Curriculum Vitae et Studiorum
of Pierluigi Maponi

Pierluigi Maponi was born on March 7, 1967, in San Severino Marche(MC), [illegible] in [illegible]. He has attended the secondary school Istituto Tecnico Industriale Statale "E. Divini" of San Severino Marche (MC) achieving the "diploma di perito tecnico in informatica" with marks 60/60. He started the master course in Mathematics of Camerino University in the academic year 1986/87; on November 15, 1990, he achieved the Master Degree in Mathematics, defending the thesis "La riflessione delle onde elettromagnetiche armoniche nel tempo in presenza di un ostacolo", supervisors professors Luciano Misici e Francesco Zirilli.

Academic positions:
- Fellowship holder, Istituto Nazionale di Alta Matematica "F. Severi", from November 16, 1990 to March 20, 1993. The fellowship has been blocked for the military service from June 1, 1991 to December 31, 1991.
- Associate Researcher, disciplinary group A04A, Faculty of Mathematical, physical and Natural Sciences of Camerino University from March 22, 1993 (permanent member of faculty staff from February 5, 1997)
- Associate Professor, disciplinary group MAT/08, Faculty of Sciences and Technologies of Camerino University from October 1, 2006

Organizational activity
- Delegate for the dean of Science and Technology faculty for student orientation, from October 15, 2006 to February 15, 2008
- Rector delegate for Master, IFTS and Vocational Training, from November 15, 2006 to October 31, 2011

Didactic activity:
- Course "Metodi Numerici per le Equazioni Differenziali" for the Master of first level "Racing Car Engineer", academic years: 2003/04, 2006/07, 2007/08
- Course "Analisi di Immagini nella Ricerca Biomedica" for the Master of first level "Tecnologie Informatiche per l'Analisi e l'Elaborazione di Immagini Biomediche", academic years: 2003/04, 2005/06, 2006/07, 2007/08
- Course "Problemi Inversi e Applicazioni" for the Master Course "Matematica e Applicazioni", academic years: 2003/04, 2005/06, 2006/07, 2007/08, 2008/09, 2009/10, 2010/11, 2011/12, 2012/13, 2013/14, 2014/15, 2015/16, 2016/17
- Course "Grafica Computazionale" for the Bachelor Course "Matematica per le Applicazioni Gestionali e Tecnologiche", academic years: 2002/03, 2003/04, 2004/05, 2005/06, 2006/07, 2007/08, 2008/09, 2009/10, 2010/11 and for Master Course "Matematics and Applications", academic years: 2011/12, 2012/13, 2013/14, 2014/15, 2015/16, 2016/17
- Course "Metodi Numerici per Equazioni Differenziali" for the Bachelor Course "Matematica per le Applicazioni Gestionali e Tecnologiche", academic years: 2001/02, 2002/03, 2003/04, 2004/05, 2005/06, 2006/07, 2007/08, 2008/09, 2008/09, 2009/10, 2010/11 and for Master Course "Matematics and Applications", academic years: 2011/12, 2012/13, 2013/14, 2014/15, 2015/16, 2016/17
- Course "Analisi Numerica" (I modulo) for the Master Course "Matematica", academic years: 1999/2000, 2000/01
- Course "Informatica ed Applicazioni Numeriche" for the Master Course "Scienze Chimiche", academic year 2001/02

- Course "Approfondimenti di Matematica" for the Bachelor Course "Scienze Geologiche", accademic years: 2001/02, 2002/03
- Course "Statistica" for the Bachelor Course "Scienze Biologiche", academic year 2000/01
- Course "Fondamenti di Informatica" for the Bachelor Courses "Scienze Biologiche", "Scienze Geologiche", and "Scienze Naturali", academic year 1999/2000
- Tutorial Course "Analisi Matematica I" for the Master Courses "Matematica" and "Fisica", academic years: 1993/94, 1995/96, 1997/98
- Tutorial Course "Analisi Matematica II", for the Master Courses "Matematica" and "Fisica", academic years:1994/95, 1996/97 e 1998/99
- Course "Integrativo 1.1 Fisico Matematica – 1o "(Modulo matematica) ", for the Master Courses "Medicina Veterinaria", academic years: 1997/98 e 1998/99
- Monographic Course "Metodi Numerici per Problemi ai Limiti per Equazioni Differenziali Ordinarie e per Problemi di Sturm-Liouville" part of the Course "Teoria e Tecnica della Programmazione per le Macchine Calcolatrici", for the Master Courses "Matematica", academic years: 1992/93, 1993/94, 1994/95, 1995/96, 1996/97.
- Tutorial Course "Analisi Numerica", teledidactic post-secondary course degree "Ingegneria Automatica ed Informatica" of Consorzio Nettuno, academic years: 1993/94 e 1994/95

