

PERSONAL INFORMATION

Luca Zanni



📍 [Redacted]

📠 [Redacted]

✉ luca.zanni@unimore.it

🌐 <http://cdm.unimo.it/home/matematica/zanni.luca/>

Scopus ID: 6602464612

ResearchID: O-6568-2016

Orcid ID: 0000-0001-9471-9128

Sex Male | Date of birth 22/08/1965 | Nationality Italian

WORK EXPERIENCE

Since April 2005

Permanent position as Full Professor

Department of Physics, Informatics and Mathematics

University of Modena and Reggio Emilia

Sector MAT/08 – Numerical Analysis

01/09/2000 – 19/04/2005

Associate Professor

Department of Pure and Applied Mathematics, University of Modena and Reggio Emilia

01/09/1992 – 31/08/2000

Researcher

Department of Pure and Applied Mathematics, University of Modena and Reggio Emilia

EDUCATION AND TRAINING

21/03/1990

Degree in Mathematics, classification 110/110 cum laude

Department of Pure and Applied Mathematics, University of Modena and Reggio Emilia

Thesis: "Il problema dell'equilibrio del traffico e le disequazioni variazionali in R^n "

PERSONAL SKILLS

Mother tongue(s)

Italian

Other language(s)

English

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken interaction	Spoken production	
C1	C1	B2	B2	C1

Technical skills and competences

Numerical optimization

- Acceleration techniques for first-order methods
- Gradient projection methods for constrained optimization problems
- Parallel algorithms for large-scale optimization

Inverse problems

- Variational approaches to image reconstruction
- Regularization techniques for inverse problems
- Optimization algorithms for machine learning methodologies

Computer skills and competences

Operating systems: Windows – Unix – Linux

Programming: Matlab, C, Fortran

General software: Microsoft Office

Driving licence

Driving licence category: B

ADDITIONAL INFORMATION

Publications Author/Co-author of more than 50 publications in National/International Journals and Conference Proceedings

Last 5 years publication track:

- E.L. Piccolomini, V.L. Coli, E. Morotti, L. Zanni, *Reconstruction of 3D X-ray CT images from reduced sampling by a scaled gradient projection algorithm*, Computational Optimization and Applications 71 (2018), 171-191.
- D. di Serafino, V. Ruggiero, G. Toraldo, L. Zanni, *On the steplength selection in gradient methods for unconstrained optimization*, Applied Mathematics and Computation 318 (2018), 176-195.
- S. Rebegoldi, L. Bautista, L. Blanc-Féraud, M. Prato, L. Zanni, A. Plata, *A comparison of edge-preserving approaches for differential interference contrast microscopy*, Inverse Problems 33 (8) (2017), 085009.
- V.L. Coli, E. Loli Piccolomini, E. Morotti, L. Zanni, *A fast gradient projection method for 3D image reconstruction from limited tomographic data*, Journal of Physics: Conference Series 904 (2017), 012013.
- D. di Serafino, V. Ruggiero, G. Toraldo, L. Zanni, *A note on spectral properties of some gradient methods*, AIP Conference Proceedings 1776 (2016), 040003.
- V.L. Coli, V. Ruggiero, L. Zanni, *Scaled first-order methods for a class of large-scale constrained least squares problems*, AIP Conference Proceedings 1776 (2016), 040002.
- S. Rebegoldi, L. Bautista, L. Blanc-Féraud, M. Prato, L. Zanni, A. Plata, *TV-regularized phase reconstruction in differential-interference-contrast (DIC) microscopy*, AIP Conference Proceedings 1776 (2016), 090043.
- L. Bautista, S. Rebegoldi, L. Blanc-Féraud, M. Prato, L. Zanni, A. Plata, *Phase estimation in differential-interference-contrast (DIC) microscopy*, Proc. - International Symposium on Biomedical Imaging, Vol. 2016, 7493229, 136-139.
- F. Porta, M. Prato, L. Zanni, *A new steplength selection for scaled gradient methods with application to image deblurring*, Journal of Scientific Computing 65 (2015), 895-919.
- L. Zanni, A. Benfenati, M. Bertero, V. Ruggiero, *Numerical methods for parameter estimation in Poisson data inversion*, Journal of Mathematical Imaging and Vision 52 (2015), 397-413.
- F. Porta, R. Zanella, G. Zanghirati, L. Zanni, *Limited-memory scaled gradient projection methods for real-time image deconvolution in microscopy*, Communications in Nonlinear Science and Numerical Simulation 21 (2015), 112-127.
- A. Cornelio, F. Porta, M. Prato, L. Zanni, *On the filtering effect of iterative regularization algorithms for discrete inverse problems*, Inverse Problems 29 (2013), 125013.
- R. Zanella, P. Boccacci, L. Zanni, M. Bertero, *Corrigendum: Efficient gradient projection methods for edge-preserving removal of Poisson noise*, Inverse Problems 29 (2013), 119501.
- R. Zanella, G. Zanghirati, R. Cavicchioli, L. Zanni, P. Boccacci, M. Bertero, G. Vicidomini, *Towards real-time image deconvolution: application to confocal and STED microscopy*, Scientific Reports 3 (2013), 2523.
- F. Porta, A. Cornelio, L. Zanni, M. Prato, *Filter factor analysis of scaled gradient methods for linear least squares*, 3rd International Workshop on New Computational Methods for Inverse Problems, Journal of Physics: Conference Series 464 (2013), 012006.
- M. Prato, L. Zanni, *A practical use of regularization for supervised learning with kernel methods*, Pattern Recognition Letters 34 (2013), 610-618.
- R. Cavicchioli, C. Chaux, L. Blanc-Feraud, L. Zanni, *ML estimation of wavelet regularization hyperparameters in inverse problems*, 38th International Conference on Acoustics, Speech, and Signal Processing (2013), 1553- 1557.
- S. Bonettini, G. Landi, E. Loli Piccolomini, L. Zanni, *Scaling techniques for gradient projection-type methods in astronomical image deblurring*, International Journal of Computer Mathematics 90(1) (2013), 9-29.

