

CURRICULUM VITAE ET STUDIORUM

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PERSONAL INFORMATION

Born in Pavia (Italy), November 2, 1979.
Italian citizenship.

On leave for health reasons:

May 11th, 2021 - June 13th, 2021
May 4th, 2020 - June 5th, 2020
November 19th, 2015 - January 15th, 2016
January 17th, 2008 - September, 16th, 2008

CURRENT ACCADEMIC POSITION

May 1, 2022-onwards. Associate Professor of Numerical Analysis, Dipartimento di Matematica “F. Casorati”, Università degli Studi di Pavia (Italy).

PAST ACCADEMIC POSITION

May 1, 2007 - April 30, 2022. Assistant Professor of Numerical Analysis, Dipartimento di Matematica “F. Casorati”, Università degli Studi di Pavia (Italy).

August 1, 2006 - April 30, 2007. Postdoctoral fellow, Dipartimento di Matematica “F. Casorati”, Università degli Studi di Pavia (Italy).

October 1, 2005 - July 31, 2006. Postdoctoral fellow, Abteilung Numerik, Universität Ulm (Germany).

EDUCATION

February 2, 2006. PhD in Mathematics and Statistics, Dipartimento di Matematica “F. Casorati”, Università degli Studi di Pavia (Italy). Advisor: Prof. Daniele Boffi. Thesis: “A Posteriori Error Estimates for Eigenvalue Problems in Mixed Form”.

September 19, 2002. Graduated in Mathematics, Università degli Studi di Pavia (Italy). Advisor: Prof. Daniele Boffi. Thesis: “Proprietà di Compattezza Discreta per Spazi di Elementi Finiti su Quadrilateri”. Mark: 110/110 *cum laude*.

July 1998. Liceo Scientifico “N. Copernico”, Pavia (Italy). Graduated from high school (scientific oriented). Mark: 60/60.

RESEARCH INTEREST

Main research field. Numerical analysis, discretization of partial differential equations, approximation of eigenvalue problems, finite elements techniques.

Main keywords. Finite element methods, mixed methods, mimetic finite differences methods, virtual element methods, a posteriori error estimates, adaptive methods, interaction of fluid and structure.

HONORS

2005 *Vice-Chancellor’s Prize for Postgraduate Research.* Granted a Fellowship by the Brunel University Graduate School to attend an international conference.

2003. *Proff. Silvio Cinquini and Maria Cinquini Cibrario Prize* (best Laurea thesis in Mathematics at the Università di Pavia; given every three years).

RESEARCH FUNDING

2016. GNCS Research project 2016 “*Precondizionatori scalabili, metodi di alto ordine e immersed boundary per l’elettrocardiologia computazionale*”. Role: participant. Principal Investigator: Simone Scacchi.

2014. GNCS Research project 2014 “*Analisi isogeometrica del modello matematico per l’accoppiamento elettro-fluido-meccanico cardiaco*”. Role: participant. Principal Investigator: Simone Scacchi.

2013. GNCS Research project 2013 “*Metodo agli elementi finiti ed analisi isogeometrica per problemi di interazione fluido-struttura*”. Role: participant. Principal Investigator: Daniele Boffi.

2014-2017. MIUR PRIN 2012: “*Modelli matematici e numerici del sistema cardiocircolatorio e loro applicazione in ambito clinico*”. Role: participant. Local Coordinator: P. Colli Franzone. National Coordinator: L. Formaggia.

2011-2013. MIUR PRIN 2009: “*Modelli, metodi e calcolo scientifico per problemi di elettrocardiologia e di interazione fluido-struttura*”. Role: participant. Local Coordinator: P. Colli Franzone. National Coordinator: A. M. Quarteroni.

2008-2010. MIUR PRIN 2007: “*Modelli, metodi e calcolo scientifico per problemi di elettrocardiologia e di interazione fluido-struttura*”. Role: participant. Local Coordinator: P. Colli Franzone. National Coordinator: A. M. Quarteroni.