- Doctoral Thesis supervisor: Josephin Giacomini "Mathematical Models for Geothermal Heat Exchangers", academic year 2015/16; Milena Garbuglia "Mathematical Models for the Wave Energy Conversion", academic year 2016/17; Mauro Bacaloni "Dental radiographies processing for the automatic age estimation", academic year 2016/17.
- Master Thesis supervisor: Anna Rucci, "Elementi di programmazione lineare", academic year 1993/94; Elena Marini, "Simulazione del comportamento elettrico di sensori di umidità a base di allumina porosa", academic year 1994/95; Fulvia Baldassari, "Un problema di controllo ottimo per le equazioni di Navier-Stokes", academic year 2000/01; Romina Gobbi "Basi ortogonali di wavelet e loro applicazione", academic year 2004/05; Samuele Rubino "Modelli di convezione forzata per elettropompe sommergibili", academic year 2008/09; Giulia Achilli "Derivative-free optimization algorithm for a new model in 3D scene reconstruction", academic year 2010/11; Michela Quadrini "Metodi per la soluzione numerica dell'equazione di Burgers", academic year 2011/12; Milena Garbuglia "Modelli matematici per la generazione di energia dal moto ondoso", academic year 2011/12; Giacomo Traballoni "Metodi di rifrazione elettromagnetica per il calcolo dell'illuminazione di una scena", academic year 2014/15; Filippo Santarelli "Image analysis for forensic purpose", academic year 2014/15; Daniele Agostinelli "Water dynamics in the soil-plantatmosphere system", academic year 2015/16.
- Bachelor Thesis supervisor: Mariapia Pica, "Un problema inverso per l'equazione del calore", academic year 1996/97; Angela Cialabrini, "Analisi della Complessità di Immagini Biomediche", academic year 2002/03; Maria Marinelli, "Metodi di Segmentazione e Riconoscimento per Immagini della Retina", academic year 2002/03; Sara Quintavalle, "Modelli matematici per il dosaggio di anticoagulanti", academic year 2004/05; Gabriele Mattiacci, "Lacunarietà e osteoporosi: studio sulle immagini in risonanza magnetica", academic year 2005/06; Matteo Taddei, "Teoria ed applicazioni della Chirp-Z Transform", academic year 2006/07; David Lucarini "Modelli di giunzioni P-N in Celle Fotovoltaiche", academic year 2007/08; Samuele Rubino "Tecniche per la trasformazione dei sistemi di colori", academic year 2007/08; Stefano Spalletti "Studio del sistema di raffreddamento per pompe ad immersione", academic year 2008/09; Matteo Perugini "Modelli matematici per la gestione degli incendi boschivi", academic year 2010/11; Elisa Marcelli "Il problema del minimo bounding box", academic year 2013/14; Daniele Agostinelli "Modelli per

diffusori acustici", academic year 2013/14; Caterina Alessandrini "Applicazione delle serie storiche nell'analisi della qualità", academic year 2014/15
- supervisor for post-secondary course degree thesis: Marianna Calò, "Metodi iterativi per sistemi lineari: teoria ed applicazioni", academic year 1999/2000; Paola Ballanti, "Problemi di flusso su rete ed applicazioni", academic year 1999/2000. Carla Cianfagna, "Metodi iterativi per sistemi lineari", academic year 1999/2000;

Scientific activity:
He is author of more than seventy scientific papers on the following research subjects:
- Direct and inverse problems of acoustic and electromagnetic scattering for bounded obstacles and inhomogeneous media: mathematical formulation by Fredholm integral equations and nonlinear optimization problems; description of new methods for the approximate solution of these problems, implementation of these methods by FORTRAN codes and numerical simulation by using synthetic data and experimental data.
- Numerical methods for image processing problems: segmentation problem and identification problems on biomedical images, image fusion problems for satellite images, phase unwrapping problems on SAR images; description of new methods and implementation with FORTRAN and MATLAB codes; numerical simulation on synthetic data, experimental data, and real data.
- Numerical methods for the computation of planar grids, description of effective methods based on nonlinear sparse optimization problems; formulation of suitable optimization methods for the generation of high quality grids and of methods for the automatic decomposition of complex domains.
- Problems for partial differential equations: numerical solution of problems for partial differential equations having particular applicative importance, inverse problems for the wave equation and the heat equation on layered media; study of the features of the "direct problem" that are useful in the formulation of new methods for the solution of the corresponding "inverse problem", implementation of these methods with FORTRAN codes and numerical simulation on test problems.
- Methods for the solution of linear systems and for the solution of continuous and discrete optimization problems: definition and analysis of the fundamental features of these problems and use of the features for the formulation of effective numerical methods, implementation of these methods in FORTRAN codes and numerical simulation on test problems.

