



Europass Curriculum Vitae & List of Publications since 2004

Personal information

Surname(s) / First name(s) **Manzini Gianmarco**

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Nationality Italian

Date of birth 12 November 1961

Gender Male

Desired employment / Occupational field

Researcher

Work experience

Dates December 2005 - present

Occupation or position held Senior Researcher (Primo Ricercatore CNR)

Main activities and responsibilities Research in Numerical Analysis

Name and address of employer IMATI - CNR
via Ferrata, 1, I-27100 Pavia (Italy)

Type of business or sector Applied mathematics and scientific computing (*italian "Settore Disciplinare MAT-08"*)

Dates January 1997 - December 2005

Occupation or position held Researcher (Ricercatore CNR)

Main activities and responsibilities Research in Numerical Analysis

Name and address of employer IMATI-CNR (formerly IAN-CNR)
via Ferrata 1, I-27100 Pavia (Italy)

Type of business or sector Applied mathematics and scientific computing (*italian "Settore Disciplinare MAT-08"*)

Dates October 1993 - December 1996

Occupation or position held Researcher

Main activities and responsibilities Research in Scientific Computing and development of
prototype software for scientific applications

Name and address of employer CRS4
c/o Technology Park, Pixiamanna, 09010 Pula (CA), Italy
(former address: via Nazario Sauro 10, 09123 Cagliari, Italy)

Type of business or sector Applied mathematics and scientific computing

Dates October 1989 - September 1993

Occupation or position held Researcher

Main activities and responsibilities | Research in scientific computing
 Name and address of employer | CERFACS
 42, Avenue Gaspard Coriolis, 31057 Toulouse (France)
 Type of business or sector | Scientific Computing. Numerical simulation of fluid dynamics models
 Dates | March 1988 - September 1989
 Occupation or position held | Consultant in Numerical Analysis
 Main activities and responsibilities | Development of software for applications in groundwater modelling
 Name and address of employer | Geomath Srl
 via G. Oberdan, 11, Pisa (Italy)
 Type of business or sector | Consulting

Education and training

Dates | 1987
 Title of qualification awarded | Laurea in Fisica
 Name and type of organisation providing education and training | Università degli studi di Pisa
 Pisa, Italy
 Dates | 1994
 Title of qualification awarded | Ph D in Fluid Mechanics
 Principal subjects / occupational skills covered | Thesis: *Application de schémas numériques de capture de choc à haute résolution à des problèmes d'Astrophysique et de Géophysique*
Advisor: Dr. M. Meneguzzi (CNRS-France)
 Name and type of organisation providing education and training | Université Toulouse 3 "P. Sabatier" (University)
 Toulouse (France)

Personal skills and competences

Mother tongue(s) | **Italian**
 Other language(s)

Self-assessment
 European level (*)

English
French

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user

(*) [Common European Framework of Reference \(CEF\) level](#)

Social skills and competences

- Good ability to adapt to multicultural environments, gained through studies and work experience abroad.
- Good communication skills gained through teaching experience in university courses at undergraduate and graduate (master) level.

Technical skills and competences

Outstanding knowledge in the numerical discretization of partial differential equations for numerical modelling of fluid flows; specific topics regards the implementation of finite volume methods, finite element methods, and mimetic finite difference methods for flows in porous media, groundwater modelling, dispersion of contaminants in soils.

Computer skills and competences

Proficient user of

- procedural programming languages like Fortran 77 and C;
- object oriented programming techniques in Fortran 90/95 and C++;
- UNIX programming environments (Solaris, Linux, FreeBSD);
- shell-type languages like Perl/Tcl-Tk/Bash/Csh.

Driving licence(s) B

Additional information **Visiting positions**

March-April 2009.

Visiting scientist at the Laboratoire d'Analyse, Topologie, Probabilité, UMR 6632 Centre de Mathématiques et Informatique (CMI) Université de Marseille-Provence, France.

June-July 2007.

Visiting scientist at the Laboratoire de Mathématiques "Jean Leray", Université de Nantes, France.

July 2005, February-March 2002, May-September 2001.

