SIMONA PEROTTO

Associate Professor in Numerical Analysis
MOX - Modeling and Scientific Computing
Department of Mathemati
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EDUCATION

1995: **Master Degree** in Mathematics, Università degli Studi di Torino, summa cum laude; advisor : Prof. C. Dagnino.

1999: **Ph.D.** in Computational Mathematics and Operations Research, Università degli Studi di Milano; advisor: Prof. A. Quarteroni.

POSITIONS HELD

– 01/11/1998 – 31/10/2000: **Post-Doc** grant in Scientific Computing and Mathematical Modeling, Department of Mathematics, EPFL, Lausanne, Switzerland.

– 01/11/2000 – 31/08/2001: **Post-Doc** grant on "Interdisciplinary Parallel Adaptive CFD Solvers", Department of Mathematics, Politecnico di Milano, Italy.

– 01/09/2001 – 15/12/2010: **Assistant Professor** in Numerical Analysis, Department of Mathematics, Politecnico di Milano, Italy.

– 16/12/2010 – present: **Associate Professor** in Numerical Analysis, Department of Mathematics, Politecnico di Milano, Italy.

– August 2017 – present: National **Scientific Habilitation to Full Professorship** (Abilitazione Scientifica Nazionale per Professore di Prima Fascia) in Numerical Analysis.

– February 2017 – present: member of the **Management Committee** of the Interdepartmental Laboratory MetaMAT-Lab (Metamaterial Laboratory), Politecnico di Milano, Italy.

– May 2019 – present: member of the **Steering Committee** of the Master in Mathematical and Physical Methods for Space Sciences, Università degli Studi di Torino, Italy.

– April 2021 – present: member of the **Steering Committee** of the Master in Mathematical and Physical Methods for Aviation Sciences, Università degli Studi di Torino, Italy.

– 21 April 2021 – present: **co-founder** and **shareholder of ADAPTA studio** s.r.l, a spin-off of Politecnico di Milano, Italy.

– May 2021 – present: **president of ADAPTA studio** s.r.l, a spin-off of Politecnico di Milano, Italy.

- December 2021 – present: **delegate** of the Department of Mathematics in the **Management Committee** of **GEOLab**, Politecnico di Milano.

AWARDS

– 2007: **prize** Young Researchers, Department of Mathematics, Politecnico di Milano.
– 2014: the **poster** "*HiMOD and HiPOD Methods for Solving Direct and Inverse Problems in Internal Fluid Dynamics*", by M. Aletti, A. Barone, S. Guzzetti, M. Lupo Pasini, S. Perotto, A. Veneziani, has been awarded at the International CAE Conference 2014, 27-28 October, Pacengo del Garda, Italy.
– 2014: the **paper** "*Coupled model and grid adaptivity in hierarchical reduction of elliptic problems*", by S. Perotto, A. Veneziani, J. Sci. Comput., **60** (2014), no. 3, 505-536 has been listed among the most notable papers 2014 for the class of Mathematics of Computing (out of 6 papers) by the Association of Machine Computing.
– 2015: the **poster** "*High Performing Free-Form Design and Material Optimization for Additive Layer Manufacturing*", by A.N. Albini, S. Micheletti, S. Perotto, L. Soli, D.A. Tobia, has been awarded at the International CAE Conference 2015, 19-20 October, Pacengo del Garda, Italy.
– 11/12/2019: **prize** Switch2Product, Innovation Challenge, XI Edition, Politecnico di Milano, Deloitte, PoliHub.
– 03/12/2019 – 09/06/2020: **acceleration program** Switch2Product, Innovation Challenge, PoliHub, Innovation District & Startup Accelerator.
– 03/12/2020: **participation medal** to 2020 Compute and Storage Technology Online Workshop, Huawei Tel Aviv Research Center.

TEACHING

Teaching Experience (most recent/relevant courses)
– *Calcolo Numerico ed Elementi di Analisi* (10CFU), Aerospace Engineering, Politecnico di Milano (2001-2013).
– **Continuing Education Courses** on "*Finite Element Method and its Applications*" (2003, 2004, 2006, 2007), and on "*Grid Generation and Adaptivity*" (2005, 2008), MOX, Department of Mathematics, Politecnico di Milano.
– **ATHENS Course** on "*Introduction to Finite Elements and Applications*", MOX, Department of Mathematics, Politecnico di Milano, November 18-22, 2013 (**joint program with TU Delft**).
– "*Recent Challenges in Numerical Analysis*", Ph.D. School in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (2013, 2014).
– "*Advanced Numerical Methods in Scientific Computing*", Ph.D. School in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (2015, 2016).
– *Numerical Analysis for Partial Differential Equations* (10CFU), Mathematical Engineering, Politecnico di Milano (2014-2017).
– ***Numerical Analysis* (MATH 315), Emory University, Atlanta (GA) USA (spring 2018).**
– *Numerical Analysis* (6CFU), Civil Engineering, Politecnico di Milano (2018).
– *Metodi Numerici e Analitici per l'Ingegneria* (5CFU-parte numerica), Energy Engineering, Politecnico di Milano (2019,2020).
– *Numerical Analysis* (5CFU), Computer Science, Telecommunications, Automation, Electronic, Sound and Acoustics Engineering, Politecnico di Milano (since 2013).
– *Metodi Numerici e Analitici per l'Ingegneria* (9CFU), Mechanical Engineering, Politecnico di Milano (since 2020).
– Course on *"Numerical Methods for Engineering Modeling"*, **Master in Mathematical and Physical Methods for Aviation Sciences**, Università degli Studi di Torino, January 17-21, 2022.

PROJECTS AND GRANTS

Academic Projects[1] and Research Grants

Principal Investigator
1. Grant FARB (Fondo di Ateneo per la Ricerca di Base) of Politecnico di Milano: *Ottimizzazione Topologica Guidata da Adattazione di Griglia*.
(1 November, 2015 – 31 October, 2018, **66.606 €**).
2. GNCS 2018: *Tecniche di Riduzione di Modello per le Applicazioni Mediche*.
(12 months, **3.500 €**).
3. Project AMAZING, Pre-Seed Investment by 360 Capital Partners.
(1 April 2020 – 31 March 2021, **140.000 €**).
4. GNCS 2020: *Tecniche Numeriche Avanzate per Applicazioni Industriali*.
(12 months, **2.400 €**).
5. Project ADAPTA studio, Seed Investment by 360 Capital Partners.
(21 April 2021, **500.000 €**).

Co-Principal Investigator/Supervisor
1. IndAM Project 2004: *Numerical Methods for Unsteady Multiscale Problems Differential*.
Role: coordinator of Politecnico di Milano' unit (12 months).
2. FIRB 2008: *Advanced Statistical and Numerical Methods for the Analysis of High Dimensional Functional Data in Life Sciences and Engineering*.
Role: Co-P.I.; P.I.: Prof. L.M. Sangalli (1 December, 2010 – 1 August, 2014, **327.000 €**).
3. NSF Project, DMS 1419060: *Hierarchical Model Reduction Techniques for Incompressible Fluid-Dynamics and Fluid-Structure Interaction Problems*.
Role: Co-P.I.; P.I.: Prof. A. Veneziani (1 July, 2014 – 30 June, 2018, **248.384 $**).
4. POLIMI International Fellowship 2015: *Ill-Posed Inverse Problems and Applications*.
Role: Co-P.I.; P.I.: Prof. E. Beretta (1 November 2015 – 31 October 2017, **70.000 €**).
5. H2020-MSCA-RISE-2019: *Project ARIA (Accurate Roms for Industrial Applications)*.
Role: coordinator of Politecnico di Milano' unit; P.I.: Prof. A. Iollo (1 December 2019 – 30 November 2023, **46.000 €**).

Participant
1. PRIN 2003: *Numerical Models for Advanced Applications in Fluid Mechanics and Electro Dynamics*.
P.I.: Prof. A. Quarteroni (24 months).
2. PRIN 2004: *Numerical and Modeling Adaptivity for Partial Differential*.
P.I.: Prof. F. Brezzi (24 months).
3. PRIN 2006: *Numerical Approximation of Multiscale and Multi-Physics Problems with Adaptive Techniques*.
P.I.: Prof. F. Brezzi (24 months).
4. PRIN 2008: *Adaptive and Non-Conformal Techniques for the Numerical Approximation of Multi-Physics Problems*.
P.I.: Prof. F. Brezzi (22 March, 2010 – 22 September, 2012).
5. PRIN 2010-2011: *Innovative Methods for Water Resources Management under Hydro-Climatic Uncertainty Scenarios*.
P.I.: Prof. A. Bellin (1 February, 2013 – 1 February, 2016).
6. Vinci 2014: *Metodi Numerici Misti di Ordine Arbitrario per la Simulazione di Flussi in Mezzi Porosi Fratturati*.
P.I.: Prof. L. Formaggia (36 months).

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1 PRIN, INdAM and GNCS projects are awarded by the Italian Ministry of University and Research.

7. GNCS 2016: *Tecniche di Riduzione della Complessità Computazionale per le Scienze Applicate.*
P.I.: Prof. G. Rozza (12 months).
8. GNCS 2017: *Metodi Numerici Avanzati Combinati con Tecniche di Riduzione Computazionale per PDEs Parametrizzate ed Applicazioni.*
P.I.: Prof. G. Rozza (12 months).
9. GNCS 2019: *Advanced Intrusive and Non-Intrusive Model Order Reduction Techniques and Applications.*
P.I.: Prof. G. Rozza (12 months).
10. Spanish Ministry for Science and Innovation (PID2020-113463RB-C32): *Machine Learning Simulation-Based Computational Engineering.*
P.I.: Prof. A. Huerta, S. Zlotnik (September, 2021 – August, 2024).
11. PRIN 2020: *Advanced Polyhedral Discretisations of Heterogeneous PDEs for Multiphysics Problems.*
P.I.: Prof. P.F. Antonietti (March, 2022 – February, 2025).
12. GNCS 2022: *Metodi di Riduzione Computazionale per le Scienze Applicate: Focus su Sistemi Complessip.*
P.I.: Prof. G. Rozza (12 months).

Industrial or Extra-Academic Projects and Grants

<u>**Principal Investigator**</u>
1. *Studio, Design, Ottimizzazione Topologica ALM di Applicazione Spaziale con Metodi Matematici Innovativi Basati su Adattazione Anisotropa di Mesh.* In collaboration with Thales Alenia Space Italia S.p.A.
(30 August – 31 December, 2016, **4.000 €**).
2. *Tutela e Valorizzazione della Proprietà Intellettuale nell'Ambito del Piano Industria 4.0. Algoritmi Matematici, Software e Sistemi di Progettazione Assistita al Calcolatore.* Grant funded by the Technology Transfer Office of Politecnico di Milano.
(1 April 2019 – 31 March 2020, **23.788 €**).