GRANTS

GNCS grant 2019. Granted a Fellowship to attend the conference “*ICIAM 2019, The 9th International Congress on Industrial and Applied Mathematics*”, Valencia, Spain, July 15-19, 2019.

GNCS grant 2018. Granted a Fellowship to attend the conference “*Spectral Geometry:*

Theory, Numerical Analysis and Applications”, Banff International Research Station for Mathematical Innovation and Discovery, Banff (Canada), July 1-6, 2018.

GNCS grant 2017. Granted a Fellowship to attend the conference “*ENUMATH 2017*”, September 25-29, 2017 Voss (Norway).

GNCS grant 2011. Granted a Fellowship to attend the “*XIX Congresso dell’Unione Matematica Italiana*”, September 12-17, 2011 Bologna (Italy).

CIME grant 2006. Granted a Fellowship to attend the C.I.M.E. course “*Mixed Finite Elements, Compatibility Conditions, and Applications*”, June 26 - July 1, 2006, Cetraro (Italy).

DFG Research grant 2006. Granted a Fellowship to attend the “*MAFELAP 2006- The Mathematics of Finite Elements and Applications*” conference, June 13-16, 2006, Brunel University of West London, Uxbridge (UK).

Enumath 2005 PhD Student Grant. Granted a Fellowship to attend the “*Sixth European Conference on Numerical Mathematics and Advanced Applications-ENUMATH 2005*”, Universidade de Santiago de Compostela, July 18-22, 2005, Santiago de Compostela (Spain).

MIT Conference Fellowship. Granted a Fellowship to attend the “*Third MIT Conference on Computational Fluid and Solid Mechanics*”, June 14-17, 2005, MIT, Cambridge (USA).

RESEARCH VISITS

7 July, 2018 - 20 July, 2018. T-5 Applied Mathematics and Plasma Physics at Los Alamos National Laboratory, Los Alamos, New Mexico (USA). Invited by G. Manzini.

March 1, 2005 - September 30, 2005. Department of Mathematics, Brunel University of West London, Uxbridge, UK.

INVITED SEMINAR TALKS

1. “*Adaptive approximation of eigenproblems: multiple eigenvalues and clusters*”. T-5 Seminar, T-5 Applied Mathematics and Plasma Physics at Los Alamos National Laboratory, Los Alamos, New Mexico (USA). July 12, 2018.
2. “*A posteriori error estimates for eigenvalue problems in mixed form*”. Oberseminar Numerik, Abteilung Numerik, Universität Ulm, Ulm (Germany), January 12, 2006.
3. “*A posteriori error estimates for eigenvalue problems in mixed form*”. Dipartimento di Matematica, Università degli Studi di Pavia, Pavia (Italy), June 6, 2005.
4. “*A posteriori error estimates for eigenvalue problems in mixed form*”. Abteilung Numerik, Universität Ulm, Ulm (Germany), July 1, 2005.
5. “*A posteriori error estimates for eigenvalue problems in mixed form*”. Department of Mathematical Sciences, Brunel University of West London, Uxbridge (UK), February 6, 2005.
6. “*Stime a posteriori per un problema agli autovalori correlato a fenomeni di interazione fluido-struttura*”. Dipartimento di Matematica, Università degli Studi di Pavia, Pavia (Italy), October 28, 2004.

7. “*Proprietà di compattezza discreta per spazi di elementi finiti su quadrilateri*”. IMATI-CNR, Pavia (Italy), March 24, 2004. Presented within the PhD course “Programming numerical methods for PDE’s I”.
8. “*Stime a posteriori per il metodo agli elementi finiti*”. Dipartimento di Matematica, Università degli Studi di Pavia, Pavia (Italy), October 17, 2003.