Visiting scientist in the group of Numerical Linear Algebra directed by Prof. I. Duff at Rutherford-Appleton Laboratory, Oxfordshire, UK.

August 1997.

Visiting scientist in the team of Parallel Algorithms directed by Prof. I. Duff at CERFACS, Toulouse, France.

International grants

2009.

Grant of Université de Marseille-Provence for visiting Prof. F. Hubert at the Laboratoire d'Analyse, Topologie, Probabilité, UMR 6632 Centre de Mathématiques et Informatique (CMI) Université de Marseille-Provence, France.

2008.

Winner of grant *Programma Professori Visitatori-2008* of Gruppo Nazionale Calcolo Scientifico (GNCS -INdAM), for funding a one-month visit at IMATI-CNR (Pavia) of Prof. Y. Coudière (Laboratoire de Mathématiques "Jean Leray", Nantes, France).

2007.

Grant of Université de Nantes for visiting Prof. Y. Coudière at the Laboratoire de Mathématiques "Jean Leray", Nantes, France.

2005.

Grant of CNR Short Term Mobility Programme 2005 for visiting Dr. M. Arioli at Rutherford-Appleton Laboratory, Oxfordshire, UK.

2001.

Grant GR/R46427/01 of Engineering and Physical Science Research Council (EPSRC) for the research program "Direct and iterative methods for solving augmented systems related to mixed finite element methods" in collaboration with Dr. M. Arioli at Rutherford-Appleton Laboratory, Oxfordshire, UK.

1996 – 1997.

Programma Galileo for cooperation Italy-France for the two year research program Monitoraggio e bonifica di suoli inquinati di aree costiere del Mediterraneo, in collaboration with Dr. L. Giraud (CERFACS) and Dr. C. Gallo (CRS4), scientific coordinator Prof. G. Gambolati, University of Padova, Italy.

1989 – 1993.

Grant of French Government for attending the Ph.D. Programme "Doctorat 3ème cycle" at the University "P. Sabatier" in Toulouse, France.

Professional activities

2009.

Organizer with Prof. R. Herbin and Prof. F. Hubert of the Benchmark for the Workshop on Anisotropic Diffusion Problems held in Porquerolles, France, in June 20-22, 2009.

2005 – present.

Coordinator at IMATI-CNR of the research project “Metodi numerici avanzati per la meccanica dei fluidi”, codice SIGLA TAP04-IMATI-C07, Dipartimento Terra & Ambiente, CNR.

2005.

Member of the International Advisory Scientific Committee for organizing the Third International Conference on Fluid Structure Interaction, September 19-21, 2005, La Coruña, Spain.

2000 – 2002.

Coordinator at IMATI-CNR in Pavia of the research project “Algoritmi innovativi dell'algebra lineare nella simulazione ed ottimizzazione per la compatibilità elettromagnetica industriale e ambientale”, Progetto Coordinato Agenzia 2000 directed by Dr. P. Fernandes (IMATI-CNR, Genova, Italy).

Software for mathematical applications

September 2004.

H.S.L.-MI31, FORTRAN 90 routine implementing the Conjugate Gradient method with stopping criteria based on the energy norm, available in the Harwell Subroutine Library; collaboration with Dr. M. Arioli (RAL, Oxfordshire, UK).

March 2002.

Alg. 817 P2MESH, C++ library for managing data structures of unstructured grids in prototyping PDE solvers; available online since March 2002 from Digital Library of Association for Computing Machinery (ACM), New York, USA; collaboration with Dr. E. Bertolazzi (University of Trento).

Peer review activity

Review activity for the following international journals:

- Advances in Water Resources;
- Applied Mathematics Letters;
- Applied Numerical Mathematics;
- Communications on Numerical Methods in Engineering;
- Computer Methods in Applied Mechanics and Engineering;
- Computer and Physics Communications;
- Computer and Mathematics Communication;
- Computing and Visualization in Science;
- Information and Software Technologies;
- Int. Journal on Numerical Methods in Fluids;
- Software: Practice and Experience;
- SIAM Int. Journal on Scientific Computing;
- Mathematics and Computer in Simulation;
- Mathematical Review.