<u>**Participant**</u>
1. *Modeling of the Dynamic Evolution of a Sedimentary Basin and of the Primary Migration of Hydrocarbons in the Mother Rock.* In collaboration with ENI S.p.A.
P.I.: Prof. A. Quarteroni (28 August, 2007 – 31 December, 2009).
2. *Numerical Modeling of Geological Processes.* In collaboration with ENI S.p.A.
P.I.: Prof. A. Quarteroni, L. Formaggia (19 December, 2008 – 18 December, 2011).
3. *Development of Innovative Techniques for the Depth Imaging with RTM.* In collaboration with ENI S.p.A.
P.I.: Prof. A. Quarteroni, L. Formaggia (1 June, 2008 – 31 May, 2011).
4. Accordo Attuativo n. 2018-5-HH.0 ASI – POLIMI *"Attività di Ricerca e Innovazione".*
(2018 – 2033).

PATENTS

1. *Metodo implementato mediante computer per la rimappatura di una texture di un oggetto grafico tridimensionale.*
Italian patent application n. 102021000018920 (priority date: July 16, 2021).
Inventors: Leonardo Locatelli, Simona Perotto, Francesco Clerici.
Assignee: Politecnico di Milano.
2. *Metodo implementato mediante computer per la semplificazione di una mesh di un oggetto grafico tridimensionale.*
Italian patent application n. 102022000001328 (priority date: January 26, 2022).
Inventors: Simona Perotto, Leonardo Locatelli, Matteo Carbonara, Francesco Clerici.
Assignee: Politecnico di Milano.

RESEARCH

Topics of interest and main scientific collaborations
- anisotropic **mesh adaptation**:
    – P. Africa, C. De Falco, N. Ferro, L. Formaggia, S. Micheletti (Politecnico di Milano);
    – G. Alaimo, M. Carraturo, S. Marconi (Università degli Studi di Pavia);
    – S. Beretta, S. Foletti, M. Gavazzoni (Politecnico di Milano);
    – A. Cangiani (University of Nottingham);
    – C. Ciancarelli, L. Soli (Thales Alenia Space Italia, Gorgonzola - Roma);
    – F. Clerici (Inria Saclay Île-De-France);
    – M. Giacomini (CIMNE, Universitat Politècnica de Catalunya, Barcelona);
    – M. Lupo Pasini (Oak Ridge National Laboratory);
    – A. Mauri (Micron Technology);
    – C. Nardoni (Institut de Recherche Technologique SystemX);
    – E. Negrello (Policlinico San Matteo di Pavia);
    – T. Villa (Politecnico di Milano).
- **model reduction** and model adaptation:
    – F. Ballarin, G. Rozza (SISSA, Trieste);
    – M.G. Carlino, A. Iollo (University of Bordeaux, Inria Bordeaux Sud-Ouest);
    – M. Lupo Pasini (Oak Ridge National Laboratory);
    – K. Calò, D. Gallo, V. Mazzi, U. Morbiducci (Politecnico di Torino);
    – P. Zunino (Politecnico di Milano).
- advanced numerical methods and mathematical models for **smart farming**:
    – L. Bascetta, M. Matteucci (Politecnico di Milano);
    – C. Ciancarelli, L. Soli (Thales Alenia Space Italia, Gorgonzola - Roma);
    – N. Ferro (Politecnico di Milano).
- advanced techniques for the design of innovative **cellular materials**:
    – D. Bianchi, R. Ferrante, M. Mannisi (Medere S.r.l, Roma);
    – D. Carbonaro, C. Ciastra, D. Gallo, U. Morbiducci (Politecnico di Torino);
    – N. Ferro (Politecnico di Milano);
    – S. Foletti, M. Gavazzoni (Politecnico di Milano);
    – M. Matteucci (Politecnico di Milano);
    – F. Mezzadri (Università degli Studi di Modena e Reggio Emilia).
- modeling of **free-surface flows** and of solute **transport in porous media**:
    – G. Conni (KU Leuven);
    – M. Icardi (University of Nottingham);
    – G.M. Porta (Politecnico di Milano);
    – S. Piccardo (CERMICS, Paris - LaCàN Universitat Politècnica de Catalunya, Barcelona).
- statistical-numerical analysis of **high dimensional functional data**:
    – L. Sangalli (Politecnico di Milano).
- **compressed sensing**:
    – S. Brugiapaglia (Concordia University, Montréal);
    – S. Micheletti (Politecnico di Milano);
    – F. Nobile (EPFL, Lausanne).
- **Bayesian computing**:
    – D. Calvetti, E. Somersalo, A. Bocchinfuso (Case Western Reserve University, Cleveland).

Visiting periods
- Muenster University, Germany (3 – 5 November, 2009).
- Emory University, Atlanta, USA (14 – 23 February, 2012).
- CEMEF/Ecole des Mines de Paris, Sophia Antipolis, France (20 – 22 September, 2014).
- EPFL, Lausanne, Switzerland (6 – 7 November, 2014).
- WIAS, Berlin, Germany (2 –5 March, 2015).
- Emory University, Atlanta, USA (20 – 30 November, 2015).
- BCAM, Bilbao, Spain **(**22 – 25 February, 2016).
- Ecole Centrale de Nantes, France (2 – 3 March, 2016).
- Emory University, Atlanta, USA (29 April – 6 May, 2016).
- Emory University, Atlanta, USA (24 November – 9 December, 2016).
- UPC, Barcelona, Spain (8 – 9 February, 2017).
- Emory University, Atlanta, USA (20 February – 3 March, 2017).
- SISSA, Trieste, Italy (19 – 21 July, 2017).
- Emory University, Atlanta, USA (31 August – 12 September, 2017).
- Emory University, Atlanta, USA (15 January – 10 May, 2018).
- Virginia Tech, Blacksburg, USA (4 – 6 November, 2019).
- Case Western Reserve University, Cleveland, USA (7 – 9 November, 2019).

PUBLICATIONS

Peer-Reviewed Journals
1. C. Dagnino, S. Perotto, E. Santi. Convergence of rules based on nodal splines for the numerical evaluation of certain 2D Cauchy principal value integrals. *J. Comput. Appl. Math.*, **89** (1998), no.2, 225-235.
2. M. Grasselli, S. Perotto, F. Saleri. Space-time finite elements for Boussinesq equations. *East-West J. Numer. Math.*, **7** (1999), no.4, 283-306.
3. S. Perotto, F. Saleri. Adaptive finite element methods for Boussinesq equations. *Numer. Methods Partial Differential Equations*, **16** (2000), no.2, 214-236.
4. L. Formaggia, S. Perotto. New anisotropic a priori error estimates. *Numer. Math.*, **89** (2001), 641-667.
5. L. Formaggia, S. Perotto, P. Zunino. An anisotropic a-posteriori error estimate for a convection-diffusion problem. *Comput. Visual. Sci.*, **4** (2001), no.2, 99-104.
6. L. Formaggia, S. Perotto. Anisotropic error estimates for elliptic problems. *Numer. Math.*, **94** (2003), 67-92.
7. S. Micheletti, S. Perotto, M. Picasso. Stabilized finite elements on anisotropic meshes: a priori error estimates for the advection-diffusion and the Stokes problems. *SIAM J. Numer. Anal.*, **41** (2003), no.3, 1131-1162.
8. L. Formaggia, S. Micheletti, S. Perotto. Anisotropic mesh adaptation in Computational Fluid Dynamics: application to the advection-diffusion-reaction and the Stokes problems. *Appl. Numer. Math.*, **51** (2004), no.4, 511-533.
9. S. Perotto. Anisotropic mesh adaption: application to Computational Fluid Dynamics. *Bollettino dell'Unione Matematica Italiana, Sezione B-Articoli di Ricerca Matematica*, **8-B** (2005), 145-165, Zanichelli Editore S.p.A.
10. E. Miglio, S. Perotto, F. Saleri. Model coupling techniques for free-surface flow problems. Part I. *Nonlinear Anal.*, **63** (2005), no.5-7, 1885-1896.
11. E. Miglio, S. Perotto, F. Saleri. Model coupling techniques for free-surface flow problems. Part II. *Nonlinear Anal.*, **63** (2005), no.5-7, 1897-1908.
12. S. Micheletti, S. Perotto. Reliability and efficiency of an anisotropic Zienkiewicz-Zhu error estimator. *Comput. Methods Appl. Mech. Engrg.*, **195** (2006), no.9-12, 799-835.
13. C.L. Bottasso, G. Maisano, S. Micheletti, S. Perotto. On some new recovery based a posteriori error estimators. *Comput. Methods Appl. Mech. Engrg.*, **195** (2006), no.37-40, 4794-4815.
14. S. Perotto. Adaptive modeling for free-surface flows. *M2AN Math. Model. Numer. Anal.*, **40** (2006), no.3, 469-499.
15. S. Micheletti, S. Perotto, M. Verani. Uzawa-based adaptive methods for linear output functionals. *IMA J.*

Numer. Anal., **28** (2008), no.3, 619-646.

16. L. Dedè, S. Micheletti, S. Perotto. Anisotropic error control for environmental applications. *Appl. Numer. Math.*, **58** (2008), no.9, 1320-1339.

17. S. Micheletti, S. Perotto. Output functional control for nonlinear equations driven by anisotropic mesh adaption. The Navier-Stokes equations. *SIAM J. Sci. Comput.*, **30** (2008), no.6, 2817-2854.

18. S. Micheletti, S. Perotto. Anisotropic mesh adaption for time-dependent problems. *Internat. J. Numer. Methods Fluids*, **58** (2008), 1009-1015.

19. S. Micheletti, S. Perotto. Space-time adaptation for purely diffusive problems in an anisotropic framework. *Int. J. Numer. Anal. Model.*, **7** (2010), no.1, 125-155.

20. S. Perotto, A. Ern, A. Veneziani. Hierarchical local model reduction for elliptic problems: a domain decomposition approach. *Multiscale Model. Simul.*, **8** (2010), no.4, 1102-1127.

21. P.E. Farrell, S. Micheletti, S. Perotto. A recovery-based error estimator for anisotropic mesh adaptation in CFD. *Bol. Soc. Esp. Mat. Apl.*, **50** (2010), 115-138.

22. P.E. Farrell, S. Micheletti, S. Perotto. An anisotropic Zienkiewicz-Zhu type error estimator for 3D applications. *Int. J. Numer. Methods Engng*, **85** (2011), 671-692.

