

CURRICULUM VITAE

LUCA FORMAGGIA

Last update: January 15, 2021

OFFICE ADDRESS

MOX, Dipartimento di Matematica
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BIBLIOMETRY DATA (SOURCE: SCOPUS)

N. of publications: 113
N. of citations: 3562
h-index: 28

EDUCATION

09/1978–04/1984 Undergraduate Studies in Mechanical Engineering at Università degli Studi di Padova (Italy)
10/1985–10/1986 Master of Science in *Finite Element Methods in Engineering Analysis and Design*, University College of Swansea (UK). Supervisor: Prof. Ken Morgan
01/1987, 02/1989 Ph.D, University College of Swansea (UK). Thesis title: *A finite element algorithm for modelling of compressible flow*. Supervisor: Prof. Ken Morgan

PROFESSIONAL CAREER

03/89–09/94 Senior researcher at the Computational Aeronautics office of Alenia Aeronautica SpA, Divisione Velivoli Difesa, Turin, Italy
09/94–04/98 Senior researcher at the Applied Mathematics unit of CRS4 (Centro di Ricerca, Sviluppo e Studi Superiori in Sardegna), Cagliari, Italy
05/98–08/2002 First Assistant to the Chair of Numerical Modelling and Scientific Computing of the Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland

09/2002-01/2006 Associate Professor of Numerical Analysis at Politecnico di Milano, Italy

02/2006 - Professor of Numerical Analysis at Politecnico di Milano, Italy

MAIN RESEARCH INTERESTS

- *Computational Geophysics*. Numerical modelling of sedimentary basins and oil migration. Reservoir simulation. Flow in fractured porous media. Reduced and hybrid-dimensional models.
 - *Mathematical modelling and simulation of the cardiovascular system*. Reduced and multi-scale models. Coupled problems.
 - *Mesh adaptation for the finite element method*. Anisotropic error estimates. Mesh generation and adaptation.
 - *Numerical solution of fluid flow problems*. Fluid-structure interaction problems. Reduced and hybrid-dimensional models.
-

SCIENTIFIC RESPONSIBILITIES

- 2017- Member of the Scientific Committee of AMIES (Agence pour les mathématiques en interaction avec l'entreprise et la société)
- 2017- President of SIMAI (Italian Society of Industrial and Applied Mathematics).
- 2014-17 Head of the MOX Laboratory of the Department of Mathematics of Politecnico di Milano, Italy
- 2009- Member of the Managing Board (Consiglio Direttivo) of SIMAI (Italian Society of Industrial and Applied Mathematics) with the role of Secretary.
- 1996-98 Head of the CFD unit of CRS4 (Centro di Ricerca, Sviluppo e Studi Superiori in Sardegna), Cagliari, Italy
-

ACADEMIC AND INSTITUTIONAL RESPONSIBILITIES

- 2018- Member of the Managing Board of the Cooperation Agreement between Politecnico di Milano and Eni S.p.A.
- 2017-2018 Member of the Italian commission for scientific habilitation (ASN) for the scientific sector of Numerical Analysis
- 2014-17 Member of the Board of the Department of Mathematics of Politecnico di Milano
- 2007,09,11,18 Member of the selection committee for the Doctoral School on Mathematical Models and Methods in Engineering, Politecnico di Milano
- 2013-2015 Scientific manager of the research agreement between the Department of Mathematics of Politecnico di Milano and MOXOFF S.r.l.
- 2012- Scientific manager of the research agreement between Politecnico di Milano and Altran S.p.A.
- 2009-2015 Scientific manager of the research agreement between the Department of Mathematics of Politecnico di Milano and ENI Spa on the development and implementation of numerical method applied to oil field prospection and exploitation

2009-2018 Member of the Scientific Committee of the Department of Mathematics of Politecnico di Milano

2008- Member of the Faculty Board of the Doctoral School on Mathematical Models and Methods in Engineering, Politecnico di Milano.

