

Curriculum Vitae

Federico G. Poloni

Personal information

Full name: Federico Giovanni Poloni.

Born: January 1, 1983 in Treviso (BG), Italy. Italian citizen.

Work address: Institut für Mathematik, Sekretariat MA 4–5, Straße des 17. Juni 136, D-10623 Berlin.

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Academic positions and fellowships

2012: Winner of a permanent research assistant (*ricercatore universitario*) position at the Institute of Computer Science, University of Pisa, Italy. Due to start in September 2012.

2011–2012: Recipient of an Alexander von Humboldt research fellowship for postdoctoral research (info: http://en.wikipedia.org/wiki/Alexander_von_Humboldt_Foundation). Academic host: prof. V. Mehrmann, Numerical Mathematics workgroup, Technische Universität Berlin.

2011: Temporary research assistant (De: *wissenschaftlicher Mitarbeiter*) position at the TU Berlin.

Studies

2010: Ph.D. (It: *diploma di perfezionamento*) in Mathematics at the *Scuola Normale Superiore*, Pisa, Italy, mark 70/70 with honours. Thesis: *Algorithms for quadratic matrix and vector equations*, supervisors: D. A. Bini and B. Meini. Average exam mark during the course: 30/30.

2008: Final diploma for the five-year honours programme of the *Scuola Normale Superiore* (info: http://en.wikipedia.org/wiki/Scuola_normale), complementing the bachelor+master studies at the University of Pisa, mark 70/70 with honours. Average exam mark during the course: 30/30.

2007: Master degree (It: *laurea specialistica*) in Mathematics at the University of Pisa, Italy, mark 110/110 with honours. Thesis (in Italian): *Methods for the fast solution of a class of algebraic Riccati equations*, supervisors: D. A. Bini and B. Meini. Average exam mark during the course: 29.50/30.

2005: Bachelor degree (It: *laurea triennale*) in Mathematics at the University of Pisa, Italy, mark 110/110 with honours. Thesis (in Italian): *Discrete Fourier transform and canonical factorization in a queuing theory problem*, supervisor: D. A. Bini. Average exam mark during the course: 29.54/30.

Research interests

General field: numerical linear algebra and matrix analysis

Matrix equations: Algebraic Riccati equations and Lur'e equations, quadratic matrix equations, matrix and vector equations in applied probability and control theory, iterative solution methods.

Matrix structures: displacement structure, Toeplitz and Cauchy-like matrices, fast and superfast algorithms for rank-structured matrices.

Matrix geometric means: analysis and computational aspects.

Journal papers

2012: F. Greco, B. Iannazzo, F. Poloni, *The Padé iterations for the matrix sign function and their reciprocals are optimal*, Linear Algebra Appl. 436 (2012), no. 3, pp. 472–477.

2011: D. A. Bini, B. Meini, F. Poloni, *On the solution of a quadratic vector equation arising in Markovian Binary Trees*, Numer. Linear Algebra Appl. 18 (2011), no. 6, pp. 981–991.

2011: B. Meini, F. Poloni, *A Perron iteration for the solution of a quadratic vector equation arising in Markovian binary trees*, SIAM J. Matrix Anal. Appl. 32 (2011), no. 1, pp. 248–261.

2010: D. A. Bini, B. Meini, F. Poloni, *Transforming algebraic Riccati equations into unilateral quadratic matrix equations*, Numer. Math. 116 (2010), no. 4, pp. 553–578.

2010: F. Poloni, *A note on the $O(n)$ -storage implementation of the GKO algorithm and its adaptation to Trummer-like matrices*, Numer. Algorithms 55 (2010), pp. 115–139.

2010: D. A. Bini, B. Meini, F. Poloni, *An effective matrix geometric mean satisfying the Ando–Li–Mathias properties*, Math. Comp. 79 (2010), pp. 437–452.

2010: F. Poloni, *Constructing matrix geometric means*, Electron. J. Linear Algebra 20(2010), pp. 419–435.

2009: D. A. Bini, B. Meini, F. Poloni, *Fast solution of a certain Riccati Equation through Cauchy-like matrices*, Electron. Trans. Numer. Anal. 33 (2009), pp. 84–104.

2008: D. A. Bini, B. Iannazzo, F. Poloni, *A fast Newton's method for a nonsymmetric algebraic Riccati equation*, SIAM J. Matrix Anal. Appl. 30 (2008), no. 1, pp. 276–290.