23. M. Lefebvre, S. Perotto. A semi-Markov process with an inverse Gaussian distribution as sojourn time. *Appl. Math. Model.*, **35** (2011), 4603-4610.

24. S. Micheletti, S. Perotto. The effect of anisotropic mesh adaptation on PDE-constrained optimal control problems. *SIAM J. Control. Optim.*, **49** (2011), no.4, 1793-1828.

25. G.M. Porta, S. Perotto, F. Ballio. Anisotropic mesh adaptation driven by a recovery based error estimator for shallow water flow modeling. *Internat. J. Numer. Methods Fluids,* **70** (2012), no.3, 269-299.

26. G.M. Porta, S. Perotto, F. Ballio. A space-time adaptation scheme for unsteady shallow water problems. *Math. Comput. Simulation,* **82** (2012), 2929-2950.

27. S. Micheletti, S. Perotto, F. David. Model adaptation enriched with an anisotropic mesh spacing for nonlinear equations: application to environmental and CFD problems. *Numer. Math. Theor. Meth. Appl.*, **6** (2013), no. 3, 447-478.

28. S. Perotto, A. Veneziani. Coupled model and grid adaptivity in hierarchical reduction of elliptic problems. *J. Sci. Comput.*, **60** (2014), no. 3, 505-536.

29. F. Dassi, S. Perotto, L. Formaggia, P. Ruffo. Efficient geometric reconstruction of complex geological structures. *Math. Comput. Simulation,* **106** (2014), 163-184.

30. T. Taddei, S. Perotto, A. Quarteroni. Reduced basis techniques for nonlinear conservation laws. *M2AN Math. Model. Numer. Anal.,* **49** (2015), no. 3, 787-814.

31. F. Dassi, B. Ettinger, S. Perotto, L.M. Sangalli. A mesh simplification strategy for a spatial regression analysis over the cortical surface of the brain. *Appl. Numer. Math.*, **90** (2015), 111-131.

32. B. Esfandiar, G.M. Porta, S. Perotto, A. Guadagnini. Impact of space-time mesh adaptation on solute transport modeling in porous media. *Water Resour. Res.,* **51** (2015), no. 2, 1315-1332.

33. M. Artina, M. Fornasier, S. Micheletti, S. Perotto. Anisotropic mesh adaptation for crack detection in brittle materials. *SIAM J. Sci. Comput.,* **37** (2015), no. 4, B633-B659.

34. S. Brugiapaglia, S. Micheletti, S. Perotto. Compressed solving: a numerical approximation technique for elliptic PDEs based on compressed sensing. *Comput. Math. Appl.,* **70** (2015), 1306-1335.

35. F. Dassi, S. Perotto, L. Formaggia. A priori anisotropic mesh adaptation on implicitly defined surfaces. *SIAM J. Sci. Comput.,* **37** (2015), no. 6, A2758-A2782.

36. S. Perotto, A. Zilio. Space-time adaptive hierarchical model reduction for parabolic equations. *Adv. Model. and Simul. in Eng. Sci.,* **2:25** (2015).

37. B. Ettinger, S. Perotto, L.M. Sangalli. Spatial regression models over two-dimensional manifolds. *Biometrika,* **103** (2016), no. 1, 71-88.

38. S. Perotto, A. Reali, P. Rusconi, A. Veneziani. HIGAMod: a Hierarchical IsoGeometric Approach for MODel reduction in curved pipes. *Comput. & Fluids*, **142** (2017), 21-29.

39. M. Signorini, S. Micheletti, S. Perotto. CMFWI: Coupled Multiscenario Full Waveform. *Inverse Probl. Sci. Eng.,* **25** (2017), no. 7, 939-964.

40. F. Dassi, S. Perotto, H. Si, T. Streckenbach. A priori anisotropic mesh adaptation driven by a higher

dimensional embedding. *Comput.-Aided Des*, **85** (2017), 111-122.

41. A. Crivellaro, S. Perotto, S. Zonca. Reconstruction of 3D scattered data via radial basis functions by efficient and robust techniques. *Appl. Numer. Math.*, **113** (2017), 93-108.

42. S. Brugiapaglia, F. Nobile, S. Micheletti, S. Perotto. A theoretical study of compressed solving for advection-diffusion-reaction problems. *Math. Comp.,* **87** (2018), no. 309, 1-38.

43. C.B. Rizzo, F.P.J. de Barros, S. Perotto, L. Oldani, A. Guadagnini. Adaptive POD model reduction for solute transport in heterogeneous porous media. *Comput. Geosci.*, **22** (2018), no. 1, 297-308.

44. S. Micheletti, S. Perotto, M. Signorini. Anisotropic mesh adaptation for the generalized Ambrosio-Tortorelli functional with application to brittle fracture. *Comput. Math. Appl.*, **75** (2018), 2134-2152.

45. E. Beretta, S. Micheletti, S. Perotto, M. Santacesaria. Reconstruction of a piecewise constant conductivity on a polygonal partition via shape optimization in EIT. *J. Comput. Phys.*, **353** (2018), 264-280.

46. S. Guzzetti, S. Perotto, A. Veneziani. Hierarchical model reduction for incompressible fluids in pipes. *Internat. J. Numer. Methods Engrg.,* **114** (2018), no. 5, 469-500.

47. M. Aletti, S. Perotto, A. Veneziani. HiMod reduction of advection-diffusion-reaction problems with general boundary conditions. *J. Sci. Comput.,* **76** (2018), no. 1, 89-119.

48. N. Ferro, S. Micheletti, S. Perotto. Anisotropic mesh adaptation for crack propagation induced by a thermal shock in 2D. *Comput. Methods Appl. Mech. Engrg.*, **331** (2018), 138-158.

49. V. Bacchelli, S. Micheletti, S. Perotto, D. Pierotti. Parameter identification for the linear wave equation with Robin boundary condition. *J. Inverse Ill-Posed Probl.,* **27** (2019), no. 1, 25-41.

50. F. Ballarin, A. D'Amario, S. Perotto, G. Rozza. A POD-selective inverse distance weighting method for fast parametrized shape morphing. *Internat. J. Numer. Methods Engrg.,* **117** (2019), no. 8, 860-884.

51. N. Ferro, S. Micheletti, S. Perotto. POD-assisted strategies for structural topology optimization. *Comput. Math. Appl.,* **77** (2019), no. 10, 2804-2820.

52. S. Micheletti, S. Perotto, L. Soli. Topology optimization driven by anisotropic mesh adaptation: towards a free-form design. *Comput. & Structures,* **214** (2019), 60-72.

53. A.S. Chiappa, S. Micheletti, R. Peli, S. Perotto. Mesh adaptation-aided image segmentation. *Commun. Nonlinear Sci. Numer. Simulat.* **74** (2019), 147-166.

54. Y.A. Brandes Costa Barbosa, S. Perotto. Hierarchically reduced models for the Stokes problem in patient-specific artery segments. *Int. J. Comput. Fluid Dyn.* **34** (2020), no. 2, 160-171.

55. N. Ferro, S. Micheletti, S. Perotto. Compliance–stress constrained mass minimization for topology optimization on anisotropic meshes. *SN Applied Sciences* **2**: 1196 (2020).

56. N. Ferro, S. Micheletti, S. Perotto. An optimization algorithm for automatic structural design. *Comput. Methods Appl. Mech. Engrg.* **372** (2020), 113335.

57. A. Barone, M.G. Carlino, A. Gizzi, S. Perotto, A. Veneziani. Efficient estimation of cardiac conductivities: a Proper Generalized Decomposition approach. *J. Comput. Phys.* **423** (2020), 109810.

58. D. Calvetti, A. Cosmo, S. Perotto, E. Somersalo. Bayesian mesh adaptation for estimating distributed parameters. *SIAM J. Sci. Comput.* **42** (2020), no. 6, A3878-A3906.

59. F. Clerici, N. Ferro, S. Marconi, S. Micheletti, E. Negrello, S. Perotto. Anisotropic adapted meshes for image segmentation: application to 3D medical data. *SIAM J. Imaging Sci.* **13** (2020), no. 4, 2189-2212.

60. S. Almi, S. Belz, S. Micheletti, S. Perotto. A dimension-reduction model for brittle fractures on thin shells with mesh adaptivity. *Math. Models Methods Appl. Sci.* **31** (2021), no. 1, 37-81.

61. M. Zancanaro, F. Ballarin, S. Perotto, G. Rozza. Hierarchical model reduction techniques for flow modeling in a parametrized setting. *Multiscale Model. Simul.* **19** (2021), no. 1, 267-293.

62. S. Brugiapaglia, F. Nobile, S. Micheletti, S. Perotto. Wavelet-Fourier CORSING techniques for multi-dimensional advection-diffusion-reaction equations. *IMA J. Numer. Anal.* **41** (2021), 2744-2781.

63. M. Lupo Pasini, V. Gabbi, J. Yin, S. Perotto, N. Laanait. Scalable balanced training of conditional generative adversarial neural networks on image data. *J. Supercomput.* **77** (2021), no. 11, 13358-13384.

64. A. Pasquale, A. Ammar, A. Falcó, S. Perotto, E. Cueto, J.-L. Duval, F. Chinesta. A separated representation involving multiple time scales within the Proper Generalized Decomposition framework. *Adv. Model. and Simul. in Eng. Sci.,* **8**:26 (2021).

65. F. Dassi, J.M. Kroos, L. Gerardo-Giorda, S. Perotto. A denoising tool for the reconstruction of cortical

geometries from MRI. *Math. Comput. Simulation* **191** (2022), 14-32.

66. N. Ferro, S. Perotto, A. Cangiani. An anisotropic recovery-based error estimator for adaptive discontinuous Galerkin methods. *J. Sci. Comput.* **90**: 45 (2022).

67. M. Lupo Pasini, S. Perotto. Hierarchical model reduction driven by a Proper Orthogonal Decomposition for parametrized advection-diffusion-reaction problems. *Electron. Trans. Numer. Anal.* **55** (2022), 187-212.

68. G.G. Gentili, M. Khosronejad, G. Bernasconi, S. Perotto, S. Micheletti. Efficient modeling of multimode guided acoustic wave propagation in deformed pipelines by hierarchical model reduction. *Appl. Numer. Math.* **173** (2022), 329-344.

69. N. Ferro, S. Perotto, D. Bianchi, R. Ferrante, M. Mannisi. Design of cellular materials for multiscale topology optimization: application to patient-specific orthopedic devices. *Struct. Multidiscip. Optim.* **65**:79 (2022).

70. M. Gavazzoni, N. Ferro, S. Perotto, S. Foletti. Multi-physics inverse homogenization for the design of innovative cellular materials: application to thermo-elastic problems. *Math. Comput. Appl.* **27**:15 (2022).