Seminar and conference communications
- Approssimazione numerica di un problema inverso per equazioni di Helmholtz, seminar, September 24, 1992, Dipartimento di Matematica, Università di Trento
- Un metodo numerico per la ricostruzione della condizione al contorno per l'equazione di Helmholtz, conference (national group 40% "Equazioni Differenziali"), April 15-16, 1993, Università di Firenze
- Problema inverso per l'equazione delle onde in un mezzo stratificato, communication, conference SIMAI, May 30-June 3, 1994, Anacapri (NA)
- La matrice laplaciano dei grafi, communication, conference (national group 40% "Equazioni Differenziali"), June 3-6, 1996, Dipartimento di Matematica, Università di Ferrara
- Generalized solution of linear systems and image restoration, communication, international conference "Advances in inverse problems and applications", March 18-21, 1998, Gargnano (MI)

- Un metodo numerico per la ricostruzione di un mezzo non omogeneo usando dati di rifrazione elettromagnetica, communication, conference SIMAI, June 1-5 ,1998, Giardini Naxos (CT)
- A numerical method to reconstruct the image of unknown targets using scattering data: an application to the ipswich data, communication, international conference "International Conference on Theoretical and Computational Acoustics", May 10-14, 1999, Trieste
- Una classe di modelli per il problema di interferometria SAR, communication, conference SIMAI, June 5-9, 2000, Ischia Porto (NA)
- A simple model related to catastrophe insurance futures pricing and weather forecast, communication, conference AMASES, September 11-14, 2002, Verona
- A perturbative method for the solution of the direct scattering problem, communication, conference "ANALISI NUMERICA: STATO DELL'ARTE", September 26-28, 2002, Cosenza
- A nonlinear constrained optimization problem for planar grid optimization, communication, international conference "International Conference on Cae and Computational Technologies for Industry", October 2-5, 2003, Pula, Cagliari
- A numerical method for direct and inverse acoustic scattering problem, communication, international conference "International Conference on Cae and Computational Technologies for Industry", October 2-5, 2003, Pula, Cagliari
- Local refinement techniques for planar grid generation, communication, international conference "MASCOT04 – 4th Meeting on Applied Scientific Computing and Tools. Grid Generation, Approximated Solutions and Visualization", November 25-27, 2004, Firenze
- An efficient T-matrix method for direct scattering problems, communication, international conference "IMACS2005 - 17th World Congress Scientific Computation, Applied Mathematics and Simulation", July 11-15, 2005, Paris.
- A class of preconditioners for the iterative solution of scattering problems, communication, international conference "ICCAM2006 - International Congress on Computational and Applied Mathematics", July 10-14, 2006, Leuven, Belgio.
- Translation techniques for the efficient solution of direct medium problems, communication, international conference "MASCOT06 – 6th Meeting on Applied Scientific Computing and Tools. Grid Generation, Approximated Solutions and Visualization", October 5-7, 2006, Roma
- The assessment of forest fire hazard: vulnerability and risk. An Integrated European Model to Protect Mediterranean Forests From Fire, Larnaca-CYPRUS, Palm Beach Hotel, Larnaca, April 7, 2011
- Simulating Li-Sinai solutions of the Burgers and Navier-Stokes equations. The numerical approach. Workshop "Blowup for the equations of Fluid Dynamics and Renormalization Group methods", August 18-29, 2014, GSSI, L'Aquila.
- The Water Information for Fast Risk Analysis and Risk Reduction, EU-MEX INNOVA European Union – Mexico Bilateral Innovation Initiative, 8-9 March 2016, Mexico D.F.
- LANDSLIDE project: Main Interventions and Outputs. Pilot Cases, LANDSLIDE conference, 10-11 November 2016, Patras, Greece

Research project
- Scientific director of the research unit of Camerino for the project "Metodi di approssimazione per problemi di ottimizzazione intera" (CNR coordinated project, research contract n. 9600249.CT01)
- Director of project Gestione ed Elaborazione di Immagini Biomediche (Progetto FIxO – Azione 3, Ministero del Lavoro e della Previdenza Sociale)
- Scientific director of Work-Package WP1"Development of methods and techniques for risk prevention", in the project PROTECT - An integrated european model to protect

mediterranean forests from fire", European Commission, Regional Cooperation Program MED (2007-2013). Coordinator: Provincia di Macerata.
- Coordinator of ForULab: Forensic Unicam Laboratory, University of Camerino, University Research Projects (2014-2015)
- Coordinator of LANDSLIDE: Landslide risk assessment model for disaster prevention and mitigation, European Commission, DG ECHO (2015-2016)