Articles in press

2010: V. Mehrmann, F. Poloni, *A generalized structured doubling algorithm for optimal control problems*, Matheon preprint n. 750, http://www.matheon.de/research/show_preprint.asp?serial=750. Accepted for publication in Numerical Linear Algebra Appl.

2010: B. Iannazzo, F. Poloni, *A subspace shift technique for solving close-to-critical nonsymmetric algebraic Riccati equations*, arXiv:1011.1363, <http://arxiv.org/abs/1011.1363>. Accepted for publication in Numerical Linear Algebra Appl.

2010: F. Poloni, *Quadratic vector equations*, arXiv:1004.1500 [math.NA], <http://arxiv.org/abs/1004.1500>. Accepted for publication in Linear Algebra Appl.

Books

2011: F. Poloni, *Algorithms for quadratic matrix and vector equations*, publications of the Scuola Normale Superiore (distributed by Birkhauser), ISBN 978-88-7642-383-3.

Conference proceedings and book chapters

2010: D. A. Bini, B. Meini, B. Iannazzo, F. Poloni, *Nonsymmetric algebraic Riccati equations associated with an M -matrix: recent advances and algorithms*, in the book *Matrix methods: theory, algorithms and applications*, edited by V. Olshevsky and E. Tyrtyshnikov, World Scientific Publishers, pp. 176–209.

2010: D. A. Bini, B. Meini, F. Poloni, *On the solution of a quadratic vector equation arising in Markovian Binary Trees*, Proceedings of the 6th intl. workshop on the numerical solution of Markov chains (NSMC) 2010, College of William & Mary, Williamsburg, VA (USA), pp. 10–12.

2010: B. Iannazzo, F. Poloni, *The worst-case scenario in nonlinear matrix equations*, Proceedings of the 6th NSMC 2010, College of William & Mary, Williamsburg, VA (USA), pp. 56–59.

Recent preprints

2012: F. Poloni, T. Reis, *On combining deflation and iteration to low-rank approximative solution of Lur'e equations*, Hamburger Beiträge zur Angewandten Mathematik 2012-01. Under review (SIMAX).

2011: V. Mehrmann, F. Poloni, *Doubling algorithms with permuted Lagrangian graph bases*, Matheon preprint n. 821, http://www.matheon.de/research/show_preprint.asp?serial=821. Under review (SIMAX).

2011: F. Poloni, *A duality relation for matrix pencils with application to linearizations*, arXiv:1110.3641, <http://arxiv.org/abs/1110.3641>.

2011: F. Poloni, T. Reis, *The SDA method for numerical solution of Lur'e equations*, arXiv:1101.1231 [math.NA], <http://arxiv.org/abs/1101.1231>. Under review (AMC).

Scientific talks

2011: *A new algorithm for a system of quadratic equations in branching processes*, XIX congresso dell'unione matematica italiana — Bologna, Italy. in Italian.

2011: *The benefits of changing identity (in Lagrangian subspaces and doubling algorithms)*, Workshop on matrix equations and tensor techniques — Aachen, Germany.

2011: *Two numerical methods for the solution of Lur'e equations*, International conference on matrix methods in mathematics and applications — Moscow.

2011: *Algorithms for nonnegative quadratic vector equations*, 18th Householder symposium — Tahoe City, CA (USA).

2010: *On the solution of a quadratic vector equation arising in Markovian Binary Trees*, 6th international workshop on the numerical solution of Markov Chains (NSMC) — Williamsburg, VA (USA).

2010: *Algorithms for nonnegative quadratic vector equations*, 16th ILAS Conference — Pisa (Italy). In the invited minisymposium on matrix functions and equations.

2010: *Algorithms for quadratic matrix equations in probability — with an eye to similarities with control theory*, Doktoranden- und Diplomanden-Seminar Numerische Mathematik — Technische Universität Berlin (Germany).

2009: *Geometric means of more than two matrices*, SIAM Applied Linear Algebra Conference — Monterey, CA (USA). In the minisymposium on functions of matrices.

2009: *An efficient matrix mean satisfying the Ando–Li–Mathias properties*, GNCS congress — Montecatini Terme (Italy), and Two days of numerical linear algebra — Perugia (Italy). In Italian.

2008: *Some implementation issues on the GKO algorithm*, Structured Linear Algebra Problems: Analysis, Algorithms, and Applications — Cortona (Italy).

2008: *SDA and cyclic reduction for a rank-structured algebraic Riccati equation*, Two days of numerical linear algebra — Bologna (Italy).

2007: *Old and new algorithms for algebraic Riccati equations*, Dagstuhl seminar 07461: Numerical Methods for Structured Markov Chains — Schloss Dagstuhl (Germany).