71. F. Vaccaro, S. Brivio, S. Perotto, A.G. Mauri, S. Spiga. Physics-based compact modelling of the analog dynamics of HfOx resistive memories. In press on *Neuromorph. Comput. Eng.* (https://doi.org/10.1088/2634-4386/ac7327).

72. M. Giacomini, S. Perotto. Anisotropic mesh adaptation for region-based segmentation accounting for image spatial information. Accepted for the publication in *Comput. Math. Appl.* (2022).

Peer-Reviewed Journals (submitted)

1. L. Ponti, S. Perotto, L.M. Sangalli. PDE-regularized smoothing method for space-time data over manifolds with application to medical data. MOX Report no. **76/2021**, Dipartimento di Matematica, Politecnico di Milano.

2. M. Lupo Pasini, S. Perotto. Hierarchical model reduction driven by machine learning for parametric advection-diffusion-reaction problems in the presence of noisy data. MOX Report no. **19/2022**, Dipartimento di Matematica, Politecnico di Milano (**arXiv:2204.00538**).

3. S. Perotto, G. Bellini, F. Ballarin, K. Calò, V. Mazzi, U. Morbiducci. Isogeometric Hierarchical Model Reduction for advection-diffusion process simulation in microchannels. MOX Report no. **35/2022**, Dipartimento di Matematica, Politecnico di Milano (**arXiv:2205.08127**).

4. N. Ferro, S. Perotto, M. Gavazzoni. A new fluid-based strategy for the connection of non-matching lattice materials. MOX Report no. **39/2022**, Dipartimento di Matematica, Politecnico di Milano (**arXiv:2206.00994**).

5. F. Gatti, M. Fois, C. de Falco, S. Perotto, L. Formaggia. Parallel simulations for fast-moving landslides: space-time mesh adaptation and sharp tracking of the wetting front. MOX Report no. **42/2022**, Dipartimento di Matematica, Politecnico di Milano.

Peer-Reviewed Proceedings

1. C. Dagnino, S. Perotto, E. Santi. Product formulas based on spline approximation for the numerical evaluation of certain 2D CPV integrals. In *Approximation and Optimization*, Vol. **I**, Transilvania, Cluj-Napoca (1997), 241-250.

2. S. Micheletti, S. Perotto. An anisotropic recovery-based a posteriori error estimator. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Italia, F. Brezzi, A. Buffa, S. Corsaro, A. Murli Eds. (2003), 731-741.

3. E. Miglio, S. Perotto, F. Saleri. A multiphysics strategy for free surface flows. In *Domain Decomposition Methods in Science and Engineering*. Series: Lect. Notes Comput. Sci. Eng., Vol. **40**, Springer-Verlag Berlin Heidelberg, R. Kornhuber, R. Hoppe, J. Périaux, O. Pironneau, O. Widlund, J. Xu Eds. (2005), 395-402.

4. S. Micheletti, S. Perotto. Anisotropic mesh adaptivity in CFD. In *Adaptive Mesh Refinement-Theory and Applications*. Series: Lect. Notes Comput. Sci. Eng., Vol. **41**, Springer Berlin Heidelberg, T. Plewa, T. Linde, V.G. Weirs Eds. (2005), 171-182.

5. S. Micheletti, S. Perotto, F. Schiavo. Modelling heat exchangers by the finite element method with grid adaption in Modelica. In Proceedings of the 4th International Modelica Conference, Amburgo, March 7-8, 2005; G.Schmitz Ed. (2005), 219-228.

6. S. Micheletti, S. Perotto. Anisotropic mesh adaptivity via a dual-based a posteriori error estimation for

semiconductors. In *Scientific Computing in Electrical Engineering*. Series: Mathematics in Industry, Vol. **9**, Springer-Verlag Berlin Heidelberg, A.M. Anile, G. Alì, G. Mascali Eds. (2006), 369-375.

7. S. Micheletti, S. Perotto. Space-time adaption for advection-diffusion-reaction problems on anisotropic meshes. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Berlin Heidelberg, K. Kunisch, G. Of, O. Steinbach Eds. (2008), 49-56.

8. A. Ern, S. Perotto, A. Veneziani. Hierarchical model reduction for advection-diffusion-reaction problems. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Berlin Heidelberg, K. Kunisch, G. Of, O. Steinbach Eds. (2008), 703-710.

9. S. Micheletti, S. Perotto. Anisotropic adaptation via a Zienkiewicz-Zhu error estimator for 2D elliptic problems. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Berlin Heidelberg, G. Kreiss, P. Lotstedt, A. Malqvist, M. Neytcheva Eds. (2010), 645-653.

10. S. Micheletti, S. Perotto. Anisotropic recovery-based a posteriori error estimators for advection-diffusion-reaction problems. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag, Berlin Heidelberg, A. Cangiani, R.L. Davidchack, E. Georgoulis, A.N. Gorban, J. Levesley, M.V. Tretyakov Eds. (2013), 43-51.

11. S. Perotto, A. Zilio. Hierarchical model reduction: three different approaches. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Berlin Heidelberg, A. Cangiani, R.L. Davidchack, E. Georgoulis, A.N. Gorban, J. Levesley, M.V. Tretyakov Eds. (2013), 851-859.

12. L. Mauri, S. Perotto, A. Veneziani. Adaptive geometrical multiscale modeling for hydrodynamic problems. In *Numerical Mathematics and Advanced Applications*, Springer-Verlag Berlin Heidelberg, A. Cangiani, R.L. Davidchack, E. Georgoulis, A.N. Gorban, J. Levesley, M.V. Tretyakov Eds. (2013), 723-730.

13. S. Perotto. Hierarchical model (Hi-Mod) reduction in non-rectilinear domains. In *Domain Decomposition Methods in Science and Engineering*. Series: Lect. Notes Comput. Sci. Eng., Vol. **98**, Springer Cham, J. Erhel, M. Gander, L. Halpern, G. Pichot, T. Sassi, O. Widlund Eds. (2014), 477-485.

14. M. Artina, M. Fornasier, S. Micheletti, S. Perotto. Anisotropic adaptive meshes for brittle fractures: parameter sensitivity. In *Numerical Mathematics and Advanced Applications. Series: Lect. Notes Comput. Sci. Eng.,* Vol. **103**, Springer, A. Abdulle, S. Deparis, D. Kressner, F. Nobile, M. Picasso Eds. (2015), 293-302.

15. M. Aletti, A. Bortolossi, S. Perotto, A. Veneziani. One-dimensional surrogate models for advection-diffusion problems. In *Numerical Mathematics and Advanced Applications. Series: Lect. Notes Comput. Sci. Eng.,* Vol. **103**, Springer, A. Abdulle, S. Deparis, D. Kressner, F. Nobile, M. Picasso Eds. (2015), 447-456.

16. M. Fedele, E. Faggiano, L. Barbarotta, F. Cremonesi, L. Formaggia, S. Perotto. Semi-automatic three-dimensional vessel segmentation using a connected component localization of the region-scalable fitting energy. *IEEE* (2015), 72-77, 9th International Symposium on Image and Signal Processing and Analysis (ISPA).

17. F. Dassi, H. Si, S. Perotto, T. Streckenbach. Anisotropic finite element mesh adaptation via higher dimensional embedding. *Procedia Engineering,* **124***,* (2015), 265-277.

18. N. Ferro, S. Micheletti, S. Perotto. Density-based inverse homogenization with anisotropically adapted elements. In *Numerical Methods for Flows. FEF 2017 Selected Contributions*. Series: Lect. Notes Comput. Sci. Eng.*,* Vol. **132**, Springer Cham, A. Corsini, S. Perotto, G. Rozza, H. van Brummelen Eds. (2020), 211-221.

19. S. Perotto, M.G. Carlino, F. Ballarin. Model reduction by separation of variables: a comparison between Hierarchical Model Reduction and Proper Generalized Decomposition. In *Spectral and High Order Methods for Partial Differential Equations ICOSAHOM 2018*. Series: Lect. Notes Comput. Sci. Eng.*,* Vol. **134**, Springer Nature Switzerland, S.J. Sherwin, D. Moxey, J. Peirò, P.E. Vincent, C. Schwab Eds. (2020), 61-77.

20. M. Lupo, M. Burcul, S. Reeve, M. Eisenbach, S. Perotto. Fast and accurate predictions of total energy for solid solution alloys with graph convolutional neural networks. In *Driving Scientific and Engineering Discoveries Through the Integration of Experiment, Big Data, and Modeling and Simulation. SMC 2021*. Series: Communications in Computer and Information Science, Vol. **1512**, Springer Nature Switzerland, J. Nichols, A.B. Maccabe, J. Nutaro, S. Pophale, P. Devineni, T. Ahearn, B. Verastegui Eds. (2022), 79-98.

Contributed Books

1. B. Ettinger, T. Passerini, S. Perotto, L.M. Sangalli. Regression models for data distributed over non-planar domains. In *Complex Models and Computational Methods in Statistics*. Series: Contributions to Statistics, Springer, Milano, M. Grigoletto, F. Lisi, S. Petrone Eds. (2013), 123-135.

2. S. Perotto. A survey of hierarchical model (Hi-Mod) reduction methods for elliptic problems. In *Numerical Simulations of Coupled Problems in Engineering*. Series: Computational Methods in Applied Sciences, Vol. **33**, Springer, S.R. Idelsohn Ed. (2014), 217-241.

3. M. Artina, M. Fornasier, S. Micheletti, S. Perotto. The benefits of anisotropic mesh adaptation for brittle fractures under plane-strain conditions. In *New Challenges in Grid Generation and Adaptivity for Scientific Computing*. Series: SEMA SIMAI Springer, Vol. **5**, Springer Cham, S. Perotto, L. Formaggia Eds. (2015), 43-67.

4. B. Esfandiar, G.M. Porta, S. Perotto, A. Guadagnini. Anisotropic mesh and time step adaptivity for solute transport modeling in porous media. In *New Challenges in Grid Generation and Adaptivity for Scientific Computing*. Series: SEMA SIMAI Springer, Vol. **5**, Springer Cham, S. Perotto, L. Formaggia Eds. (2015), 231-260.

5. D. Baroli, C.M. Cova, S. Perotto, L. Sala, A. Veneziani. Hi-POD solution of parametrized fluid dynamics problems: preliminary results. In *Model Reduction of Parametrized Systems*. Series: MS&A Springer, P. Benner, M. Ohlberger, A.T. Patera, G. Rozza, K. Urban Eds. (2017), Chapter 15, 235-254.