2007-09 Responsible for the student internships for the course on Mathematical Engineering, Politecnico di Milano

2007-08 Member of the Managing Board of the Doctoral school on Mathematical Engineering (Ingegneria Matematica), Politecnico di Milano

Member (also with the role of President) of several committees for the selection of faculty staff in Italian and International Universities

EDITORIAL ACTIVITIES

2012- Chief Editor of the SEMA-SIMAI Springer Series on Applied and Industrial Mathematics

2011-2017 Member of the Editorial Board of the SIAM Journal of Scientific Computing (SISC)

2010- Member of the Editorial Board of the International Journal for Numerical Methods in Biomedical Engineering

2010-2018 Member of the Advisory Board of the International Journal for Numerical Methods in Fluids

SCIENTIFIC REFEREEING ACTIVITIES

- Reviewer for the American Mathematical Society (AMS)
- Reviewer of several journals on numerical analysis and scientific computing, among which Computer Methods in Applied Mechanical Engineering, Journal of Computational Physics, International Journal for Numerical Methods in Engineering, International Journal for Numerical Methods in Fluids, Mathematical Modelling and Numerical Analysis, SIAM Journal of Scientific Computing, Computational Geosciences

CONFERENCE ORGANIZATION

- Member of the Technical Committee of the *Eighth International Conference of Finite Elements in Fluids*, 1995
- Member of the Technical Committee della *Ninth International Conference of Finite Elements in Fluids*, 1996
- Member of the Organising Committee of the Workshop on *Parallel Computing in Applied Fluid Mechanics*, Scuola Normale di Pisa, 1997
- Member of the Organising Committee of the *Second AMIF Conference*, Il Ciocco, Italy, 2000
- Member of the Organising Committee of the Workshop on *Cardiovascular System: from Mathematical Modelling to Clinical Applications*, Milan, 6-8 March 2002
- Member of the Scientific Committee of the *First International Symposium on Modelling of Physiological Flows*, Lausanne, Switzerland, 1-3 September 2003

- Member of the Organising Committee of the Workshop *Integrazione di Sistemi Complessi in Biomedicina, Modelli Simulazioni, Rappresentazioni*. Bergamo, Italy, 22-24 November 2004
- Member of the Scientific Committee of the *Second International Symposium on Modelling of Physiological Flows*, Sesimbra, Portugal, 31/03-2/04 2005
- Member of the Local Organizing Committee of the *8th World Congress of Computational Mechanics (WCCM8)* and the *Fifth European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2008)*, Venice, Italy, 30/06-4/07 2008
- Member of the *International Advisory Committee* of the *First International Conference on Computational and Mathematical Biomedical Engineering*, Swansea, UK, June 29th-July 1st 2009
- Member of the Scientific Committee of the *4th International Symposium on Modelling of Physiological Flows*, Chia Laguna, Italy, June 2-3, 2010.
- Member of the Scientific Committee of *SIMAI 2012*, Torino, Italy, June 25-28, 2012
- Member of the Scientific Committee of the *SIAM Conference on the Mathematical and Computational Issues in the Geosciences (GS13)*, Padova, Italy, June 17-20, 2013
- Member of the International Program Committee of the *19th IMACS World Congress*, El Escorial-Maria Cristina, Spain August 26-30, 2013
- Member of the Scientific Committee of the *First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI*, Bilbao. June 30- July 4, 2014
- Member of the Scientific Committee of SimRace, Conference on numerical methods and High Performance Computing for industrial fluid flows IFPEN / Rueil-Malmaison - 8-10 December 2015
- Member of the Scientific Committee of the Eccomas Conference X-DMS of Extended Discretization Methods, Ferrara (Italy), 9-11 September 2015
- Head of the Organizing Committee of the SIMAI 2016 Biannual Congress, Milano (Italy), 13-16 September 2016
- Member of the Scientific Committee of the Eccomas X-DMS 2017 Conference of Extended Discretization Methods, Umea (Sweden), 19-21 June 2017
- Member of the Scientific Committee of the SIAM Conference on Imaging Science. Bologna, Italy, June 5-8 2018
- Member of the Scientific Committee of the SIMAI Biannual Congress, Rome, 2-6 July, 2018
- Member of the International Advisory Committee of the 6th Int. Conf. Computational and Mathematical Biomedical Engineering (CMBE19), Tohoku University, Katahira Campus, Sendai City, Japan, 10-12 June 2019
- Member of the Scientific Committee of the Eccomas X-DMS 2019 Conference of Extended Discretization Methods for Partial Differential Equations on Complex and Evolving Domains, Lugano (Switzerland), 3-5 July 2019
- Member of the Scientific Committee of NUMTA 2019, The 3rd International Conference and summer school on Numerical Computation: Theory and Algorithms. June 15-21, 2019, Le Castella Village, Italy
- Member of the Scientific Committee of the Workshop on Mathematical Modelling and Control for Healthcare and Biomedical Systems, Rome, Italy, September 8-10, 2020