CONFERENCE TALKS

1. *invited* “*Conforming and Nonconforming Virtual Element Methods for Eigenvalue Problems*”. Workshop on Numerical methods for spectral problems: theory and applications. RIMS, Kyoto University (Japan), September 2-4, 2019.
2. *invited* “*Conforming and Nonconforming Virtual Element Methods for Eigenvalue Problems*”. ICIAM 2019, Valencia (Spain), July 15-19, 2019.
3. *invited* “*Conforming and Nonconforming Virtual Element Methods for Eigenvalue Problems*”. MAFELAP 2019- The Mathematics of Finite Elements and Applications, Brunel University of West London, Uxbridge (UK), June 18-21, 2019.
4. *invited* “*Conforming and Nonconforming Virtual Element Methods for Eigenvalue Problems*”. WONAPDE 2019, Concepción (Chile), January 21-25, 2019.
5. *invited* “*Adaptive Approximation of Eigenproblems: multiple eigenvalues and clusters*”. Spectral Geometry: Theory, Numerical Analysis and Applications, Banff International Research Station for Mathematical Innovation and Discovery, Banff (Canada), July 1-6, 2018.
6. *invited* “*Virtual element method for eigenvalue problems*”. ENUMATH 2017–The European Conference on Numerical Mathematics and Advanced Applications, Bergen (Norway), September 25-29, 2017.
7. “*Local mass conservation of Stokes finite elements*”. MAFELAP 2013–The Mathematics of Finite Elements and Applications, Brunel University of West London, Uxbridge (UK), June 11-14, 2013.
8. “*Conservazione della massa per l'approssimazione agli elementi finiti del problema di Stokes*”. XIX Congresso dell'Unione Matematica Italiana, Bologna (Italy), September 12-17, 2011.
9. *invited* “*Mimetic finite differences for eigenvalue problems*”. Workshop “Non-Standard Numerical Methods for PDEs”, Pavia (Italy), June 29-July 2, 2010.
10. “*Mimetic finite differences for eigenvalue problems*”. SIMAI 2010, Congresso Nazionale della Società Italiana di Matematica Applicata e Industriale SIMAI, Cagliari (Italy), June 21-25, 2010.
11. “*A superconvergence result for the mixed approximation of eigenvalue problems*”. The Fourth European Finite Element Fair”, Zurich (Switzerland), June 2-3, 2006.
12. “*A posteriori error estimates for eigenvalue problems in mixed form*”. 22nd GAMM Seminar, Lipsia (Germany), January 19-21, 2006.
13. “*On a superconvergence result for the mixed approximation of eigenvalue problems*”. ENUMATH 2005–The Sixth European Conference on Numerical Mathematics and Advanced Applications, Santiago de Compostela (Spain), July 18-22, 2005.

14. “*A posteriori error estimates for eigenvalue problems in mixed form*”. International Workshop on Reliable Methods of Mathematical Modelling, Zurich (Switzerland), July 6-8, 2005.
15. “*A posteriori error estimates for an eigenvalue problem arising from fluid-structure interaction*”. Third MIT Conference on Computational Fluid and Solid Mechanics, MIT, Boston (USA), June 14-17, 2005.
16. “*A posteriori error estimates for eigenvalue problems in mixed form*”. The Third European Finite Element Fair, University of Pavia, Pavia, June 3-4, 2005.
17. “*Proprietà di compattezza discreta per spazi di elementi finiti su quadrilateri*”. Convegno del Gruppo Nazionale di Calcolo Scientifico dell’INDAM, Montecatini Terme, (Italy), February 9-11, 2004.
18. “*Discrete compactness property for quadrilateral finite element spaces*”. The First European Finite Element Fair, Isaac Newton Institute for Mathematical Sciences, Cambridge, (UK), May 8-9, 2003.