6. A.G. Mauri, B. Morini, S. Perotto, F. Sgallari. Grid generation and algebraic solvers. To appear in *Springer Handbook of Semiconductor Devices*. Springer, M. Rudan, R. Brunetti, S. Reggiani Eds. (2021), Chapter 38.

Conference Papers

1. S. Perotto. A posteriori error estimates for Boussinesq equations. In Numerical Methods for Fluid Dynamics VI. M.J. Baines Ed., Oxford (1998), 451-457. Proceedings of ICFD, Conference on Numerical Methods for Fluid Dynamics.

2. S. Perotto. Modelling nonlinear dispersive waves. In Proceedings of WASCOM 99, 10th Conference on Waves and Stability in Continuous Media. V. Ciancio, A. Donato, F. Oliveri, S. Rionero Eds., World Scientific, Singapore (2001), 371-381.

3. S. Micheletti, S. Perotto. A theoretical design of the stability coefficients on anisotropic elements. In Proceedings of SIMAI 2002, VI Congresso Nazionale della Società Italiana di Matematica Applicata e Industriale.

4. L. Formaggia, S. Micheletti, S. Perotto. Anisotropic mesh adaption with application to CFD problems. In Proceedings of WCCM V, Fifth World Congress on Computational Mechanics, 2002. H.A. Mang, F.G. Rammerstorfer, J. Eberhardsteiner (Eds).

5. L. Formaggia, S. Micheletti, S. Perotto. Anisotropic mesh adaption for advection-diffusion-reaction problems. In Proceedings of IMACS/ISGG Workshop MASCOT02, 2nd Meeting on Applied Scientific Computing and Tools, 2002.

6. E. Miglio, S. Perotto, F. Saleri. Multiphysics coupling strategy for free surface flows. In Proceedings of ADMOS 2003, the 1st International Conference on Adaptive Modelling and Simulation. N.E. Wiberg, P. Díez (Eds).

7. E. Miglio, S. Perotto, F. Saleri. A coupling strategy for free surface flows. In Proceedings of ECCOMAS 2004, 4th European Congress on Computational Methods in Applied Sciences and Engineering. P. Neittaanmäki, T. Rossi, S. Korotov, E. Onate, J. Périaux, D. Knörzer (Eds).

8. B. Ettinger, S. Perotto, L.M. Sangalli. Spatial smoothing over non-planar domains. In Proceedings of the 46th Scientific Meeting of the Italian Statistical Society, 2012. ISBN 978-88-6129-882-8, Cleup Eds.

9. B. Ettinger, S. Perotto, L.M. Sangalli. Studying hemodynamic forces via spatial regression models over non-planar domains. In Proceedings of the 47th Scientific Meeting of the Italian Statistical Society, 2013. Electronic Book: Advances in Latent Variables-Methods, Models and Applications, Eds. E. Brentari, M. Carpita, Vita e Pensiero, Milano. ISBN 978-88-343-2556-8.

10. B. Ettinger, S. Perotto, L.M. Sangalli. A functional data analysis approach to modeling spatially distributed data across several non-planar domains. In Proceedings of S.Co.2013, Complex Data Modeling and Computationally Intensive Statistical Methods for Estimation and Prediction, 2013. ISBN 9788864930190.

11. E. Faggiano, T. Lorenzi, S. Perotto. TV-H1 variational inpainting applied to metal artifact reduction in CT images. In Proceedings of VIPIMAGE 2013 - Computational Vision and Medical Image Processing IV, Taylor & Francis Group, London. Joao Manuel R. S. Tavares and R. M. Natal Jorge Eds. (2014), Chapter 47, 277-282.

12. D. di Cristofaro, C. Galimberti, D. Bianchi, R. Ferrante, N. Ferro, M. Mannisi, S. Perotto. Adaptive topology optimization for innovative 3D printed metamaterials. In: Proceedings of WCCM – ECCOMAS 2020, Volume 1200 – Modeling and Analysis of Real World and Industry Applications Conference (DOI: 10.23967/wccm-eccomas.2020.049).

Lecture Notes
1. L. Formaggia, S. Perotto. Error estimation for finite element methods. In *31st Computational Fluid Dynamics Lecture Series*, Von Karman Institute **LS 2000-05**.
2. L. Formaggia, S. Perotto. Anisotropic error estimation for finite element methods. In *31st Computational Fluid Dynamics Lecture Series*, Von Karman Institute **LS 2000-05**.

PLENARY LECTURES

1. *Model reduction for anisotropic models governed by parabolic partial differential equations.* ADMOS 2011, Paris, June 6, 2011.
2. *Recent advances in Hierarchical Model (HiMod) reduction.* ADMOS 2015, Nantes, June 10, 2015.
3. *HIerarchical MODel (HI-MOD) reduction: towards haemodynamics applications.* MoRePaS 2015, Trieste, October 14, 2015.
4. *Anisotropic mesh adaptation, from the lab to the end-user.* IMR26, Barcelona, September 20, 2017.
5. *Isogeometric hierarchical model reduction in haemodynamic modeling.* ICOSAHOM 2018, London, July 12, 2018.

SEMIPLENARY LECTURES

1. *TBA*. IACM CFC 2023, Cannes, April 25-28, 2023.

KEYNOTE LECTURES

1. *Anisotropic mesh adaption driven by a metric based optimization procedure.* Tetrahedron Workshop II, INRIA, Paris, October 19, 2007.
2. *An a posteriori error estimator for a hierarchical model dimension reduction.* WCCM8-ECCOMAS 2008, Venezia, July 2, 2008.
3. *Anisotropic adaptation based on a gradient recovery error estimator.* ECCM 2010, Paris, May 19, 2010.
4. *A recovery-based error estimator for mesh adaptation in an anisotropic framework.* Tetrahedron Workshop III, Swansea, September 14, 2010.
5. *Adaptive hierarchical model reduction coupled with mesh adaptation.* COUPLED PROBLEMS 2013, Ibiza, June 17, 2013.
6. *Anisotropic mesh adaptation: in & out.* Tetrahedron IV, Verbania, July 3, 2013.
7. *Hierarchical Model (HiMod) reduction for incompressible fluid dynamics in rigid and deformable pipes.* IACM ECCOMAS 2014, Barcelona, July 22, 2014.
8. *Hi-Mod reduction for incompressible flows.* FEF 2017, Rome, April 7, 2017.
9. *HiMod and HiPOD in haemodynamic modeling.* COUPLED PROBLEMS 2017, Rhodes, June 12, 2017.
10. *HiMOD methods for computational fluid dynamics.* Summer School on Reduced Order Methods in Computational Fluid Dynamics, SISSA, Trieste, July 12, 2019.
11. *Advanced techniques for new challenges in structural topology optimization.* RAMSES workshop, SISSA, Trieste, December 17, 2021.
12. *TBA*. London Mathematical Society Research School on Adaptive Methods and Model Reduction for PDEs, Nottingham, UK, May 24-28, 2023.

INVITED TALKS

1. *Anisotropic mesh adaption: applications to computational fluid-dynamics*. XVII Congresso UMI, Milano, September 11, 2003.

2. *Adaptive modeling for unsteady nonlinear hydrodynamics: a theoretical framework*. WCNA 2004, Orlando, July 2, 2004.

3. *An a posteriori modeling error analysis for free surface flows*. FoCM05, Santander, July 2, 2005.

4. *A goal-oriented recovery-based anisotropic error estimator for advection diffusion reaction problems*. MAFELAP 2006, Brunel University, London, June 4, 2006.

5. *Layer capturing via anisotropic mesh adaption*. BAIL 2006, Gottingen, July 25, 2006.

6. *Robustness of an a posteriori error estimator on anisotropic grids*. Giornata speciale Seminario di Matematica Applicata, Università di Milano, September 18, 2007.

7. *Anisotropic mesh adaptation in CFD: a metric-based approach in 2D*. MINES ParisTech - CEMEF, Sophia Antipolis, November 25, 2008.

8. *Adattazione anisotropa di griglia guidata da una procedura di ottimizzazione locale*. Seminario di Modellistica Differenziale Numerica, La Sapienza, Roma, February 17, 2009.

9. *Mesh adaptation driven by a posteriori error estimators in an anisotropic framework*. MAFELAP 2009, Brunel University, London, June 9, 2009.

10. *Mesh adaptation driven by a metric-based optimization procedure*. ENUMATH 2009, Uppsala, June 29, 2009.

11. *Hierarchical local model reduction for 2D elliptic problems*. Westfälische Wilhelms Universität, Münster, November 4, 2009.

12. *Adaptive hierarchical local model reduction*. MOX-CCE Workshop, Milano, January 21, 2011.

13. *Anisotropic mesh adaptation as auxiliary tool for PDE-constrained optimal control problems*. FEF 2011, Munich, March 23, 2011.

14. *Goal-oriented hierarchical local model reduction with mesh adaptation*. USNCCM 11, Minneapolis, July 25, 2011.

15. *Hierarchical model reduction for parabolic problems*. ENUMATH 2011, Leicester, September 6, 2011.

16. *The impact of anisotropic mesh adaptation on CFD: a metric based approach*. ADAP_CFD12 , WIAS, Berlin, April 25, 2012.

17. *Hierarchical model reduction: a domain decomposition approach*. DD XXI, Inria Rennes Bretagne Atlantique, June 25, 2012.

18. *A Zienkiewicz-Zhu-like error estimator driving anisotropic mesh adaptation in 2D and 3D*. ECCOMAS 2012, Vienna, September 14, 2012.

19. *Model reduction for parabolic equations in a hierarchical framework*. MoRePaS II, Gunzburg, October 3, 2012.

20. *Hierarchical Model (HiMod) reduction for advection-diffusion-reaction problems*. ADMOS 2013, Lisbon, June 5, 2013.

21. *Anisotropic mesh adaptation: an effective strategy in CFD*. USNCCM12, Raleigh, July 23, 2013.

22. *Recent developments of Hierarchical Model (HiMod) reduction for boundary value problems*. ENUMATH 2013, Lausanne, August 26, 2013.

23. *Anisotropic meshes for PDEs: a posteriori error analysis and mesh adaptivity*. ICAM 2013, Heraklion, September 17, 2013.

24. *Hi-Mod reduction driven by a POD strategy*. ECMI 2014, Taormina, June 11, 2014.

25. *One-dimensional surrogate models generated via a Hi-Mod reduction approach*. First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao, July 1, 2014.

26. *Generazione di modelli surrogati monodimensionali mediante riduzione gerarchica: teoria e pratica*. Seminario di Modellistica Differenziale Numerica, La Sapienza, Roma, February 24, 2015.

27. *Adaptive Hierarchical Model (HiMod) reduction for initial boundary value problems*. WIAS, Berlino, March 3, 2015.