- Member of the Scientific Committee of SIMAI2020, Biennial Congress of the Italian Society for Applied and Industrial Mathematics, 15-19 June 2020, Parma, Italy
- Member of the International Advisory Committee of the 7th International Conference on Computational and Mathematical Methods in Biomedical Engineering (CMBE21), 28-30 June 2021, Politecnico di Milano, Italy
- Chair and member of the Organizing Committee of SIAM-GS21, SIAM Conference on Mathematical and Computational Issues in the Geosciences, 21-24 June 2021, Politecnico di Milano, Italy

SUPERVISION ACTIVITY

Supervision of PhD Thesis

1. A. Bulgalho de Moura, *The Geometrical Multiscale Modelling of the Cardiovascular System: Coupling 3D FSI and 1D Models*, Mathematical Engineering, Politecnico di Milano, Italy, 2008
2. Sara Minisini, *Mathematical and numerical modeling of drug eluting stents*, Mathematical Engineering, Politecnico di Milano, Italy, 2009
3. Andrea Mola, *A model for the dynamics of high performance rowing boats*. Mathematical Engineering, Politecnico di Milano, Italy, 2009
4. Andrea Villa, *Three dimensional geophysical modeling: from physics to numerical simulation*, Applied Mathematics, Università degli studi di Milano, Italy, 2009
5. Anna Scotti, *Models for oil generation and primary migration*, Mathematical Engineering, Politecnico di Milano, Italy, 2009
6. Alessio Fumagalli, *Numerical modelling of flows in fractured media by the XFEM method*, Mathematical Models and Methods for Engineering, Politecnico di Milano, 2012
7. Matteo Pischiutta, *Mathematical and numerical modelling of the evolution of mixtures of sand in aeolian dunes*, Mathematical Models and Methods for Engineering, Politecnico di Milano, 2012
8. Nur Fadel, *HPC simulation of sedimentary basins*, Mathematical Models and Methods for Engineering, Politecnico di Milano, 2013
9. Alessandro Melani, *Adjoint-based parameter estimation in human vascular one dimensional models*, Mathematical Models and Methods for Engineering, Politecnico di Milano, 2013
10. Davide Baroli, *Multiscale models for heterogeneous Darcy's flows*, Mathematical Models and Methods for Engineering, Politecnico di Milano, 2015.
11. Stefano Zonca, *Unfitted numerical methods for fluid-structure interaction arising between an incompressible fluid and an immersed thick structure* Mathematical Models and Methods for Engineering, Politecnico di Milano (with C. Vergara), 2018.
12. Bianca Giovanardi, *Numerical modeling of hydro-mechanical coupling in deformable porous media: compaction and fractures*. Mathematical Models and Methods for Engineering, Politecnico di Milano (with A. Scotti), 2018.
13. Daquin Liu, *A numerical method for analyzing fault slip tendency under fluid injection with XFEM*, Mathematical Models and Methods for Engineering, Politecnico di Milano (with A. Scotti), 2018.

