

SILVIA GAZZOLA

CURRICULUM VITÆ ET STUDIORUM

CURRENT POSITION

Lecturer, University of Bath since June 2016
Department of Mathematical Sciences
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PAST POSITIONS

Research Associate, Heriot-Watt University June 2015 - May 2016
Biomedical and Astronomical Signal Processing Group,
School of Engineering & Physical Sciences Edinburgh, UK
Supervisor: Prof Y. Wiaux.
Topic: “Compressed Quantitative MRI”

Visiting Researcher, University of Edinburgh November 2015 - May 2016
Institute of Digital Communications,
School of Engineering Edinburgh, UK
Hosted by Prof M. Davies

Post-Doctoral Researcher, University of Padova February 2014 - May 2015
Department of Mathematics Padova, Italy
Supervisor: Prof M. Redivo Zaglia
Topic: “Krylov projection methods for linear inverse problems”

Ph.D. Student, University of Padova January 2011 - December 2013
Doctoral School in Mathematical Sciences
Computational Mathematics Area Padova, Italy
Supervisor: Prof P. Novati
Topic: “Regularization techniques based on Krylov methods for ill-posed linear systems”

DEGREES

PhD in Mathematics March 10, 2014
University of Padova
Grade: excellent

MSc in Pure and Applied Mathematics October 19, 2010
University of Parma
Grade: 110/110 *cum laude*

BSc in Mathematics April 29, 2008
University of Parma
Grade: 101/110

SKILLS

Languages	English, Italian (mother tongue)
Operating Systems	Mac OS X, Microsoft Windows, GNU/Linux (basic)
Programming Languages	Matlab, Fortran (basic), C++ (basic)
Text Editors	Latex, Microsoft Office, Open Office

RESEARCH TOPICS

Regularization techniques, Krylov subspace methods, numerical linear algebra, imaging problems, inverse problems, compressive sensing, tomography, boundary element methods.

PUBLICATIONS

Refereed Papers in Journals

1. S. Gazzola and L. Reichel. A NEW FRAMEWORK FOR MULTI-PARAMETER REGULARIZATION. *BIT Numerical Mathematics*, 2016.
Available online: <http://dx.doi.org/10.1007/s10543-015-0595-4>
2. S. Gazzola, A. Karapiperi. IMAGE RECONSTRUCTION AND RESTORATION USING THE SIMPLIFIED TOPOLOGICAL ε -ALGORITHM. *Appl. Math. Comput.*, 274: 539 – 555, 2016.
3. S. Gazzola, E. Onunwor, L. Reichel, and G. Rodriguez. ON THE LANCZOS AND GOLUB-KAHAN REDUCTION METHODS APPLIED TO DISCRETE ILL-POSED PROBLEMS. *Numer. Linear Algebra Appl.*, 23(1): 187–204, 2016.
4. S. Gazzola and P. Novati. INHERITANCE OF THE DISCRETE PICARD CONDITION IN KRYLOV SUBSPACE METHODS. *BIT Numerical Mathematics*, 2016. Available online: <http://dx.doi.org/10.1007/s10543-015-0578-5>
5. S. Gazzola, P. Novati, and M. R. Russo. ON KRYLOV PROJECTION METHODS AND TIKHONOV REGULARIZATION. *Electron. Trans. Numer. Anal.*, 44:83–123, 2015.
6. S. Gazzola, P. Novati, and M. R. Russo. EMBEDDED TECHNIQUES FOR CHOOSING THE PARAMETER IN TIKHONOV REGULARIZATION. *Numer. Linear Algebra Appl.*, 21(6):796–812, 2014.
7. S. Gazzola and J. Nagy. GENERALIZED ARNOLDI-TIKHONOV METHOD FOR SPARSE RECONSTRUCTION. *SIAM J. Sci. Comput.*, 36(2):B225–B247, 2014.
8. S. Gazzola and P. Novati. AUTOMATIC PARAMETER SETTING FOR ARNOLDI-TIKHONOV METHODS. *J. Comput. Appl. Math.*, 256:180–195, 2014.
9. S. Gazzola and P. Novati. MULTI-PARAMETER ARNOLDI-TIKHONOV METHODS. *Electron. Trans. Numer. Anal.*, 40:452–475, 2013.
10. A. Aimi, S. Gazzola, and C. Guardasoni. ENERGETIC BOUNDARY ELEMENT METHOD ANALYSIS OF WAVE PROPAGATION IN 2D MULTILAYERED MEDIA. *Math. Methods Appl. Sci.*, 35:1140–1160, 2012.
11. A. Aimi, S. Gazzola, and C. Guardasoni. ENERGETIC BEM FOR DOMAIN DECOMPOSITION IN 2D WAVE PROPAGATION PROBLEMS. *Commun. Appl. Ind. Math.*, 2(1):1–22, 2011.