28. *HiPOD: two POD strategies for a Hierarchical Model reduction*. USNCCM13, San Diego, CA, July 29,

2015.

29. *Hierarchical MODel (HiMOD) reduction methods: basics and applications.* BCAM Bilbao, February 23, 2016.

30. *Improving PDE approximation via anisotropic mesh adaptation.* Emory University, Atlanta, May 6, 2016.

31. *HiPOD: a POD-based hierarchical model reduction for inverse problems.* ECCOMAS 2016, Crete, June 8, 2016.

32. *Hierarchical model reduction methods for incompressible fluids: basics, advances, applications.* SIMAI 2016, Milano, September 15, 2016.

33. *Hierarchical model reduction: theory and practice.* SIAM-CSE17, Atlanta, March 3, 2017.

34. *Riduzione di modello di tipo gerarchico per la fuidodinamica.* Department of Electronics, Information and Bioengineering, Politecnico di Milano, July 11, 2017.

35. *HiMod reduction for parameter dependent problems.* ADMOS 2017, Verbania, June 27, 2017.

36. *HiMod solvers in haemodynamics.* European Workshop on ROMs for Industrial Applications, Turin, October 17, 2017.

37. *Solutori HiMod per l'emodinamica computazionale.* Università Campus Bio-Medico di Roma, November 27, 2017.

38. *When the mesh is important. The role of anisotropic mesh adaptation in numerical modeling, from crack propagation to topology optimization.* Emory University, February 12, 2018.

39. *Anisotropic mesh adaptation in finite elements: from theory to practice.* Georgia Scientific Computing Symposium 2018, Atlanta, February 24, 2018.

40. *Hybrid Methods for ROM II: HiMod and POD.* ROM4CVS, Emory University, April 26, 2018.

41. *Mesh adaptation-aided image segmentation.* SIAM-IS 18, Bologna, June 7, 2018.

42. *Hierarchical model reduction for parameter-dependent problems.* ECCM-ECFD 2018, Glasgow, June 14, 2018.

43. *Ambrosio-Tortorelli approximations for crack propagation and image segmentation modeling with anisotropic mesh adaptation.* Laboratori de Càlcul Numèric, UPC, Barcelona, September 12, 2018.

44. *Mesh simplification for a spatial regression analysis over complex surfaces.* NuMa 2018, Torino, September 21, 2018.

45. *HiMod discretization for haemodynamic modeling.* University of Nottingham, January 30, 2019.

46. *Energy functional minimization combined with an anisotropic mesh adaptation.* Seminario di Modellistica Differenziale Numerica, La Sapienza, Roma, February 5, 2019.

47. *Hierarchical solvers for parametric problems.* SIAM-CSE19, Spokane, March 1, 2019.

48. *Anisotropic mesh adaptation applied to image segmentation.* ADMOS 2019, El Campello, Alicante, May 27, 2019.

49. *HiMod discretizations for parametric problems in CFD.* COUPLED 2019, Sitges, June 4, 2019.

50. *Hierarchical model reduction for hemodynamic modeling: towards patient-specific simulations.* Virginia Tech, Blacksburg, November 5, 2019.

51. *SIMPATY: a new adaptive tool for structure design.* Case Western Reserve University, Cleveland, November 8, 2019.

52. *Topology optimization: a new algorithm based on anisotropic mesh adaptation.* Scuola Normale Superiore di Pisa, January 29, 2020.

53. *Problem-specific computational meshes in the design of structures and in the segmentation of images.* 2020 Compute and Storage Technology Online Workshop, Huawei Tel Aviv Research Center, December 3, 2020 (online).

54. *SIMPATY algorithm for the design of metamaterials.* WCCM-ECCOMAS 2020 Virtual Congress, January 14, 2021 (online).

55. *Topology optimization: from the macro- to the micro-scale.* Seminar at the School for Simulation and Data Science Series, RWTH Aachen University, January 18, 2021 (online).

56. *Mathematical modeling for structural topology optimization in engineering applications.* Seminar for the Master in Mathematical and Physical Methods for Space Sciences, Università degli Studi di Torino, Italy, February 5, 2021 (online).

57. *Adaptive topology optimization in the design of structures and metamaterials*. Weierstrass Institute, Berlin, March 30, 2021 (online).

58. *Mesh adaptation-aided design of metamaterials*. 4th Symposium on International Joint Graduate Program in Materials Science and 5th Symposium for the Core Research Clusters for Materials Science and Spintronics, Tohoku University, October 26, 2021 (online).

59. *Design of new structures and materials assisted by Mathematics*. Seminar for the Master in Mathematical and Physical Methods for Space Sciences, Università degli Studi di Torino, Italy, February 4, 2022 (online).

60. *Hierarchical model reduction in haemodynamics: advances and challenges*. ARIA Online Seminar, March 10, 2022 (online).

61. *POD- and RB-Hierarchical Model reduction techniques in a parametrized setting*. Reduced-Order Models at Work. Industry and Medicine, Bordeaux, April 1, 2022 (online).

62. *Design of 3d-printable structures and materials driven by innovative topology optimization techniques*. CMS Mathematics Seminar, Leicester, April 7, 2022 (online).

63. *ADAPTA studio*. MOX20 – Politecnico di Milano, May 27, 2022.

64. *Design of cellular materials for multiscale topology optimization*. ECCOMAS 2022, Oslo, June 5, 2022.

65. *Advanced numerical techniques for industrial applications: structural topology optimization at the macro- and at the micro-scale*. GNCS Annual Meeting, Montecatini, June 28, 2022.

66. *Hierarchical model reduction: a POD-based strategy to manage geometric bifurcations*. WCCM XV – APCOM VIII, Yokohama, July 31- August 5, 2022.

67. *Efficient structural topology optimization driven by POD*. IUTAM Symposium on Ultralarge-scale Topology Optimization, Copenhagen, April 24-26, 2023.

TALKS at NATIONAL and INTERNATIONAL CONFERENCES

1. *On the convergence of product formulas based on nodal spline interpolation for the numerical evaluation of certain 2D CPV integrals*. Conference on Numerical Mathematics Celebrating the 60th Birthday of M.J.D. Powell, Cambridge, July 27, 1996.

2. *A posteriori error estimates for Boussinesq equations*. ICFD, Conference on Numerical Methods for Fluid Dynamics, Oxford, April 2, 1998.

3. *Elementi finiti adattivi per l'equazioni di Boussinesq*. SIMAI 98, Giardini Naxos, June 5, 1998.

4. *Modelling nonlinear dispersive waves*. WASCOM 99, Vulcano, June 10, 1999.

5. *An adaptive method for Boussinesq equations*. ICIAM '99, Edimburgh, July 6, 1999.

6. *Le equazioni di Boussinesq per l'approssimazione di flussi a superficie libera*. XVI Congresso dell'Unione Matematica Italiana, Napoli, September 15, 1999.

7. *Anisotropic error estimates applied to convection-diffusion problems*. Second ESF International Conference, Il Ciocco, October 13, 2000.

8. *An anisotropic Zienkiewicz-Zhu error estimator*. ENUMATH 2001, Ischia, July 24, 2001.

9. *A theoretical design of the stability coefficients on anisotropic elements*. SIMAI 2002, Chia Laguna, May 29, 2002.

10. *Anisotropic mesh adaption in CFD: part I and II*. OPA 2002, Heidelberg, October 7, 2002.

11. *Multiphysics coupling strategy for free surface flows*. ADMOS 2003, Göteborg, October 1, 2003.

12. *Strategie per il coupling di modelli idrodinamici: un approccio a posteriori*. GNCS Annual Meeting, Montecatini, February 10, 2004.

13. *Model coupling for free surface flows*. The Second European Finite Element Fair, Berlin, June 5, 2004.

14. *Adaptive modeling in hydrodynamics*. ECMI 2004, Eindhoven, June 25, 2004.

15. *An a posteriori modeling error estimator for shallow water flows*. ECCOMAS 2004, Jyväskylä, July 25, 2004.

16. *Application of anisotropic error estimates to problems in fluid dynamics*. ECCOMAS 2004, Jyväskylä, July 26, 2004.

17. *Approcci multifisica e multimodello per l'idrodinamica*. Final Meeting of the Project Intergruppo INDAM

2004 "Numerical Methods for Unsteady Multiscale Problems", Milano, February 21, 2005.

18. *Hierarchical model dimension reduction*. MAFELAP 2006, Brunel University, Londra, June 16, 2006.

19. *Anisotropic mesh adaption for evolutionary problems*. ICFD, Conference on Numerical Methods for Fluid Dynamics, Reading, March 27, 2007.

20. *Adaptive hierarchical model reduction for elliptic problems*. ENUMATH 2007, Graz, September 10, 2007.

21. *Anisotropic mesh adaption for environmental applications*. Second FIMA International Conference - Energy and Environment, Ayas-Champoluc, January 23, 2008.

22. *A hierarchical model dimension reduction driven by an a posteriori error estimator*. MOSOCOP08, Heidelberg, July 24, 2008.

23. *Anisotropic space-time adaptation for parabolic problems*. SIMAI 2008, Roma, September 17, 2008.

24. *Riduzione gerarchica di modello per problemi ellittici bidimensionali*. GNCS Annual Meeting, Montecatini, February 3, 2009.

25. *Adaptive hierarchical model dimension reduction*. ADMOS 2009, Bruxelles, May 26, 2009.

26. *Anisotropic mesh adaptation and mesh control: a recovery-based error estimator*. CMWR 2010, Barcelona, June 24, 2010.

27. *Some adaptive techniques for the numerical approximation of PDEs*. SNAPLE (Statistical and Numerical methods for the Analysis of Problems in Life Sciences and Engineering) Kickoff Meeting, MOX, Milano, October 13, 2011.

28. *A mesh simplification strategy for a spatial regression analysis over the cortical surface of the brain*. SNAPLE (Statistical and Numerical methods for the Analysis of Problems in Life sciences and Engineering) Final Meeting, MOX, Milano, May 16, 2014.

29. *Riduzione gerarchica di modello: sviluppi recenti ed applicazioni*. XX Congresso UMI, Siena, September 7, 2015.

30. *Adaptive finite elements for structure design*. COMPLAS 2019, Barcelona, September 5, 2019.

MENTORING

PhD Theses (Advisor)

1. Giovanni Porta.
Anisotropic mesh adaptation for shallow water modeling.
Ph.D. in Hydraulic Engineering, Department of Civil and Environmental Engineering, Politecnico di Milano (final discussion: February 19, 2010).

2. Franco Dassi.
Advanced techniques for the generation and the adaptation of complex surface meshes.
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (final discussion: September 17, 2014).