Recent pubblications

1. C. Boldrighini, S. Frigio, and P. Maponi. On the blow-up of some complex solutions of the 3-d Navier-Stokes Equations: Theoretical Predictions and Computer simulations, to appear in THE IMA JOURNAL OF APPLIED MATHEMATICS.
2. A. Zaia, P. Maponi, G. Di Stefano, T. Casoli (2017). Biocomplexity and Fractality in the Search of Biomarkers of Aging and Pathology: Focus on Mitochondrial DNA and Alzheimer's Disease. AGING AND DISEASE, vol.8, p.44-56.
3. N. Dobrinkova, P. Maponi (2017). Decision Support Tool in the Project LANDSLIDE. K. Georgiev et al. (eds.), Advanced Computing in Industrial Mathematics, STUDIES IN COMPUTATIONAL INTELLIGENCE 681. Springer International Publishing
4. N. Egidi, P. Maponi (2016). Artificial boundary conditions for the Burgers equation on the plane. APPLIED MATHEMATICS AND COMPUTATION, vol. 286, p. 1-14.
5. M. Bacaloni, P. Maponi, R. Cameriere (2015). Tooth Segmentation Algorithm for Age Estimation. S. Battiato et al. (Eds.): ACIVS 2015, LNCS 9386. Springer International Publishing
6. S. Chelli, P. Maponi, G. Campetella, P. Monteverde, M. Foglia, E. Paris, A. Lolis, T. Panagopoulos (2015). Adaptation of the Canadian Fire Weather Index to Mediterranean forests. NATURAL HAZARDS, vol. 75, p.1795–1810.
7. R. Cameriere, S.D. Luca, N. Egidi, M. Bacaloni, P. Maponi, L. Ferrante, M. Cingolani (2015). Automatic age estimation in adults by analysis of canine pulp/tooth ratio: preliminary results, JOURNAL OF FORENSIC RADIOLOGY AND IMAGING, vol. 3, p. 61–66.
8. C. Boldrighini, S. Frigio, and P. Maponi (2012). Exploding solutions of the complex two-dimensional Burgers equations: Computer simulations. JOURNAL OF MATHEMATICAL PHYSICS, vol. 53 doi: 10.1063/1.4746814
9. N. Egidi, P. Maponi (2011). Residual correction techniques for the efficient solution of inverse scattering problems. MATHEMATICS AND COMPUTERS IN SIMULATION, vol. 82, p. 192-204
10. N. Egidi, P. Maponi (2011). Singular value expansion for the Green function of Helmholtz operator. JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS, vol. 377, p. 670-682
11. N. Egidi, P. Maponi (2010). An efficient method for the solution of the inverse scattering problem for penetrable obstacles. MATHEMATICS AND COMPUTERS IN SIMULATION, vol. 81, p. 731-741
12. N. Egidi, P. Maponi (2010). The numerical approximation of a singular system for Helmholtz operator. IMACS SERIES COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 15, p. 71-80
13. N. Egidi, P. Maponi (2010). The use of Sherman-Morrison formula in the solution of Fredholm integral equation of second kind. MATHEMATICS AND COMPUTERS IN SIMULATION, vol. 81, p. 693-704
14. N. Egidi, P. Maponi (2009). Residual correction techniques for the efficient solution of direct scattering problems. IMACS SERIES COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 14, p. 57-66

15. N. Egidi, P. Maponi (2009). The efficient solution of direct medium problems by using translation techniques. MATHEMATICS AND COMPUTERS IN SIMULATION, vol. 79, p. 2361-2372
16. N. Egidi, P. Maponi (2009). The solution of Tikhonov regularized equations arising from Fredholm integral equations of first kind. IMACS SERIES COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 14, p. 47-56
17. N. Egidi, P. Maponi (2008). A constructive method for the solution of Fredholm integral equations of second kind. IMACS SERIES COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 13, p. 71-80
18. N. Egidi, P. Maponi (2008). An active set strategy to generate quadrilateral grids. JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 218, p. 492-505
19. N. Egidi, P. Maponi (2008). An inverse scattering problem for electromagnetic waves. IMACS SERIES COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 13, p. 81-90
20. N. Egidi, P. Maponi (2008). Block decomposition techniques in the generation of adaptive grids. MATHEMATICS AND COMPUTERS IN SIMULATION, vol. 78, p. 593-604
21. N. Egidi, P. Maponi (2008). Preconditioning techniques for the iterative solution of scattering problems. JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS, vol. 218, p. 229-237

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