PARTICIPATION TO MEETINGS (WITHOUT TALK)

1. HOFEIM 2019, “*High-order Finite Element and Isogeometric Methods Workshop 2019*”, May 28-31, 2019, Università degli Studi di Pavia, Pavia, Italy.
2. POEMS 2017, “*Workshop on Polytopal Element Methods in Mathematics and Engineering*”, July 5-7, 2017, Università degli Studi di Milano, Milano, Italy.
3. “*The 15th European Finite Element Fair*”, May 26-27, 2017, Università degli Studi di Milano, Milano, Italy.
4. “*Workshop on Nonconforming and DG methods*”, January 27, 2017, Università degli Studi di Milano, Milano, Italy.
5. “*The 14th European Finite Element Fair*”, May 20-21, 2016, University of Bonn, Bonn, Germany.
6. “*Analysis and Numerics of Partial Differential Equations-In memory of Enrico Magenes*”, November 2-4, 2011, CNR-Pavia, Pavia, Italy.
7. Workshop on “*Multiscale Problems: Modeling, Adaptive Discretization, Stabilization, Solver*”, September 18-22, 2006, Cortona, Italy.
8. “*The Second European Finite Element Fair*”, June 4-5, 2004, University of Berlin, Berlin, Germany.

PARTICIPATION TO SCHOOLS AND COURSES

1. International School on “*Frontiers in Partial Differential Analysis and Solvers*”, May 22-25, 2017, Università degli Studi di Pavia, Pavia, Italy.
2. C.I.M.E. Summer Course “*Mixed Finite Elements , Compatibility Conditions , and Application*”, June 26 - July 1, 2006, Cetraro, Italy.
3. “*School on Modelling, Control and Numerical Simulation of Smart Systems*”, September 15-19, 2003, IMATI-CNR Pavia, Pavia, Italy.

REFEREEING ACTIVITY

- Advances in Computational Mathematics
- Applied Mathematics and Computations
- Applied Mathematics Letters
- Applied Numerical Mathematics
- Calcolo
- Computer and Mathematics with Applications
- IMA Journal of Numerical Analysis
- Mathematical Modelling and Numerical Analysis
- Mathematical Review
- Numerical Methods for Partial Differential Equations
- Numerische Mathematik
- Science China Mathematics
- SIAM Journal on Numerical Analysis
- SIAM Journal on Scientific Computing

PROFESSIONAL SOCIETIES

- Member of UMI Italian Mathematical Union (since 2007).
- Member of the GNCS-IndAM Nazionale per il Calcolo Scientifico” (since 2003).

HIRING COMMITTEE

- Member of the hiring committee for three Post-Doc positions on “Isogeometric analysis” (Università degli Studi di Pavia, 2017)
- Member of the hiring committee for a Post-Doc position on “Numerical approximation of partial differential equations and high performance computing” (Università degli Studi di Pavia, 2017)

ADMINISTRATIVE DUTIES

January 2013 - onwards member of the committee of students and professors for the BSc in Mathematics at the University of Pavia

July 2012 - onwards member of the committee for the admission test to the BSc in Mathematics at the University of Pavia.

TEACHING (in Italian)

2021/2022

- Lecturer. MATHEMATICS (6 CFU, 48 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, (6 CFU, 56 hours, BSc in Mathematics, University of Pavia).

2020/2021

- Lecturer. MATHEMATICS (6 CFU, 48 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, (6 CFU, 56 hours, BSc in Mathematics, University of Pavia).

2019/2020

- Lecturer. MATHEMATICS (6 CFU, 48 hours, BSc in Biotechnologies, University of Pavia).

2018/2019

- Lecturer. MATHEMATICS (6 CFU, 48 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. PROGRAMMING 2, (3 CFU, 30 hours, BSc in Mathematics, University of Pavia).

2017/2018

- Lecturer. MATHEMATICS (6 CFU, 48 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. PROGRAMMING 2, (3 CFU, 30 hours, BSc in Mathematics, University of Pavia).

2016/2017

- Lecturer. MATHEMATICS (9 CFU, 72 hours, BSc in Biotechnologies, University of Pavia).