14. Florent Chave, *Hybrid High-Order methods for interface problems* in co-sharing with Prof. Di Pietro of University of Montpellier, France. PhD grantee of a Vinci France Italy Scholarship, 2018.
15. Ludovica Del Popolo Carciopolo. *Mathematical Models and Methods for Engineering*, Politecnico di Milano (with A. Scotti), 2020.

Reviewer/external examiner of the following PhD Thesis:

1. Li Yenzung *Hybrid Grids Methods for the Numerical Solution of the Navier-Stokes Equations Around Complex Three-Dimensional Configurations*, DIC, Aeronautics Department, Imperial College, London. Supervisor: D. Doorly. 1997.
2. Paul Metier, *Modelisation, analyse mathématique et applications numériques de problèmes d'interaction fluid-structure instationnaires*, Université Pierre et Marie Curie, Paris VI. Supervisor: Yvon Maday. 2003.
3. Emil Lovgren *Reduced basis modeling of hierarchical flow systems*, Department of Mathematical Sciences, Norwegian University of Science and Technology, Trondheim, Norway. Supervisor: E.M. Ronquist. 2005.
4. Nicole Poussineau, *Réduction variationnelle d'un couplage fluids-structure. application à l'hémodynamique*. Université Pierre et Marie Curie, Paris VI. Supervisor: Yvon Maday. 2007.
5. Carlo D'Angelo, *Multiscale modelling of metabolism and transport phenomena in living tissues*, EPFL, Lausanne, Switzerland. Supervisor: Alfio Quarteroni. 2007.
6. Angelo Casagrande, *Parallel Mesh Adaptive Techniques for Complex Flow Simulation*, Laboratoire d'ingénierie numérique, EPFL, Switzerland. Supervisor: Penelope Leyland. 2008.
7. Tormod, Bjontegaard, *A high order splitting method for time dependent domains*, Department of Mathematical Sciences, Norwegian University of Science and technology, Trondheim, Norway. Supervisor: E.M. Ronquist. 2008.
8. Anrea Lani, *An object-oriented and high-performance platform for aerothermodynamics simulation*, Von Karman Institute, Belgium. Supervisor: Herman Deconinck. 2008.
9. Adrien Loseille, *Adaptation de maillage anisotrope 3D multi-échelles et ciblée à une fonctionnelle pour la mécanique des fluides. Application à la prédiction haute-fidélité du bang sonique*, Université Pierre et Marie Curie et INRIA Roquencourt, Paris VI. Supervisor: Frederic Alauzet. 2008.
10. Joan Baiges, *The Fixed-Mesh ALE method applied to multiphysics problems using stabilized formulations*, Universitat Politècnica de Catalunya, Supervisor: Ramon Codina, 2010.
11. Riccardo Aramini, *Computational Inverse Scattering Via Qualitative Methods*, University of Trento, Supervisor: Andrea Massa and Michele Piana, 2011.
12. Anca Belme, *Aérodynamique instationnaire et méthode adjointe*, INRIA Sophia_Antipolis and University of Bordeaux, Supervisor: Alain Dervieux, 2011.
13. *Simulation Dynamique des systemes bateau-remeurs*, Francois, Rongere, University of Nantes, Supervisor: Jean Michel Kobus, 2011
14. Geraldine Olivier, *Anisotropic metric-based mesh adaptation for unsteady CFD simulations involving moving geometries*, Université Pierre et Marie Curie et INRIA Roquencourt, Paris VI. Supervisor: Frederic Alauzet. 2012.

15. Vincent Chabannes, Vers la simulation des écoulements sanguins, Université de Grenoble. Supervisor Christophe Prudhomme, 2013.
16. Radu Popescu, Parallel algorithms and efficient implementation techniques for finite element approximations, EPFL. Supervisor: Alfio Quarteroni, 2013.
17. Joubine Aghili, University of Montpellier, France, Supervisor: Daniele Di Pietro, 2016.
18. Maya Groza, University of Nice, France. Supervisor: Roland Masson, 2016.
19. Rita Riedlbeck, University of Montpellier, France. Supervisor: Daniele Di Pietro, 2017.
20. Yoann Robert, University Centrale Nantes, France. Supervisor: Michel Visonneau, 2017.
21. Alex Karkoulas, Universitat Politècnica de Catalunya, Spain and Università di Pavia, Italy, Supervisor: Antonio Huerta, 2020.