Presentations	<p>Author/Co-author of more than 30 presentations in National/International Conferences and Workshops</p> <p>Last 5 years oral presentations track:</p> <ul style="list-style-type: none"> • Steplength selection strategies and variable metric approaches in gradient projection methods, <i>"INDAM intensive period on "Computational Methods for Inverse Problems in Imaging"</i>, Como, 11-15 June 2018 (invited speaker). • Spectral properties in gradient-based optimization methods: a review and perspective, <i>Convegno: "Calcolo scientifico e modelli matematici: alla ricerca delle cose nascoste attraverso le cose manifeste"</i>, Dipartimento di Matematica, Università degli Studi dell'Insubria, Como, 16-18 May 2018 (invited speaker). • First-order optimization methods for imaging problems, <i>"International Conference on Optimization and Decision Science"</i>, Sorrento, 4-7 September 2017 (invited speaker). • Acceleration strategies for first-order methods in optimization, <i>Convegno: "Calcolo scientifico e modelli matematici: alla ricerca delle cose nascoste attraverso le cose manifeste"</i>, Dipartimento di Matematica, Università degli Studi di Genova, Genova, 3-5 June 2015 (invited speaker). • Parameter estimation in regularization models for Poisson data, <i>"First French-German Mathematical Image Analysis Conference"</i>, Institut Henri Poincaré, Paris, 13-15 January 2014 (invited speaker). • Step-length selection in gradient projection methods for large-scale optimization in image processing, <i>"First Workshop on Optimization for Image and Signal Processing"</i>, Ecole Polytechnique, Palaiseau, 18-20 November 2013 (invited speaker).
Organization	<p>Last 5 years track:</p> <ul style="list-style-type: none"> • Organizer: Minisymposium on <i>"Large scale optimization and applications"</i>, The XIV Biennial Congress of Simai, Rome, 2-6 July 2018. • Member of the Technical Program Committee: <i>"The 12th Learning and Intelligent Optimization Conference"</i>, Kalamata, Greece, 10-15 June 2018. • Organizer: Minisymposium on <i>"Optimization methods for inverse problems in imaging"</i>, 18th French-German-Italian Conference on Optimization, Paderborn, 25-28 September 2017. • Member of the Technical Program Committee: <i>"The 11th Learning and Intelligence Optimization Conference"</i>, Nizhny Novgorod, Russia, 19-21 June 2017. • Member of the Scientific Committee: Workshop on <i>"Optimization Techniques for Inverse Problems III"</i>, Modena, Italy, 19-21 September 2016. • Member of the Scientific Committee: <i>"The 2nd International Conference and Summer School on Numerical Computations: Theory and Algorithms"</i>, Pizzo Calabro, Italy, 19-25 June 2016. • Organizer: Minisymposium on <i>"First Order Methods and Applications"</i>, SIAM Conference on Optimization 2014, San Diego, USA, 19-22 May 2014. • Member of the Scientific Committee: <i>"International Workshop on Advances in Regularization, Optimization, Kernel methods and Support vector machines: theory and applications"</i>, Lueven, Belgium, 8-10 July 2013.
Peer review activity	<p>SIAM Journal on Optimization, IEEE Transaction on Neural Networks, IEEE Transaction on Medical Imaging, Signal Processing: Image Communication, SIAM Journal on Imaging Science, Inverse Problems, Journal of Optimization Theory and Applications, Journal of Mathematical Imaging and Vision, Optimization Methods and Software, Computational Optimization and Applications, Computational and Applied Mathematics, Optimization Letters, Inverse Problems and Imaging, Numerical Algorithms, IEEE International Symposium on Biomedical Imaging, Calcolo, Advances in Computational Mathematics, Computers and Mathematics with Applications, IEEE Journal of Selected Topics in Signal Processing, International Journal of Computer Mathematics, Journal of Machine Learning Research, Journal of Global Optimization, International Journal of Systems Science.</p>