2015/2016

- Lecturer. MATHEMATICS (9 CFU, 72 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2014/2015

- Lecturer. MATHEMATICS (9 CFU, 72 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2013/2014

- Lecturer. MATHEMATICS (9 CFU, 72 hours, BSc in Biotechnologies, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2012/2013

- Lecturer. LABORATORY OF COMPUTATIONAL MATHEMATICS (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2011/2012

- Lecturer. LABORATORY OF COMPUTATIONAL MATHEMATICS (3 CFU, 36 hours, BSc in Mathematics, University of Pavia)
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2009/2010

- Lecturer. LABORATORY OF COMPUTATIONAL MATHEMATICS (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).
- Lecturer. NUMERICAL ANALYSIS, mod. 2 (3 CFU, 36 hours, BSc in Mathematics, University of Pavia).

2008/2009

- Head Assistant. NUMERICAL ANALYSIS (BSc in Mathematics, University of Pavia).

2007/2008

- Head Assistant. NUMERICAL ANALYSIS (BSc in Mathematics, University of Pavia).

2006/2007

- Head Assistant. NUMERICAL ANALYSIS (BSc in Mathematics, University of Pavia).
- Head Assistant. NUMERICAL METHODS FOR CHEMISTRY (BSc in Chemistry, University of Pavia).

2003/2004

- Head Assistant. NUMERICAL MODELLING (BSc in Mathematics, University of Pavia).
- Head Assistant. MATHEMATICS FOR APPLIED SCIENCES (BSc in Natural Sciences, University of Pavia).

2001/2002

- Tutor. NUMERICAL ANALYSIS (BSc in Chemistry, University of Pavia).

TEACHING (in English, at foreign Universities)

2005/2006

- Head Assistant. EINFÜHRUNG IN DIE FINITE ELEMENTE METHODE. (MSc in Finance, University of Ulm).
- Head Assistant. NUMERIK IA (BSc in Mathematics, University of Ulm).

STUDENT ADVISING

Bachelor/Master Students

1. Amanda Cuzzolin. *Approssimazione numerica di problemi di vibrazioni*. Pavia, 2017, BSc in Mathematics.

2. Cataldo Manigrasso. *Elementi finiti quadrilateri per la soluzione di problemi agli autovalori*. Pavia, 2007, MSc in Mathematics. Co-advisor: Daniele Boffi.

REFEREE AND MEMBER OF PhD COMMITTEES

- Referee and member of the committee for the evaluation of the thesis of H. Espinoza, (Universita Politècnica de Catalunya, May 2015)