Supervision of Post-Docs:

Nur Fadel, Anna Scotti, Alessio Fumagalli, Stefano Zonca, Martin Prosi, Silvia Anicic, Antonio Montano, Stefania Ferrari, Andrea Mola, Mikel Landajuera,

KEYNOTE AND PLENARY TALKS AT INTERNATIONAL CONFERENCES

1. *Implementation of a 3D explicit Euler solver on a Cray computer.* **Keynote Lecture**, Fourth International Symposium on Science and Engineering on Cray Supercomputers, 12-14 October 1988, Minneapolis Minnesota.
2. *Mesh generation and adaption strategies for Euler and Navier-Stokes equations.* **Keynote Lecture**. Workshop on Grid Adaptation in Computational PDE's: Theory and Applications, Edimbrough, July 1996.
3. *Some anisotropic mesh adaption strategies for the FEM.* **Keynote Lecture**. Chemnitz-FEM Symposium 2002, Chemnitz, Germania, 23-25 September 2002.
4. *Multiscale modelling of the cardiovascular system.* **Keynote Lecture**. Second International Symposium on Modelling of Physiological Flows, 31st March-2nd April 2005, Sesimbra, Portugal.
5. *Fluid-structure interaction problems in free surface flows: application to boat dynamics.* **Keynote Lecture**. ICFD06, Conference on Numerical Methods for Fluid Dynamics, University of Reading, 26-29 March 2007
6. *Numerical models for the evolution of geological basins and oil generation.* **Plenary Lecture** for the SIMAI 2010 conference, Cagliari, Italy, June 22nd 2010
7. *Numerical models for the simulation of the cardiovascular system,* **Plenary Lecture** at the INI/WIMCS meeting on Computational challenges in PDEs, Swansea, UK, April 4-8, 2011.
8. *The challenge of complexity in sedimentary and reservoir simulations,* **Keynote Lecture**, ACME-UK 2015. 23rd Conference on Computational Mechanics, 8-10 April 2015, Swansea, UK.
9. *Some numerical challenges of numerical simulations of subsurface flows,* **Plenary Lecture** at the first joint Brazil-Italy meeting in Mathematics, Rio de Janeiro, 29 August, 2nd September 2016

10. *Geometrical multiscale modeling of liquid packaging systems: an example of scientific cross-fertilization*, **Plenary Lecture** at the ECMI 2016 Conference. 13-17th June 2016. Santiago de Compostela, Spain.
11. *Darcy flow in fractured porous media: some mathematical and numerical aspects*, **Invited Lecture** at the Gordon Research Conference on Flow and Transport in Porous Media, July 31-August 5, 2016
12. *Some numerical techniques for problems with embedded domains and interfaces*, **Plenary Lecture** at the XDMS 2017 conference on eXtended Discretization MethodS for partial differential equations on complex and evolving domains. 19-21 June 2017, Umea, Sweden.
13. *Approximation of fractured porous media flow by mimetic finite differences*, **Invited Lecture** at POEMS 2017, Polytopal Element Methods in Mathematics and Engineering, 5-7 July 2017, University of Milano-Bicocca, Italy.
14. *Numerical model for fault reactivation based on a Nitsche method and XFEM*, **Invited Lecture** at the Oberwolfach Workshop on Reactive flow in deformable, complex media. 31st August 2018.
15. *Numerical modeling of flow in fractured porous media and fault reactivation*, **Plenary Lecture** at NUMTA2019, 3rd International Conference and Summer School on Numerical Computations: Theory and Algorithms, Capo Rizzuto, Italy, 2019.
16. *Numerical techniques for fluid-structure interaction problems with large displacements and applications in hemodynamics*, **Keynote Lecture** at the 3rd International Conference on Modern Mathematical Methods and High Performance Computing in Science & Technology, Inderprastha Engineering College, Ghaziabad, Uttar Pradesh, India, 2019.