Papers under review

1. S. Gazzola and Y. Wiaux. FAST NONNEGATIVE LEAST SQUARES THROUGH FLEXIBLE KRYLOV SUBSPACES. November 2015.

Theses

1. REGULARIZATION TECHNIQUES BASED ON KRYLOV METHODS FOR ILL-POSED LINEAR SYSTEMS. PhD thesis, University of Padova, 2014. Advisor: Dr. P. Novati.
2. UN METODO ENERGETICO AGLI ELEMENTI DI CONTORNO PER PROBLEMI DI PROPAGAZIONE ONDOSA IN MULTIDOMINI. MSc thesis, University of Parma, 2010. Advisor: Dr. A. Aimi. Co-advisor: Dr. C. Guardasoni.

Other

1. S. Gazzola. THE MATHEMATICS BEHIND OUR COMPUTERS. *PLaNCK!* (scientific outreach magazine), 2015.
2. D. Badziahin, F. B. Planella, M. Ferreira, S. Gazzola, J. G. Herterich, A. Krupp, S. W. X. Lim, S. Miklavcic, R. Pronko, J. Skinner. SEGMENTATION AND SCENE CONTENT IN MOVING IMAGES. Technical Report, *107nd European Study Group with Industry*, University of Manchester, 2015.
3. D. Cellai, A. Faqeeh, S. Gazzola, A. Gloster, A. Hegarty, E. Kashdan, A. S. Nielsen, K. O'Sullivan, and A. Parnell. ANALYSIS AND INTERPRETATION OF TELLUS BORDER ELECTROMAGNETIC DATA. Technical Report, *102nd European Study Group with Industry*, UCD, 2014. Available at <http://mathsci.ucd.ie/esgi/>.
4. S. Gazzola. REGULARIZATION BY MEANS OF GENERALIZED ARNOLDI-TIKHONOV METHODS. Notes of a seminar, *Seminario Dottorato 2012/2013*, Department of Mathematics, University of Padova. Available at http://dottorato.math.unipd.it/sites/default/files/SemDott1213_note.pdf.

EDITORIAL ACTIVITIES

Referee for:

- *Applied Mathematics and Computation*
- *BIT Numerical Mathematics*
- *SIAM Journal on Matrix Analysis and Applications*
- *SIAM Journal on Scientific Computing*
- *Inverse Problems*
- *Linear Algebra and its Applications*
- *Science China Mathematics*
- *Journal of Scientific Computing*
- *IEEE Transactions on Medical Imaging*
- *IEEE Signal Processing Letters*
- *Numerical Algorithms*
- *Numerical Linear Algebra with Applications*

Managing Editor for:

Electronic Transactions on Numerical Analysis

since October 2014

Reviewer for:

Mathematical Reviews

since May 2015

SCIENTIFIC COMMUNICATIONS

Invited Talks

- ENFORCING NONNEGATIVITY BY FLEXIBLE KRYLOV SUBSPACES. *ILAS2016*, Leuven (Belgium). Within the Minisymposium "Image Restoration and Reconstruction". July 14, 2016.