2007: *Exploiting displacement structure in the solution of a class of nonsymmetric algebraic Riccati equations*, 2nd International Conference on Matrix Methods and Operator Equations — Moscow.

2007: *Fast Newton method for an algebraic Riccati equation*, Two days of numerical linear algebra — Padua (Italy). In Italian.

Other scientific activities

2008–now: Referee for the journals: Int. J. Comput. Math., Linear Algebra Appl., Linear and Multilinear Algebra, Numer. Algorithms, Numer. Math., Proc. Roy. Soc. Edinburgh Sect. A, SIAM J. Matrix Anal. Appl.

2011: Organizer (with T. Reis) of a *young researchers minisymposium* on algebraic Riccati equations in the 17th ILAS Conference, Braunschweig (Germany).

2011: Summer school on numerical linear algebra for dynamical and high-dimensional problems — Trogir (Croatia).

2010: Member of the local organizing committee of the 16th ILAS conference, Pisa (Italy).

2010: Gene Golub SIAM Summer School 2010 — Selva di Fasano (Italy).

2010: Visiting scholar (two months) at the Technische Universität Berlin.

2009: Summer School and Advanced Workshop on Trends and Developments in Linear Algebra — Trieste (Italy).

2008: SIAG/LA–SIMUMAT International Summer School on Numerical Linear Algebra — Castro Urdiales (Spain).

Teaching activities

2008–2010: Computer lab classes supporting the Numerical Analysis undergraduate course; University of Pisa, in the academic years 2008–2009, 2009–2010, 2010–2011.

2008–2010: Tutoring activities for first-year students of the Scuola Normale.

2009: Several lectures as teaching assistant for the Advanced Numerical Analysis graduate course; University of Pisa, academic year 2009–2010.

2004–2010: Lecturer in many local and national training seminars for the preparation of high-school students to the Italian and international mathematical Olympiads.

Other work experiences

2003–now: Collaboration with the organising committee of the Italian mathematical Olympiad: taking part in the Italian Olympiads as organiser and judge (2004–2009); proposing problems; correcting exam papers. Member of the organising committee since 2009. Member of the scientific staff following the Italian team to several international competitions: Romanian master of mathematics 2009 and 2010, international mathematical Olympiad 2009.

2010: Referee for the Mathematics part of the unified admission test to Engineering and Architecture studies used in most Italian universities.

2004–2007: System administrator of a small computer lab (12 Linux+Windows workstations, 500+ users, Linux and Windows servers), in collaboration with the computing centre of the Scuola Normale.

Awards

2011: “Shortlisted” (=among the top 6) in the XIV Householder Award for the best dissertation in numerical linear algebra in the triennium 2008-2010.

2007: *2nd matrix prize for young speakers*, for the talk presented during the 2nd ICMMOE in Moscow (see **Conferences and workshops**).

2004: *Championnat international de jeux mathématiques (CIJM)*: 1st place in the Italian stage, 1st place in the international finals (Paris, France).

2003: CIJM: 4th place in the Italian stage.

2002: International mathematical Olympiad (IMO): 2nd place in the Italian Olympiad; 1st place in the Italian team selection test; bronze medal with 17 points (best result *ex aequo* in the Italian team) in the 43rd international mathematical Olympiad (Glasgow, UK).

2001: IMO: 3rd place in the Italian Olympiad; 1st place in the Italian team selection test; honourable mention in the 42nd international mathematical Olympiad (Washington D.C., USA) with 9 points.

Also finalist in the Italian physics (2002) and informatics (2001) Olympiads.

Language skills

Italian: Mother tongue. **English:** Excellent. **French:** Good. **German:** Adequate.

Computer skills

Operating systems: GNU/Linux: excellent knowledge (use and administration). Windows: good knowledge (use and administration).

Office apps: Good knowledge: word processors, spreadsheets, database applications (including basic SQL).

Programming: Good knowledge of C++, C, Matlab. Basic knowledge of FORTRAN 90, Perl, shell scripting. Programming experience with the following libraries: Boost, GTK+, GTKmm, TNT Template Numerical Toolkit, LAPACK, ncurses.

Other: Good knowledge of L^AT_EX. Basic HTML with CSS. Basic knowledge of several revision control programs.

Hobbies

Programming, learning and using GNU/Linux; basketball; juggling; contract bridge; reading science-fiction books.

Publications and theses are available online on <http://fph.altervista.org/acad/>. According to the common practice in mathematics, the order of the authors in publications is usually alphabetical and does not indicate a difference in the contribution.

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