PARTICIPATION/COORDINATION OF RESEARCH PROJECT

Supported by National or European research financing bodies

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|-------------|---|
| 10/93-09/95 | Participation to: E.U. BRTE AER20031 <i>ECARP: European Computational Aerodynamics Project</i> . Coordinated by British Aerospace. Subject: mesh adaptation of the Euler Equations. |
| 06/96-05/98 | Participation to: E.U. ESPRIT PCI-II <i>PCECOWATER</i> Subject: development of parallel solvers for free surface flows with environmental applications. |
| 06/97-05/98 | Participation to: E.U. EU-1063, HPPC-SEA <i>VIVA: The Virtual Vascular Project</i> . Subject: Development of a Navier-Stokes solver. |
| 02/00-01/02 | Participation to: E.U. BRPR-CT97-0591 <i>IdeMAS: Industrial Demonstrator of Accurate and Efficient Multidimensional Upwind and Multigrid Algorithms for Aerodynamic Simulations on Unstructured Grids</i> . Coordinated by Prof. Deconinck, Von Karman Institute for Fluid Dynamics, Belgium. |
| 09/00-08/02 | Participation to: FNS (Fond National Suisse) project <i>Multimodels and multidomains methods for fluid structure interaction problems</i> . Principal coordinator: Prof. A. Quarteroni. |
| 09/00-08/03 | Participation to: FNS (Fond National Suisse) project <i>Mathematical Modelling and Numerical Simulation of Fluid Flow and Mass Transport Processes in Heterogeneous Media</i> . Principal coordinator: Prof. A. Quarteroni. |

- 09/98-08/00 Participation to: FNS (Fond National Suisse) project *Domain Decomposition and Adaptive Methods: Analysis, Development and Applications*. Principal coordinator: Prof. A. Quarteroni.
- 01/02-06/03 Participation to: E.U./OFES BRPR-CT97-0591. Continuation of *IdeMAS:Industrial Demonstrator of Accurate and Efficient Multidimensional Upwind and Multi-grid Algorithms for Aerodynamic Simulations on Unstructured Grids*, Coordinator: Prof. Deconinck, Von Karman Institute for Fluid Dynamics, Belgium.
- 01/02-12/05 **Co-responsible** of: FNS (Fond National Suisse) project *Techniques hybrides et adaptives pour la simulation complexe*, with P. Leyland, EPFL Lausanne.
- 01/01-12/02 Participation to: Project MCB: *Multiscale Computing in Biofluidynamics* funded by Politecnico di Milano. Principal Investigator: Prof. A. Quarteroni.
- 01/00-09/00 **Co-responsible** of the CTI (Commission Technologie et Industrie) project *ChronoDial* on the development of a mathematical model of biochemical exchanges in peritoneal dialysis. Principal Investigator: Prof. A. Quarteroni.
- 09/01-03/03 Participation to: CNR Progetto Agenzia 2000. *Modelling Fluid Structure Interaction in the arterial System*. Coordinator: Prof. A. Quarteroni.
- 01/02-12/05 Participant and **local coordinator** of E.U. HPRNCT-2002-002670 *HaeMOdel: Modelling the Cardiovascular System*. P.I.: Prof. A. Quarteroni. The project involved 6 European University and was coordinated by Politecnico di Milano.
- 01/03-12/04 Participation to: MURST Cofin 2003 *Numerical simulation of the cardiovascular system and Error estimation and mesh adaptivity for finite elements*. Coordinated by Prof. Quarteroni.
- 01/04-12/05 Participation to: MURST Cofin 2004 *Multiscale models and methods*. Coordinated by Prof. F. Brezzi, CNR-IMATI, Pavia, Italy.
- 06/04-05/05 Participation to: INDAM (Italian Institute for High Mathematics) project *Integrazione di sistemi complessi in biomedicina: modelli, rappresentazioni, simulazioni..* Coordinator: Alfio Quarteroni.
- 02/06-01/08 Participation to: MIUR PRIN05 project *Numerical models in fluid dynamics with application to the cardiovascular system and to the environment*. Coordinator: A. Quarteroni.
- 03/04-02/06 Participation to: *Interazione Fluido Struttura: comportamento aeroelastico con metodologie sperimentali e numeriche*, financed by Politecnico di Milano. Coordinator: Prof. G. Diana.
- 03/05-02/07 **Co-responsible** of: *Modellistica Matematica di Materiali Microstrutturati per Dispositivi a Rilascio di Farmaco*, project financed by Fondazione Cariplo, Italy. Participants: MOX, LaBS (Politecnico di Milano), Department of Chemistry (University of Bologna). P.I.: Prof. A. Quarteroni.
- 10/08-9/10 Participation to: MIUR PRIN07. *Mathematical and numerical modelling for cardiovascular and fluid dynamics applications*. Coordinator: Alfio Quarteroni.
- 06/06-05/11 Participation to: *Nanobiotechnology models and methods for local drug delivery from nano/micro structured materials*. Project financed by the Italian Institute of Technology (IIT). Coordinator: Alfio Quarteroni.
- 01/09-12/13 **Coordination of the Politecnico unit** of *MathCard* ERC advanced grant. Grantee: Prof. A. Quarteroni.