Conference and talks

- A higher order flux approximation for the mimetic finite difference method, Laboratoire d'Analyse, Topologie, Probabilité, UMR 6632 Centre de Mathématiques et Informatique (CMI) Université de Marseille-Provence, France, 7 April 2009.
- The mimetic finite difference method (invited speaker), Finite Volumes for Complex Applications-V, Aussois, France, 7–13 June 2008.
- The mimetic finite difference method MOX -Politecnico di Milano, Italy, 6 June 2008.
- Mimetic finite difference methods for elliptic problems Laboratoire de Mathématiques "Jean Leray", Université de Nantes, France, 21 June 2007.
- Second-order diamond-cell discretizations of elliptic and convection-dominated problems (invited speaker), FV06: Anisotropie a Porquerolles, Porquerolles, France, 14–16 June 2006.
- A mixed finite element solver for liquid-liquid impacts XXIX Convegno di Idraulica e costruzioni idrauliche, Trento, Italy, 7–10 September 2004.
- A mixed finite element solver for liquid-liquid impacts Fluid Structure Interaction II, Cadiz, Spain, September 2003.
- Least square-based finite volumes for solving the advection-diffusion of contaminants in porous media, IMACS/ISGG Workshop MASCOT-02, Rome, Italy, 2–4 October 2002.
- A finite volume method for transport of contaminants in porous media, VI Congresso della Società Italiana di Matematica Applicata e Industriale, Chia Laguna, Cagliari, Italy, 27–31 May 2002.
- Mixed finite elements and null-space methods for the Darcy's equations, CRS4, Cagliari, Italy, 12 December 2001.
- Contaminant transport in porous media by a finite volume method Proceedings of the IMACS/ISGG Workshop MASCOT/01, Rome, Italy, 22–24 October 2001.
- Un algoritmo di spazio nullo per approssimazioni agli elementi finiti misti dell'equazione di Darcy, Due giorni di Algebra Lineare Numerica, Pisa, Italy, 29–30 May 2000.
- P2MESH: a collection of template classes for implementing FE and FV PDE solvers on 2-D unstructured grids, INRIA, Sophia-Antipolis France, 30 March 1999.
- Discontinuous finite elements for diffusive problems, CRS4, Cagliari, Italy, 9 July 1999.
- Newton and quasi-Newton methods for the non-linear Richards' equation, International Conference on Computational Methods in Water Resources XII, Crete, Greece, 1998.

Teaching

Summer School / Master courses

September 2006.

Centro di GeoTecnologie, S.Giovanni Valdarno (Siena) Italy, University of Siena. Lecturer of Finite

Volume Methods in Hydrological Modelling (8 hours), for Summer School on Advanced Numerical Modeling of Flow and Transport in Soils and Aquifers.

Winter Semester 2007.

University of Milano-Bicocca, Faculty of Science. Lecturer of M.Sc. Course on Programming in C/C++ (60 hours), Master Programme Applied Mathematics for Industry and Finance, organized by Istituto Nazionale di Alta Matematica (INdAM).

Spring Semesters from 2003 to 2007.

University of Milano-Bicocca, Faculty of Science. Lecturer of M.Sc. Course on C++ and Object Oriented Programming (36 hours), Master Programme Applied Mathematics for Industry and Finance, organized by INdAM.

Spring Semester 2008.

University of Milano-Bicocca, Faculty of Science. Lecturer of M.Sc. Course on C++ and Object Oriented Programming, School of Applied Mathematics for Industry, (60 hours) organized by INdAM.

Undergraduate courses

Winter Semesters from 2003 to date.

University of Pavia, Faculty of Engineering. Lecturer of Numerical Analysis (50 hours), Laurea in Ingegneria Informatica e dell'Ambiente e Territorio.

Winter Semesters from 2006 to date.

University of Milano-Bicocca, Faculty of Science. Teaching assistant of Numerical Analysis (12hours), Laurea in Informatica.

Winter Semesters from 2001 to 2006.