- FAST NONNEGATIVE LEAST SQUARES THROUGH FLEXIBLE KRYLOV SUBSPACES. *SIAM LA15*, Atlanta (USA). Within the Minisymposium “Recent Advances in Numerical Linear Algebra for Inverse Problems”. October 30, 2015.
- SPARSE RECONSTRUCTION BY FLEXIBLE KRYLOV METHODS. *AIP 2015*, Helsinki (Finland). Within the Minisymposium “Efficient Methods for Large-Scale Inverse Problems in Imaging”. May 25, 2015.
- A NEW FRAMEWORK FOR MULTI-PARAMETER REGULARIZATION. *Two Days on Applied Mathematics in Cagliari* (Italy). April 10, 2015.
- REGULARIZING INVERSE PROBLEMS BY KRYLOV SUBSPACE METHODS. *Seminar*, Emory University (USA). October 31, 2014.
- REGULARIZING INVERSE PROBLEMS BY KRYLOV SUBSPACE METHODS. *Computational and Applied Mathematics Seminar*, Kent State University (USA). September 26, 2014.
- REGULARIZATION BY KRYLOV SUBSPACE METHODS. *Colloquium*, Department of Mathematics, Virginia Tech (USA). September 5, 2014.
- ADAPTIVE CHOICE OF THE REGULARIZATION PARAMETER AND MATRIX FOR THE ARNOLDI-TIKHONOV METHODS. *SIMAI 2014*, Taormina (Italy). Within the Minisymposium “Numerical methods for inverse problems and image processing”. July 8, 2014.
- REGULARIZATION BY KRYLOV SUBSPACE METHODS. *Seminar*, Emory University (USA). November 1, 2013.
- GENERALIZED ARNOLDI-TIKHONOV METHODS FOR SPARSE RECONSTRUCTION. *Seminar*, Emory University (USA). January 23, 2013.

Talks

- ARNOLDI-TIKHONOV METHODS WITH APPLICATIONS TO SPARSE RECONSTRUCTION. *25th Biennial Numerical Analysis Conference*, Glasgow (UK). June 25, 2013.
- REGULARIZATION BY MEANS OF GENERALIZED ARNOLDI-TIKHONOV METHODS. *Seminario Dottorato*, University of Padova, Padova (Italy). March 20, 2013.
- AUTOMATIC PARAMETER SETTING FOR ARNOLDI-TIKHONOV METHODS. *3rd Dolomites Workshop on Constructive Approximation and Applications*, Alba di Canazei (Italy). September 11, 2012.
- BEM FOR WAVE PROPAGATION PROBLEMS IN 2D MULTILAYERED MEDIA. *NumLab Seminars*, University of Padova, Padova (Italy). January 25, 2011.

Posters

- ARNOLDI-TIKHONOV METHODS FOR SPARSE RECONSTRUCTION. *Inverse Problems and Spectral Theory*, College Station (USA). October 18, 2014.
- ARNOLDI-TIKHONOV METHODS FOR SPARSE RECONSTRUCTION. *Householder Symposium XIX*, Spa (Belgium). June 10, 2014.
- NUMERICAL METHODS FOR IMAGE RECONSTRUCTION. *Notte dei Ricercatori*, Padova (Italy). September 27, 2013.
- PARAMETER SELECTION STRATEGIES FOR THE ARNOLDI-TIKHONOV METHODS. *Nonlinear Evolution Equations and Linear Algebra*, Cagliari (Italy). September 3, 2013.

Organization of Minisymposia

- “Efficient Methods for Large-Scale Inverse Problems in Imaging”. *AIP 2015*, Helsinki (Finland), May 25–29, 2015. With J. Chung.

Other

- TIPS FOR MATH & CS JOB APPLICATIONS. Invited by Emory SIAM Chapter, with Joe Sincad. Atlanta (USA). November 5, 2015.

VISITING EXPERIENCES

Department of Mathematics and Computer Science
Emory University, Atlanta, GA, USA

Hosted by J. Nagy

- November 2 - November 6, 2015
- October 28 - November 2, 2014
- October 18 - November 8, 2013
- September 19, 2012 - January 29, 2013 (as a Short-Term Scholar)