- Projects Coordination of research projects
- GNCS-INdAM 2018, “*Metodi di ottimizzazione stocastica per problemi di apprendimento automatico a larga scala*”
 - Emilia-Romagna Regional Operative Program 2007-2013, European Social Fund, Spinner 2013 PhD project: “*High-complexity inverse problems in biomedical applications and social systems*”, 2012-2014.
 - MIUR PRIN 2008, ‘*Optimization Methods and Software for Inverse Problems*’ (unit coordinator).
 - MIUR PRIN 2006, ‘*Inverse Problems in Medicine and Astronomy*’ (unit coordinator).
 - FIRB-Project 2001, ‘*Statistical Learning: Theory, Algorithms and Applications*’, (unit coordinator).
 - MURST-Project 1997, ‘*Numerical Analysis: Methods and Mathematical Software*’ (unit coordinator).
- Project member
- GNCS 2017: “*Metodi numerici per problemi di ottimizzazione vincolata di grandi dimensioni e applicazioni*”.
 - GNCS 2016: “*Nuove frontiere dell’ottimizzazione non differenziabile nei problemi inversi*”.
 - GNCS 2015: “*Nuovi aspetti della regolarizzazione nell’imaging*”.
 - COFIN 2004: “*Numerical methods and mathematical software for applications*”.
 - FIRB 2001: “*Parallel algorithms and numerical nonlinear optimization*”.
- Industrial contracts
- Joint Project iLD (in-Line Devices) - University of Modena and Reggio Emilia, “*Machine Learning Software for Sensor Modelling in Moisture Estimation*” (2014).
 - Joint Project Expert System S.p.A - University of Modena and Reggio Emilia, “*Machine Learning Algorithms for Text Categorization*” (2010).
 - Joint Project Edue Italia S.p.A. - University of Modena and Reggio Emilia, “*Machine Learning Technologies for Banknote Recognition*” (2006).
- Honours and awards Paper awards
- Selection of the publication “A Cornelio, F Porta, M Prato and L Zanni, *Inverse Problems* 29 2013, 125013” for the Inverse Problems Highlights Collection 2013.
 - Selection of the publication “F Benvenuto, R Zanella, L Zanni and M Bertero, *Inverse Problems* 26 2010, 025004” for the Inverse Problems Highlights Collection 2010.
 - Selection of the publication “Bonettini S., Zanella R. and Zanni L., *Inverse Problems* 25 2009, 015002” for the Inverse Problems Highlights Collection 2009.
- Software
- SGP-IDL: An Interactive Data Language (IDL) package for the single and multiple deconvolution of 2D images corrupted by Poisson noise, with the optional inclusion of a boundary effect correction (<http://www.unife.it/prin/software>).
 - SGP-dec: A Matlab package for the deconvolution of 2D and 3D images corrupted by Poisson noise (<http://www.unife.it/prin/software>).
 - GPDT: A gradient projection-based decomposition technique for large quadratic programs in training Support Vector Machines: serial and parallel software (<http://dm.unife.it/gpdt/>).
 - Software for the numerical evaluation of projection-type methods for large quadratic programs <http://www.unife.it/AnNum97/index2.html>

Relevant professional activities

- Member of the Working Group 7.4 “*Inverse Problems and Imaging*”, International Federation for Information Processing (IFIP) (2014 - present)
- Vice-Director, Department of Physics, Informatics and Mathematics, University of Modena and Reggio Emilia, (2012-2015)
- Director, Department of Mathematics, University of Modena and Reggio Emilia, (2010-2012)
- Vice-Principal, Faculty of Mathematical, Physical and Natural Sciences, University of Modena and Reggio Emilia, (2009-2012)
- Vice-Director, Department of Mathematics, University of Modena and Reggio Emilia, (2007-2010)
- Member of the PASCAL1 Network of Excellence (Pattern Analysis, Statistical Modelling and Computational Learning), 2006
- Vice-Director, PhD School ‘Multiscale Modelling, Computational Simulations and Characterization in Material and Life Sciences’, University of Modena and Reggio Emilia (2005-2013)

Teaching duties

Academic courses at the University of Modena and Reggio Emilia:

- Numerical Analysis, Bachelor Degree in Mathematics, 1992 - present
- Numerical Optimization, Bachelor Degree in Mathematics, 2003 - present
- Parallel Computing, Bachelor Degree in Computer Science, 2005 - present; Master Degree in Computer Science, 2016 - 2017.
- Machine Learning, Bachelor Degree in Computer Science, 2006 - 2007; Master Degree in Computer Science, 2008.
- Variational Methods for Imaging, PhD Degree in Mathematics, 2016, 2018

Supervisor of 7 PhD Theses in Mathematics; about 40 Theses in Mathematics; 7 Theses in Computer Science.

Outside examiner of 6 PhD Theses.