3. Bahman Esfandiar.
The impact of space-time adaptation techniques on solute transport modeling in porous media.
Ph.D. in Environmental and Infrastructure Engineering, Department of Civil and Environmental Engineering, Politecnico di Milano
(final discussion: October 17, 2014).

4. Simone Brugiapaglia.
COmpRessed SolvING: sparse approximation of PDEs based on compressed sensing.
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (final discussion: January 18, 2016).

5. Marianna Signorini.
Innovative models and methods for geoscience.
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (final discussion: July 19, 2016).

6. Nicola Ferro.

Topology optimization: advanced techniques for new challenges.
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano
(final discussion: February 12, 2019; **winner of the 10th edition of ECCOMAS Ph.D. Olympiads**).
7. Yves Antonio Brandes Costa Barbosa.
Isogeometric hierarchical model reduction: from analysis to patient-specific simulations.
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano
(final discussion: February 18, 2020).
8. Francesco Vaccaro.
Subject: *mathematical modeling of electronic memories for neuromorphic application.*
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano
(ongoing).
9. Erika Temellini.
Subject: *modeling in precision agriculture.*
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano
(ongoing).
10. Luca Liverotti.
Subject: *innovative processing techniques for earth observation data exploitation in smart farming.*
Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano
(ongoing).

PhD Theses (Co-Advisor)
1. Matteo Gavazzoni.
Mechanical characterization and design of lattice structures for innovative multi-functional applications.
Ph.D. in Mechanical Engineering, Department of Mechanics, Politecnico di Milano
(final discussion: November 11, 2021).

Master Theses (Advisor)
1. Valerio Cereda.
Mesh adaptation driven by a posteriori error estimators for the study of the strain state under static and dynamic conditions.
Mechanical Engineering Degree, Politecnico di Milano (a.y. 2005-2006).
2. Lorenzo Mauri.
Coupling of 1D and 2D hydrodynamic models for the free surface flow simulation.
Environmental Engineering Degree, Politecnico di Milano (a.y. 2006-2007).
3. Pantaleo Acquaviva.
Time adaptation driven by an a posteriori error estimator for the numerical simulation of engineering systems.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2007-2008).
4. Simone Pezzuto.
Space-time adaptation for nonlinear reaction-diffusion systems applied to electrocardiology.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2008-2009).
5. Alessandro Zilio.
Anisotropic models: numerical analysis and approximation.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2009-2010).
6. Nicoletta Papucci.
Anisotropic mesh adaptation applied to image segmentation.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2010-2011).
7. Alberto Crivellaro.
Adaptive reconstruction of sparse data via radial basis functions.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2010-2011).
8. Tommaso Taddei.
Basi ridotte: mappe transfinite per domini parametrici e leggi di conservazione

(**winner of the Carlo Cercignani prize 2012**).
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2011-2012).
9. Bardelli Alessandro.
A machine learning approach for mesh adaptivity in a goal-oriented framework.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2011-2012).
10. Stefano Zonca.
Isotropic volume and surface mesh adaptation driven by a Zienkiewicz-Zhu error estimator with an application to haemodynamics.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
11. Francesco Cremonesi.
Mesh adaptation for the design of lighter than air vehicles.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
12. Massimiliano Lupo Pasini.
HI-POD: HIerarchical model reduction driven by a Proper Orthogonal Decomposition for advection-diffusion-reaction problems.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
13. Matteo Carlo Maria Aletti.
Educated bases for HIerarchical MODel reduction in 2D and 3D.
(**winner of the Carlo Cercignani prize 2013**).
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
14. Davide Longoni.
Anisotropic mesh adaptation driven by a recovery-based goal-oriented error estimator applied to the linearized shallow water equations.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
15. Michele Haile.
Restauro di immagini tomografiche mediche tramite l'uso di metodi di image inpainting.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
16. Sofia Guzzetti.
Hierarchical model reduction for incompressible flows in cylindrical domains.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2013-2014).
17. Alessandro Barone.
Parallel and multilevel techniques for hierarchical model reduction.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2013-2014).
18. Andrè Nicol Albini.
Topological optimization driven by mesh adaptation for additive manufacturing applications.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
19. Nicola Ferro.
Propagation of fractures in brittle materials induced by a thermal shock.
(**winner of the Carlo Cercignani prize 2015***).
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
20. Paolo Rusconi.
Hierarchical model reduction for internal fluid dynamics in curved domains with an isogeometric analysis.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
21. Daniele Alessandro Tobia.
Manifattura additiva e ottimizzazione topologica: nuove prospettive per gli equipaggiamenti di satellite.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
22. Luca Borchini.
PGD and HiPOD solutions of geometrically parameterized Stokes flow in haemodynamics.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
23. Alessandro D'Amario.
A reduced-order Inverse Distance Weighting technique for the efficient mesh-motion of deformable interfaces

and moving shapes in computational problems.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
24. Maria Cristina Cova.
Hierarchical Model reduction for parameter-dependent problems: application to the Navier-Stokes equations.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
25. Luca Marco Valsecchi.
Reduced order methods for PDEs: a comparison between Proper Orthogonal Decomposition and Proper Generalized Decomposition.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2014-2015).
26. Yves Antonio Brandes Costa Barbosa.
Hierarchical model reduction with isogeometric approximation applied to data assimilation.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
27. Chiara Doriana Schenardi.
Problemi di diffusione e trasporto: schemi di discretizzazione continui e discontinui con adattazione di griglia.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
28. Matteo Zancanaro.
Hierarchical model reduction techniques for flows in a parametric setting.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
29. Stefania Fresca.
Goal-oriented mesh adaptivity for topology optimization.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
30. Cristina Vaghi.
POD reduced order modelling for cortical spreading depression.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
31. Diana Volponi.
Riduzione gerarchica di modello per problemi di interazione fluido struttura in emodinamica.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
32. Beatrice Giacomini.
Inverse problems and model reduction: a Bayesian approach.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2015-2016).
33. Michele Giuliano Carlino.
Model reduction by Proper Generalized Decomposition in electrocardiology.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
34. Tommaso Ferri.
Topology and shape optimization for structural design.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
35. Alessia Mirto.
Ottimizzazione topologica multi-obiettivo per applicazioni aerospaziali.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
36. Francesco Migliorini.
Reconstruction of 3D surfaces with sharp features from scattered data via radial basis functions.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
37. Carola Ferrando
Isogeometric hierarchical model reduction for parameter-dependent problems.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
38. Giulia Meglioli.
Comparison of model order reduction approaches in parametrized optimal control problems.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
39. Marco Splendiani.
Metodi innovativi per la progettazione di sistema applicata ai sistemi spaziali radar SAR.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).

40. Nicolò Ripamonti.
Energy-preserving model reduction of fluid flows.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
41. Barbara Francesca Del Gaudio.
Analysis, prediction and clustering of residential water demand by Proper Orthogonal Decomposition.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
42. Cesare Giannetti.
A reduced basis method for electrophysiology: propagating steep front by L1-norm minimization.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
43. Anna Cosmo.
Mesh adaptation techniques driven by hierarchical Bayesian models.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
44. Davide Cortellessa.
A level set method with mesh adaptation for topology optimization.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
45. Riccardo Segliani.
Optimal reconstruction of patient-specific geometries.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
46. Anna Maria Ranno.
Recovery-based error estimators for age-structured model with spatial diffusion in cell population dynamics.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
47. Elisa Ghiringhelli.
Proper Generalized Decomposition applied to selective laser melting processing.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
48. Stefano Piccardo.
Hierarchical perturbation-based model reduction: applications to advection-diffusion-reaction problems.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
49. Giovanni Conni.
Hierarchical perturbation-based model reduction: applications to transport problems in porous media.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
50. Mario Allora.
A recovery-based error estimator for advection-diffusion-reaction problems solved with discontinuous finite.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
51. Alberto Bocchinfuso.
Hybrid data assimilation: a benchmark study and applications.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
52. Francesco Clerici.
Adaptive algorithms for image segmentation and reconstruction with application to 3D biomedical datasets.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
53. Leonardo Locatelli.
Segmentation and reconstruction of images from indirect measures.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).
54. Leonardo Boledi.
Hierarchical model reduction for flow profiles in cooling channels.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2018-2019).
55. Wael Mohammed Alsaid Tawfik Wanis.
Development of a GUI-APP for topology optimization driven by mesh adaptation.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2018-2019).
56. Giulio Gavinelli.
Topology optimization of structures in additive manufacturing processes with a control on the overhangs.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2019-2020).

57. Esmail Mostatira.
Topology optimization for flow problems using level set and density methods.
Energy Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
58. Ludovica Saccaro.
Data-driven model reduction techniques for flow modeling.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
59. Gloria Bellini.
Isogeometric hierarchical model reduction for blood flow modeling in vessels.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
60. Vittorio Gabbi.
Scalable numerical optimization for distributed multi-agent deep learning.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
61. Marko Burcul.
A deep learning approach for fast, accurate predictions of material properties for solid solution alloys.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
62. Angelo Pasquale.
Time multiscale based on Proper Generalized Decomposition: application to elastodynamics and inelasticity.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
63. Moaad Khamlich.
Model order reduction for bifurcating phenomena in fluid-structure interaction problems.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
64. Azer Omarov.
Development of an extensible and template-driven GUI framework for programmable software tools.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2019-2020).
65. Giulia Campaniello.
Topology optimization for the design of manufacturable cellular materials.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
66. Evandro Maddes.
Reinforcement learning for mesh adaptivity.
Computer Science and Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
67. Jérémy Robert F. Lengelé.
Vehicle routing and orienteering algorithms applied to precision irrigation processes.
Computer Science and Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
68. Federico Morreale.
Microsatellite SAR constellations: a near real-time scheduler optimization for emergencies and precision farming.
Computer Science and Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
69. Davide Calabrò.
A deep learning approach for detection and localization of leaf diseases.
Computer Science and Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
70. Monang Kevin Napitupulu.
Application of Proper Orthogonal Decomposition to a sampling-based kinodynamic planning algorithm.
Automation and Control Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
71. Teresa Babini.
Coupling intra-cellular and multi-cellular dynamics in spatially-extended models of root-hair initiation.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
72. Marco Ruffinazzi.
Application of anisotropic 3D mesh adaptation to TRIGA Mark II neutronics modeling.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2020-2021).
73. Antonio Matusan.
Subject: multispectral satellite imaging.

Automation and Control Engineering Degree, Politecnico di Milano (ongoing).