Department of Mathematics
Kent State University, Kent, OH, USA

Hosted by L. Reichel

- September 15 - December 18, 2014

Department of Mathematics
Virginia Tech, Blacksburg, VA, USA

Hosted by J. Chung

- September 4 - 14, 2014

ATTENDED CONFERENCES, SUMMER SCHOOLS, WORKSHOPS, MEETINGS

- *20th Conference of the International Linear Algebra Society (ILAS2016)*, KU Leuven (Belgium), July 11–15, 2016.
- *Distributed machine learning and optimization*, ICMS Edinburgh (UK), November 25–27, 2015.
- *SIAM Conference on Applied Linear Algebra*, Atlanta (GA, USA), October 26–30, 2015.
- *SPARS 2015: Signal Processing with Adaptive Sparse Structured Representations*, Cambridge (UK), July 6–9, 2015.
- *Applied Inverse Problems*, Helsinki (Finland), May 25–29, 2015.
- *Two Days on Applied Mathematics in Cagliari*, Cagliari (Italy), April 9–10, 2015.
- *107th European Study Group with Industry*, University of Manchester, Manchester (UK), March 23–27, 2015.
- *Inverse Problems and Spectral Theory*, Texas A&M University, College Station (TX, USA), October 17–19, 2014.
- *SIMAI 2014*, Taormina (Italy), July 7–10, 2014.
- *102nd European Study Group with Industry (ESGI102)*, UCD, Dublin (Ireland), June 30–July 4, 2014.
- *Householder Symposium XIX*, Spa (Belgium), June 8–13, 2014.
- *Numerics in Image and Surface Processing*, Workshop, Bologna (Italy), January 30–31, 2014.
- *Nonlinear Evolution Equations and Linear Algebra*, Cagliari (Italy), September 2–5, 2013.
- *25th Biennial Numerical Analysis Conference*, Glasgow (UK), June 25–28, 2013.
- *International Conference on Preconditioning Techniques for Scientific and Industrial Applications*, Oxford (UK), June 19–21, 2013.
- *3rd Dolomites Workshop on Constructive Approximation and Applications*, Alba di Canazei (Italy), September 9–14, 2012.
- *2012 SIAM Conference on Applied Linear Algebra*, Valencia (Spain), June 18–22, 2012.
- *Due Giorni di Algebra Lineare Numerica* (Two Days on Numerical Linear Algebra), Genova (Italy), February 16–17, 2012.
- *International Conference on Scientific Computing (SC2011)*, S. Margherita di Pula (Italy), October 10–14, 2011.
- *XIX Congresso dell'Unione Matematica Italiana* (19th Italian Mathematical Association Conference), Bologna (Italy), September 12–17, 2011.
- *Current Challenges in Stability Issues for Numerical Differential Equations*, CIME-EMS Summer School in Applied Mathematics, Cetraro (Italy), June 27–July 2, 2011.

- *Integral Equations: recent numerical developments and new applications*, Workshop, Parma (Italy), October 29–30, 2009.

GRANTS AND AWARDS

- “YOUNG RESEARCHERS” GRANT.
Funded by GNCS (Gruppo Nazionale Calcolo Scientifico). September 2014.
- POST-DOCTORAL GRANT.
Funded by the University of Padova. January 2014.
- SIAM UKIE PRIZE FOR THE BEST STUDENT TALKS.
25th Biennial Numerical Analysis Conference, University of Strathclyde. June 2013.
- THREE-YEAR DOCTORAL SCHOLARSHIP at the University of Padova.
Funded by CaRiPaRo Foundation. December 2010.

TEACHING ACTIVITIES

- Teaching assistant: INTRODUCTION TO COMPRESSED SENSING for Erasmus Mundus masters students in Vision and Robotics (VIBOT). Heriot-Watt University (UK). September 2015.
- Adjunct instructor: NUMERICAL ANALYSIS for undergraduate students in Engineering. University of Padova (Italy). Years: 2012, 2014.
- Course assistant: NUMERICAL ANALYSIS LABORATORY for undergraduate students in Engineering. University of Padova (Italy). Years: 2013, 2014.

SUPERVISING EXPERIENCES

- Roberto de Jesus Duarte Coello (VIBOT Master student). Co-supervisor of the thesis: A COMPRESSIVE SENSING APPROACH TO QUANTITATIVE MRI, May 2016.

PROFESSIONAL MEMBERSHIPS

- Member of SIMAI (Italian Society for Applied and Industrial Mathematics). Years: 2011, 2014.
- Member of GNCS (National Scientific Computing Group). Since 2011.

OTHER ACTIVITIES

- Member of the *ISSS society* committee. Heriot-Watt University. October 2015 – May 2016.
- *Post-Doctoral researchers representative* in the Faculty Council of the Department of Mathematics. University of Padova. Year: 2015.
- *PhD students representative* in the Faculty Council of the Department of Mathematics. University of Padova. Years: 2011, 2012.
- *PhD students representative* in the Directive Council of the Doctoral School of Mathematical Sciences. University of Padova. Year: 2012.
- Degree in Guitar, Conservatory of Music, Piacenza (Italy), July 2008.

REFERENCES

Prof Paolo Novati

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Prof James Nagy

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