface for `Julia` is here: `https://github.com/rimbach/Ccluster.jl` also available through `Singular`
2015 - 2016	`subdivision_solver`: a subdivision solver for systems of large dense polynomials. **Main designer and developer**. Written in `C++`, `Python/Cython`, `Sage`. Available as a package for `Sage` here: `http://subdiv-solver.gforge.inria.fr/`

Reviewing activity

2018	**Reviewer** for special issue *Formalization of geometry, automated and interactive geometric reasoning* in *Annals of Mathematics and Artificial Intelligence*, *Springer*.

Education

October 2013	**PhD** in Computer Science, Université de Strasbourg, France *Solving geometric constraints by leading an homotopy method by geometry* Advisor: Pascal Mathis; Supervisor: Pr. Pascal Schreck Committee members: D. Michelucci, B. Mourrain, M.Tajine, P. Serré.
June 2010	**Master's degree** in Computer Science, Université de Strasbourg Specialty: Computer Science and Imaging
September 2008	**Master's degree** in Mathematics, Université de Strasbourg Specialty: Discrete Mathematics

Referees

Pr. Chee K. Yap (`yap@cs.nyu.edu`) is full professor of CS at CIMS, NYU.
301, Warren Weaver Hall, 251, Mercer Street, New York, NY 10012

Pr. Victor Y. Pan (`victor.pan@lehman.cuny.edu`) is Distinguished professor of Mathematics at CUNY.

Dr. Guillaume Moroz and **Dr. Marc Pouget** (`firstname.lastname@inria.fr`) are researchers at INRIA Nancy-Grand Est and were the advisors of my researches in Nancy.
INRIA Nancy-Grand Est 615 rue du jardin botanique 54600 Villers lès Nancy
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Pr. Pascal Schreck (`schreck@unistra.fr`) is full professor of CS at UDS and was my thesis supervisor.
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2. Publications

A complete list of my publications is available on my personal web page: `https://cims.nyu.edu/~imbach/`. Here is a selection.

On the order of author's names In the community of symbolic computing where [IPY19, IMP18, IMP17, IP19, IPY19+, IPY18, IMP16] have been published, the usage is to make appear the names of the authors in their alphabetical order.

In the community of computer graphics where [IMS16, ISM14, MSI12] have been disseminated, the usage is to make appear the name of the main contributor in first position.

International journals

[IPY19] Rémi Imbach, Marc Pouget and Chee Yap. *Clustering Complex Zeros of Triangular System of Polynomials*. To appear in Mathematics in Computer Sciences.

[IMP18] Rémi Imbach, Guillaume Moroz and Marc Pouget. *Reliable location with respect to the projection of a smooth space curve*. Reliable Computing, 26:13 – 55, 2018

[IMP17] Rémi Imbach, Guillaume Moroz and Marc Pouget. *A certified numerical algorithm for the topology of resultant and discriminant curves*. Journal of Symbolic Computation, vol. 80, Part 2, pages 285 – 306, 2017.

[IMS16] Rémi Imbach, Pascal Mathis and Pascal Schreck. *A robust and efficient method for solving point distance problems by homotopy*. Mathematical Programming, vol. 163, Issue (1-2), pages 115–144, 2017.

[ISM14] Rémi Imbach, Pascal Schreck and Pascal Mathis. *Leading a continuation method by geometry for solving geometric constraints*. Computer-Aided Design, vol. 46, pages 138–147, 2014.

International conferences, peer reviewed

[IP19] Rémi Imbach, Victor Y. Pan. *New practical advances in polynomial root finding.* To appear in Mathematical Aspects of Computer and Information Sciences

[IPY19+] Rémi Imbach, Victor Y. Pan, Chee Yap, Ilias S. Kotsireas, and Vitaly Zaderman. *Root-finding with implicit deflation.* In Matthew England, Wolfram Koepf, Timur M. Sadykov, Werner M. Seiler, and Evgenii V. Vorozhtsov, editors, Computer Algebra in Scientific Computing, pages 236–245, Cham, 2019. Springer International Publishing.

[IPY18] Rémi Imbach, Victor Y. Pan, and Chee Yap. *Implementation of a near-optimal complex root clustering algorithm.* In James H. Davenport, Manuel Kauers, George Labahn, and Josef Urban, editors, Mathematical Software – ICMS 2018, pages 235–244, Cham, 2018. Springer International Publishing.

[IMP16] Rémi Imbach, Guillaume Moroz and Marc Pouget. *Numeric and certified isolation of the singularities of the projection of a smooth space curve*, pages 78–92. Springer International Publishing, Cham, 2016.

[MSI12] Pascal Mathis, Pascal Schreck and Rémi Imbach. *Decomposition of geometrical constraint systems with reparameterization*. Proceedings of the 27th Annual ACM Symposium on Applied Computing, pages 102–108. ACM, 2012.

Technical report

[Imbach16] Rémi Imbach. *A Subdivision Solver for Systems of Large Dense Polynomials*. Technical Report RT-0476, INRIA Nancy, March 2016.

PhD Thesis

[Imbach13] Rémi Imbach. *Solving geometric constraints by leading an homotopy method by geometry*. PhD Thesis, Université de Strasbourg, 2013.

3. Selected communications

Seminars

Nov. 2019 — *Practical Advances in Complex Root Clustering.*
Joint CUNY Graduate Center-Courant Seminar in Symbolic-Numeric Computing, Courant Institute of Mathematical Sciences, New York. `http://qcpages.qc.cuny.edu/~aovchinnikov/seminar.html`

Jan. 2019 — *Complex Roots/Solutions Clustering Algorithms.*
OGRE team seminar, Nantes, France

May 2018 — *Numerical and certified computation of the topology of projected curves.*
Joint CUNY Graduate Center-Courant Seminar in Symbolic-Numeric Computing, CUNY Graduate Center, New York. `http://qcpages.qc.cuny.edu/~aovchinnikov/seminar.html`

July 2017 — *Certified numerical tools for computing the topology of projected curves.*
AGAG seminar, Technische Universität Kaiserslautern Germany
`http://www.mathematik.uni-kl.de/en/agag/talks/20170101/`

Sept. 2016 — *Certified numerical tools for computing the topology of projected curves.*
AriC seminar, ENS(École Normale Supérieure) Lyon, France
`http://www.ens-lyon.fr/LIP/AriC/seminar`

International conferences and workshops

Aug. 2019	*Clustering Complex Zeros of Triangular Systems of Polynomials*. CASC 2019 (Computer Algebra in Scientific Computing), Moscow, Russia. `http://www.casc-conference.org/2019/`
July 2018	*Implementation of a near-optimal complex root clustering algorithm*. ICMS 2018 (International Congress of Mathematical Software), Notre-Dame, USA. `http://icms-conference.org/2018/`
June 2016	*Interval tools for computing the topology of projected curves*. SWIM 2016 (Summer Workshop on Interval Methods), Lyon, France. `https://swim2016.sciencesconf.org/`
Novembre 2015	*Numeric and Certified Isolation of the Singularities of the Projection of a Smooth Space Curve*. MACIS 2015 (Sixth International Conference on Mathematical Aspects of Computer and Information Science), Berlin, Germany. `http://macis2015.zib.de/`