PUBLICATIONS

- [19] D. Boffi, F. Gardini, L. Gastaldi. *Virtual element approximation of eigenvalue problems*. Submitted.
- [18] D. Boffi, F. Gardini, L. Gastaldi. *Approximation of PDE eigenvalue problems involving parameter dependent matrices*. *Calcolo* 57 (2020), no. 41.
- [17] O. Čertík, F. Gardini, G. Manzini, L. Mascotto, G. Vacca, *The p - and hp -versions of the virtual element method for elliptic eigenvalue problems*. *CAMWA* 79, (2020), no. 7, 2035-2056
- [16] O. Čertík, F. Gardini, G. Manzini, G. Vacca, *The Virtual Element Method for Eigenvalue Problems with Potential Terms on Polytopal Meshes*. *Appl. Math.* 63 (2018), no. 3, 333-365.
- [15] F. Gardini, G. Manzini, G. Vacca, *The Nonconforming Virtual Element Method for Eigenvalue Problems*. *ESAIM: M2AN* 53, (2019), no. 3, 749-774.
- [14] F. Gardini, G. Vacca, *Virtual Element Method for Second Order Elliptic Eigenvalue Problems*. *IMA Journal of Numerical Analysis* 38 (2018), no. 4, 2026-2054.
- [13] D. Boffi, D. Gallistil, F. Gardini, L. Gastaldi, *Optimal convergence of adaptive FEM for eigenvalue cluster in mixed form*. *Mathematics of Computation*, 86 (2017), no. 307, 2213-2237.
- [12] D. Boffi, R.G. Durán, F. Gardini, L. Gastaldi, *A posteriori error analysis for nonconforming approximation of multiple eigenvalues*. *Mathematical Methods in the Applied Sciences*, 40 (2017), no. 2, 350-369.
- [11] D. Boffi, N. Cavallini, F. Gardini, L. Gastaldi, *Mass preserving distributed lagrange multiplier approach to immersed boundary method*. (Proceedings of the V International Conference on Computational Methods for Coupled Problems in Science and Engineering), in: *Coupled Problems 2013*, pp. 323-334, S. Idelsohn, M. Papadrakakis, and B. Schrefler (Eds). Cimne.
- [10] D. Boffi, N. Cavallini, F. Gardini, L. Gastaldi, *Stabilized stokes element and local mass conservation*. *Bollettino U.M.I.*, (9) V (2012), no. 3, 543-573.
- [9] D. Boffi, N. Cavallini, F. Gardini, L. Gastaldi, *Local mass conservation of Stokes finite elements*. *Journal of Scientific Computing* , 52 (2012), no. 2, 383-400.
- [8] D. Boffi, F. Gardini, L. Gastaldi, *Some remarks on eigenvalue approximation by finite elements*. In: *Frontiers in Numerical Analysis - Durham 2010*, pp.1-77. Springer Lecture Notes in Computational Science and Engineering, 85 (2012).
- [7] D. Boffi, N. Cavallini, F. Gardini, L. Gastaldi, *Immersed boundary method: performance analysis of popular finite element spaces*. (Proceedings of the IV International Conference on Computational Methods for Coupled Problems in Science and Engineering), in: *Coupled Problems 2011*, pp. 1-12, M. Papadrakakis, E. Onate and B. Schrefler (Eds). Cimne.
- [6] A. Gangiani, F. Gardini, G. Manzini, *Convergence of the mimetic finite difference method for eigenvalue problems in mixed form*. *Comp. Meth. Appl. Mech. Engrg.*, 200 (2011), no. 9-12, 1150-1160.

- [5] F. Gardini, *Mixed Approximation of Eigenvalue Problems: a Superconvergence Result*. M2AN Math. Model. Numer. Anal., 43 (2009), no. 5, 853-865
- [4] F. Gardini, *On a Superconvergence Result for Mixed Approximation of Eigenvalue Problems*. Numerical Mathematics and Advanced Applications, (Springer-Verlag),(2006), 243-251
- [3] F. Gardini, *A Posteriori Error Estimates for an Eigenvalue Problem Arising from Fluid-Structure Interaction*. In Computational fluid and solid mechanics 2005, Third MIT Conference on Computational Fluid and Solid Mechanics, June 14-17, 2005, K.J. Bathe editor, 228-231
- [2] F.Gardini, *Discrete Compactness Property for Quadrilateral Finite Element Spaces*. Numer. Methods Partial Differential Equations 21 (2005), no. 1, 41-56
- [1] F. Gardini, *A Posteriori Error Estimates for an Eigenvalue Problem Arising from Fluid-Structure Interaction*. Istituto Lombardo (Rend. Sc.) 138 (2004), 17-34

Thesis

- [1] F. Gardini. *A posteriori error estimates for eigenvalue problem in mixed form*, PhD Thesis, University of Pavia (Italy). Advisor: Prof. Daniele Boffi.
- [2] F. Gardini. *Proprietà di compattezza discreta per spazi di elementi finiti su quadrilateri*, Laurea in Mathematics, University of Pavia (Italy). Advisor: Prof. Daniele Boffi.

FOREIGN LANGUAGES

English. Good written and oral knowledge.

COMPUTER SKILLS

Operative Systems. Windows (very good), Unix/Linux (good).

Programming Languages. Matlab (very good), Fortan77 (good), C (good).

Productivity Programs. Latex (very good), Microsoft Office (Excel, Frontpage, Outlook, Word) (very good).