University of Pavia, Faculty of Engineering. Lecturer of Analytical Geometry and Linear Algebra (50hours), Laurea in Ingegneria.

Spring Semesters 1999 and 2000.

University of Pavia, Faculty of Engineering. Lecturer of Numerical Analysis (50 hours). Diploma Universitario in Ingegneria.

M.Sc. thesis advisor

M.Sc. Thesis advisor for the Master Programme Applied Mathematics for Industry and Finance; students:

- Lorenzo Botto (2004, stage in IMATI-CNR, Pavia),
- Francesca Sannia (2006, stage in Software Company, Milano),
- Marco Martelli (2006, stage in Software Company, Milano),
- Alva Perez (2006, stage in IMAT-CNR, Pavia),
- Contini Antonio (2007, stage in INRIM Div. Meccanica, Torino),
- Sandonà Luca (2007, stage in Software Company, Milano),
- Lorusso Valeria (2007, stage in Software Company, Milano).

**List of Publications
since 2004**

Refereed journal publications

1. A. Cangiani, G. Manzini, and A. Russo. *Convergence analysis of a mimetic finite difference method*

- for general second-order elliptic problems. Technical Report 15PV07/15/0, IMATI-CNR, 2007. Accepted for publication in SIAM Journal on Numerical Analysis .
2. L. Beirao da Veiga, K. Lipnikov, and G. Manzini. *Convergence analysis of the high-order mimetic finite difference method*. Technical Report 14PV08/13/0, IMATI-CNR, 2008. Accepted for publication in Numerische Mathematik.
 3. G. Manzini. *An efficient and conservative hybrid method for solving multi-dimensional conservation laws*. Technical Report 23PV08/20/0, IMATI-CNR. To appear in Numerical Methods for Partial Differential Equations. Published online since August 2008, available at <http://www3.interscience.wiley.com/cgi-bin/fulltext/121391136/PDFSTART>.
 4. G. Manzini. *An implicit-explicit finite volume scheme for 1-D convection-reaction equations*. Mathematics and Computers in Simulation, 79:2403-2428, 2009.
 5. L. Beirao da Veiga and G. Manzini. *An a-posteriori error estimator for the mimetic finite difference approximation of elliptic problems*. International Journal of Numerical Methods in Engineering, 76(11):1696-1723, 2008.
 6. L. Beirao da Veiga and G. Manzini. *A higher-order formulation of the mimetic finite difference method*. SIAM, J. Sci. Comput., 31(1):732-760, 2008.
 7. S. Bertoluzza, S. Falletta, and G. Manzini. *Efficient design of residual-based stabilization techniques for the three fields domain decomposition method*. Mathematical Models and Methods in Applied Sciences, 18(7):973-999, 2008.
 8. A. Cangiani and G. Manzini. *Flux reconstruction and solution post-processing in mimetic finite difference methods*. Computer Methods in Applied Mechanics and Engineering, 197(9-12):933-945, 2008.
 9. G. Manzini and A. Russo. *A finite volume methods for advection-diffusion problems in convection dominated regimes*. Computer Methods in Applied Mechanics and Engineering, 197(13-16):1242-1261, 2008.
 10. E. Bertolazzi and G. Manzini. *Computer modelling of liquid-solid impacts*. Mathematical and Computer Modelling, 45(1-2):162-176, 2007.
 11. E. Bertolazzi and G. Manzini. *DIMEX Runge-Kutta finite volume methods for multidimensional hyperbolic systems*. Mathematics and Computers in Simulation, 75(5-6):141-160, 2007.
 12. E. Bertolazzi and G. Manzini. *On vertex reconstructions for cell-centered finite volume approximations of 2D anisotropic diffusion problems*. Mathematical Models and Methods in Applied Sciences, 17(1):1-32, 2007.
 13. G. Manzini and M. Putti. *Mesh locking effects in the finite volume solution of 2-D anisotropic diffusion equations*. Journal of Computational Physics, 220(2):751-771, 2007.
 14. M. Arioli and G. Manzini. *A network programming approach in solving Darcy's equation by mixed finite element methods*. Electronic Transactions on Numerical Analysis, 22:41-70, 2006.
 15. E. Bertolazzi and G. Manzini. *A second-order maximum principle preserving finite volume method for steady convection-diffusion problems*. SIAM Journal on Numerical Analysis, 43(5):2172-2199, 2005.
 16. E. Bertolazzi and G. Manzini. *A unified treatment of boundary conditions in least square-based finite volume methods*. Computer & Mathematics with Applications, 49(11-12):1755-1765, 2005.