- 10/11-10/12 Participation to MIUR PRIN09. *Numerical methods for scientific computing and advanced applications*. P.I.: Alfio Quarteroni.
- 03/14-03/17 **Coordination (P.I.)** of MIUR PRIN12. *Mathematical and numerical modelling of the cardiovascular system and clinical applications*.
- 2016 **Coordinator** of the IHP Trimester on Numerical Methods for PDEs, Institute Henry Poincaré, Paris, France, 5 September-16 Decembre 2016. With D. di Pietro and A. Ern. Financed by Institute Henry Poincaré and CNRS France.
- 02/17-02/18 **Principal Investigator** of INdAM-GNCS project “Modellazione numerica di fenomeni idro/geomeccanici per la simulazione di eventi sismici”
- 2018- **Responsible** of Work Package n.5: Data analysis and mathematical tools for environmental risk assessment for a research project between Agenzia Spaziale Italiana and Politecnico di Milano.

Financed by Industries

- 2004-05 **Scientific Coordinator**, with S. Micheletti of the project *Glow1D* and *Glow2D*. Financed by Federal Mogul Inc. Subject: numerical models for the simulation of a diesel engine glow plug. Development of an original finite element code for the related electro-thermal interaction problem.
- 2005-07 Participation to *Steam2D*. Project financed by Eni S.p.A. on the mathematical and numerical modelling of sedimentary basins. Coordinators: Alfio Quarteroni and Fausto Saleri.
- 2007-09 **Scientific Coordinator**, with A. Quarteroni, of *Steam3D* and *Pmod+*, two research projects financed by Eni S.p.A. on the mathematical and numerical modelling of sedimentary basins and oil generation and primary migration. Development of original numerical methods and software.
- 2003-08 **Scientific Coordinator** of the projects *Kime* and *Rowing*. Financed by Filippi Lido S.r.L. Subject: Development of a dynamics model competition rowing boats.
- 2008-10 **Scientific Coordinator**, with Piercesare Secchi, of the project *Microseepage*. Financed by Eni S.p.A. Responsible of the work package: models of transport of hydrocarbons in sands.
- 2008-10 **Scientific Coordinator**, with Stefano Micheletti, of the project *Eni-Imaging*, financed by Eni S.p.A. Subject: novel numerical methods to support seismic imaging.
- 2008-10 **Scientific Coordinator**, with G. Arioli, of the project *RUM*, financed by Altran Italia. Subject: Development of tools for the management of uncertainties in the design of oil pipes.
- 2009-11 **Scientific Coordinator**, with N. Parolini, of the MOX research activity within the project EnergIT, financed by Regione Lombardia, Italy, on the development of green data centers.
- 2013-2014 **Scientific Coordinator** of a research project in collaboration with Nolan group SpA on the development of numerical tools for bettering the comfort of a motorcycle helmet, crash analysis and vibro-acoustics.
- 2013-2015 **Scientific Coordinator** of the project KAFRES upscaling on the development of upscaling techniques for fractured reservoirs. Financed by Eni spa.

2013-2014	Scientific Coordinator of the project SIMBA-GE on the development and implementation on GPUs of numerical techniques for the simulation of oil generation and expulsion in source rocks. Financed by Eni spa.
2014	Scientific Coordinator of the project KAFRES gridding on the development of mesh generation techniques for fractured reservoirs. Financed by Eni spa.
2014-2015	Scientific Coordinator of the project GEOMECH on fault reactivation and induced seismicity. Financed by Eni spa.
2017-	Participation consultancy contracts between Politecnico di Milano and MOX-OFF S.p.A.

MAIN PUBLICATIONS

REFEREED JOURNALS

- [1] Paola F. Antonietti, Jacopo De Ponti, Luca Formaggia, and Anna Scotti. Preconditioning techniques for the numerical solution of flow in fractured porous media. *Journal of Scientific Computing*, 86(1):1–32, 2021.
- [2] D. Cerroni, L. Formaggia, and A. Scotti. A control problem approach to Coulomb’s friction. *Journal of Computational and Applied Mathematics*, 385:113196, 2020.
- [3] Ludovica Delpopolo Carciopolo, Luca Formaggia, Anna Scotti, and Hadi Hajibeygi. Conservative multirate multiscale simulation of multiphase flow in heterogeneous porous media. *Journal of Computational Physics*, 404(109134), mar 2020.
- [4] F. Chave, D. A. Di Pietro, and L. Formaggia. A Hybrid High-Order method for passive transport in fractured porous media. *GEM - International Journal on Geomathematics*, 10(12):1–12, 2019.
- [5] S. Zonca, C. Vergara, and L. Formaggia. An unfitted formulation for the interaction of an incompressible fluid with a thick structure via an xfem/dg approach. *SIAM J. Sc. Comp.*, 40(1):B59–B84, 2018.
- [6] Mikel Landajuela, Christian Vergara, Antonello Gerbi, Luca Dedé, Luca Formaggia, and Alfio Quarteroni. Numerical approximation of the electromechanical coupling in the left ventricle with inclusion of the purkinje network. *International journal for numerical methods in biomedical engineering*, 34(7):1–24, 2018.
- [7] Luca Formaggia, Christian Vergara, and Stefano Zonca. Unfitted extended finite elements for composite grids. *Computers & Mathematics with Applications*, 76(4):893–904, 2018.
- [8] L. Formaggia, A. Scotti, and F. Sottocasa. Analysis of a mimetic finite difference approximation of flows in fractured porous media. *ESAIM: Mathematical Modelling and Numerical Analysis*, 52(2):595–630, 2018.
- [9] L. Delpopolo Carciopolo, L. Bonaventura, A. Scotti, and L. Formaggia. A conservative implicit multirate method for hyperbolic problems. *Computational Geosciences*, pages 1–18, 2018.
- [10] Florent Chave, Daniele A. Di Pietro, and Luca Formaggia. A Hybrid High-Order method for Darcy flows in fractured porous media. *SIAM Journal on Scientific Computing*, 40(2):A1063–A1094, 2018.

- [11] Christian Vergara, Davide Le Van, Maurizio Quadrio, Luca Formaggia, and Maurizio Domanin. Large eddy simulations of blood dynamics in abdominal aortic aneurysms. *Medical Engineering & Physics*, 47:38–46, 2017.
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