17. E. Bertolazzi and G. Manzini. *A cell-centered second-order accurate finite volume method for convection-diffusion problems on unstructured meshes*. *Mathematical Models and Methods in Applied Sciences*, 14(8):1235-1260, 2004.
18. E. Bertolazzi and G. Manzini. *A finite volume method for transport of contaminants in porous media*. *Applied Numerical Mathematics*, 49(3-4):291-305, 2004.
19. E. Bertolazzi and G. Manzini. *Least square-based finite volumes for solving the advection-diffusion of contaminants in porous media*. *Applied Numerical Mathematics*, 51(4):451-461, 2004.
20. E. Bertolazzi and G. Manzini. *Limiting strategies for polynomial reconstructions in the finite volume approximation of the linear advection equation*. *Applied Numerical Mathematics*, 49(3-4):277-289, 2004.
21. E. Bertolazzi and G. Manzini. *A mixed finite element solver for liquid-liquid impacts*. *Communications in Numerical Methods in Engineering*, 20(8):595-606, 2004.
22. E. Bertolazzi and G. Manzini. *A finite volume method for the numerical simulation of liquid bore impact against wall*. *Far East Journal of Applied Mathematics*, 14(2):221-241, 2004.
23. G. Manzini and S. Ferraris. *Mass-conservative finite volume methods on 2-D unstructured grids for the Richards' equation*. *Advances in Water Resources*, 27(12):1199-1215, 2004.

Conference proceedings (with peer review)

24. G. Manzini. *The mimetic finite difference method. Benchmark on anisotropic problems*. In R. Eymard and Herard J.-M., editors, *Finite Volumes for Complex Applications V, Problems and Perspectives*, pages 865-878. Wiley, 2008.
25. G. Manzini. *The mimetic finite difference method (invited)*. In R. Eymard and Herard J.-M., editors, *Finite Volumes for Complex Applications V, Problems and Perspectives*, pages 119-134. Wiley, 2008.

Papers under evaluation for publication in international journals

26. L. Beirao da Veiga, V. Gyrya, K. Lipnikov, and G. Manzini. *Mimetic finite difference method for the Stokes problem on polygonal meshes*. Los Alamos National Laboratory, LA-UR 09-00753. Submitted to *J. Comput. Phys*.
27. Y. Coudiere and G. Manzini. *The discrete duality finite volume method for convection-diffusion problems*. Technical Report Tech. Report IMATI-CNR 19PV08/17/0, IMATI-CNR, 2008. Submitted to *SIAM Journal on Numerical Analysis*.
28. G. Manzini. *The mimetic finite difference method with Lagrange multipliers*. Technical Report 1PV08/1/0, IMATI-CNR, 2008. Submitted to *SIAM Journal on Numerical Analysis*.

Software

29. M. Arioli and G. Manzini. *HSL_MI31 - Package Specification*. In HSL Release 2004. Computational Centre and Engineering Department, Atlas Centre, Rutherford Appleton Laboratory, CCLRC, Oxon, UK.

30. M. Arioli and G. Manzini. *MI31: a conjugate gradient algorithm implementation with energy-norm stopping criteria*. Technical Report RAL-TR-2005-004, Computational Centre and Engineering Department, Atlas Centre, Rutherford Appleton Laboratory, CCRLC, Oxon, Uk, March 2005.

Conference proceedings

31. E. Bertolazzi, G. Manzini, and F. Trivellato. *A mixed finite element solver for liquid-liquid impacts*. In XXIX Convegno di Idraulica e costruzioni idrauliche, pages 1-9. Universita degli Studi di Trento, 7-10 September 2004. Tech. Report IMATI-14-PV.