Master Theses (Co-Advisor)
1. Silvia Fiordalise.
Uno stimatore a posteriori dell'errore per le equazioni di Black e Scholes.
Mathematics Degree, Università degli Studi di Milano (a.y. 2001-2002).
2. Fabio Anastasio.
Simulazione numerica del modello drift-diffusion nei semiconduttori con adattività di griglia.
Electronic Engineering Degree, Politecnico di Milano (a.y. 2002-2003).
3. Giorgio Maisano.
Stimatori a posteriori dell'errore di discretizzazione basati su tecniche di ricostruzione.
Aeronautical Engineering Degree, Politecnico di Milano (a.y. 2002-2003).
4. Filippo David e Simone Prandi.
Adattività di modello in problemi di diffusione-trasporto-reazione con applicazioni alla microelettronica.
Electronic Engineering Degree, Politecnico di Milano (a.y. 2005-2006).
5. Claudia Álvarez Pujol.
Reduced order models for pollution transport (advection-diffusion) in urban areas.
Civil Engineering Degree, Universitat Politècnica de Catalunya, Barcelona (a.y. 2018-2019).
6. Ziyang Wang.
HiMLMC: Hierarchical model reduction with Multi Level Monte Carlo.
Simulation Science Degree, RWTH Aachen University (a.y. 2020-2021).
7. Dalila Di Palma.
Topic: *topological optimization of a hip prosthetic implant.*
Double Degree in Biomedical and Mechanical Engineering, Politecnico di Milano (ongoing).
8. Sara Maggioni.
Topic: *topological optimization of a hip prosthetic implant.*
Double Degree in Biomedical and Mechanical Engineering, Politecnico di Milano (ongoing).

Bachelor Theses (Advisor)
1. Giovanni Migliorati.
Onde dispersive non lineari: equazioni di Boussinesq.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2006-2007).
2. Gaia Barbic e Giorgio Paulon.
A PDE-based model for tomographic image reconstruction.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2012-2013).
3. Giulio Gargantini.
Modello di controllo ottimale per la locomozione umana.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
4. Thomas Bellotti.
Modelizzazione dell'effetto loto tramite le equazioni di Allen-Cahn e di Cahn-Hilliard.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2016-2017).
5. Andrea Poiatti.
Deblurring di immagini attraverso le decomposizione ai valori singolari: metodi ed applicazioni.
Mathematical Engineering Degree, Politecnico di Milano (a.y. 2017-2018).

Reading Courses (Advisor)
1. Francesco Peparello.
Ottimizzazione di orbite per costellazioni di satellite. Applicazione alla missione Skymed per immagini SAR.
Mathematical Engineering Bachelor Degree, Politecnico di Milano (a.y. 2018-2019).

Research Grants (Supervisor)
1. Nicola Ferro.
Protection and enhancement of the intellectual property within the Industry 4.0 plan.
MOX-Department of Mathematics, Politecnico di Milano (1 April, 2019 – 31 March, 2020).
2. Leonardo Locatelli.
Advanced numerical techniques for the reconstruction of 3D surfaces.
MOX-Department of Mathematics, Politecnico di Milano (1 April, 2020 – 30 Aprile, 2021).
3. Nicola Ferro.
Metodi innovativi per ottimizzazione strutturale e segmentazione di immagini tramite adattazione anisotropa di mesh.
Fondazione Fratelli Confalonieri – Post-Doc Grant (1 April, 2020 – 31 March, 2021).
4. Matteo Carbonara.
Development of advanced algorithms for the reconstruction of 3D surfaces.
MOX-Department of Mathematics, Politecnico di Milano (1 June, 2020 – 31 May, 2021).
5. Nicola Ferro.
Modellistica e discretizzazione numerica di problemi di design strutturale alla micro- e alla macro-scala.
Assegno INdAM di Collaborazione ad Attività di Ricerca, a.a. 2020-2021 (1 April, 2021 – 31 March, 2022).
6. Luca Mombelli.
Algoritmi avanzati per l'ottimizzazione di superfici 3D.
MOX-Department of Mathematics, Politecnico di Milano (1 June, 2021 – 31 May, 2022).

Term Contracts (Supervisor)
1. Eugenio Pino.
Implementazione di algoritmi numerici per la ricostruzione di oggetti 3D.
MOX-Department of Mathematics, Politecnico di Milano (15 October, 2020 – 31 March, 2021).
2. Raul Invernizzi.
Tecniche di remeshing per superfici.
MOX-Department of Mathematics, Politecnico di Milano (1 February, 2022 – 31 March, 2022).

Erasmus Projects (Italian Supervisor)
1. Juan Ignacio Garcia Nicolas.
Segmentation of images based on anisotropic mesh adaptation.
ERASMUS+ Student Placement European Programme between Politecnico di Milano and Universidad Politecnica de Valencia (October 24 – December 23, 2016).
2. Xavier Guzmán Carsí.
Topology optimization using Python and comparison with commercial software.
ERASMUS Student, Máster Universitario en Ingeniería Mecánica, Universidad Politecnica de Valencia (September 10, 2018 – February 28, 2019).

Industrial Internships (Tutor)
1. Andrè Nicol Albini, Politecnico di Milano (October 15, 2014 – October 13, 2015).
Modeling, analysis and optimization of structures in additive layer manufacturing for applications in aerospace engineering.
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.
2. Daniele Alessandro Tobia, Politecnico di Milano (October 15, 2014 – October 13, 2015).
Possible evolutions of satellite equipments via design and technologies in additive layer manufacturing.
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.
3. Alessia Mirto, Politecnico di Milano (October 19, 2015 – October 18, 2016).
Multi-objective optimization of structures in additive layer manufacturing for aerospace industrial equipments.
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.
4. Marco Splendiani, Politecnico di Milano (December 15, 2016 – December 14, 2017).

Innovative architectures, emerging technologies and new applications for microsatellites.
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.
5. Matteo Metra, Politecnico di Milano (March 6 – September 8, 2017).
Optimisation de forme en simulation hydrodynamique du pneumatique.
Host industry: MICHELIN, Clermont-Ferrand.
6. Angelo Pasquale, Politecnico di Milano (April 6 – July 24, 2020).
Materials' long-time behavior in modelling aging and fatigue: time multiscale and Proper Generalized Decomposition.
Host industry: ESI Group – Arts et Metiers ParisTech – AMVALOR, Angers.
7. Marco Ebreo, Università degli Studi di Torino (March 1 – July 31, 2020).
Ottimizzazione delle risorse nell'ecosistema dell'agricoltura tramite tecnologia RADAR SAR "space born": il caso della concimazione azotata tramite agricoltura di precisione.
Host industry: Thales Alenia Space Italia, Roma.
8. Luca Liverotti, Università degli Studi di Torino (May 10 – September 30, 2021).
Study and assessment of SAR-based remote sensing technology associated with innovative mathematical modeling and techniques, for improving management of resources in agriculture monitoring applications.
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.
9. Amine Sekourane, Sorbonne Université (May 3 – October 29, 2021).
Raffinement de maillage adaptatif en optimization topologique.
Host industry: Institut de Recherche Technologique SystemX, Palaiseau.
10. Federico Morreale, Politecnico di Milano (April 19, 2021 – April 19, 2022).
Topic: *Optimization of a satellite costellation for precision farming.*
Host industry: Thales Alenia Space Italia, Gorgonzola, Milano.

Academic Internships (Tutor)
1. Alex Viguerie (September 9, 2015 – February 20, 2016).
Hierarchical model reduction applied to haemodynamic problems.
Guest university: Emory University, Atlanta (GA) USA.
2. Cristina Vaghi, Politecnico di Milano (October 3 – December 31, 2016).
Implementation of POD techniques in cortical spreading depression simulation.
Host university: BCAM, Bilbao.
3. Francesco Cola (October 19, 2017 – April 16, 2018).
Adaptive and Bayesian algorithms for image segmentation.
Guest university: Sapienza Università di Roma.
4. Claudia Alvarez (March 4 – May 31, 2019).
Reduced order models for pollution transport (advection-diffusion) in urban areas.
Guest university: Universitat Politècnica de Catalunya, Barcelona.
5. Anna Maria Ranno (September 1 – 18, 2020; May 10 – June 11, 2021).
Model reduction in arteries with drug-eluting stents.
Guest university: RWTH Aachen University.
6. Gloria Bellini (September 25 – November 27, 2020).
Application of Isogeometric Hierarchical Model Reduction for complex geometries of blood vessels.
Host university: Inria Bordeaux Sud-Ouest.
7. Matteo Giacomini (July 19 – August 1, 2021; September 6-12, 2021; November 8-14, 2021).
Personalised prosthetics medicine: from imaging to manufacturing of patient-specific solutions.
Young Investigators Training Programme 2019.
Guest university: Universitat Politècnica de Catalunya.
8. Francesco Clerici (January 10 – July 10, 2022).
Topic: *anisotropic mesh adaptation techniques in the modeling of 3D turbulent flows.*
Guest university: INRIA Saclay-Ile de France, Paris.

SCIENTIFIC ORGANIZATION

International Conferences
1. *Second ESF International Conference.*
Il Ciocco, Italy. October 12-14, 2000.
2. *Recent Developments in Numerical Methods for Model Reduction.* IHP Conference.
Paris, November 7-10 2016.
3. *FEF 2017, the 19th International Conference on Finite Elements in Flow Problems.*
Rome, April 5-7, 2017.
4. *ADMOS 2017, the 8th International Conference on Adaptive Modeling and Simulation.*
Verbania, June 26-28 2017.
5. *COUPLED PROBLEMS 2021, the 9th International Conference on Coupled Problems in Science and Engineering.*
Online conference, June 13-16, 2021.
6. *Math 2 Product 2023, the 1st International Conference on Emerging Technologies in Computational Science for Industry, Sustainability and Innovation.*
Taormina, May 30 – June 1, 2023.

National Conferences
1. *MATHKNOW08, Mathematics, Applied Sciences and Real Life.*
 Politecnico di Milano, May 22-24 , 2008.
2. *SIMAI 2010.*
Università di Cagliari, June 21-25, 2010.
3. *MOX10 : Immaginare il Futuro con uno Sguardo al Passato.*
MOX, Department of Mathematics, Politecnico di Milano, May 28, 2012.

Workshops
1. *Anisotropic Grids: Generation, Adaption and Error Estimation.*
MOX, Department of Mathematics, Politecnico di Milano, June 21, 2002.
2. *The Fourth Tetrahedron Workshop on Grid Generation for Numerical Computations.*
Verbania, July 1-3, 2013.
3. *Adaptive Moving and Anisotropic Meshes for the Numerical Approximation of PDEs.*
ICMS Workshop, Edinburgh, May 9-13, 2022.

Minisimposia and Invited Sessions
1. *Tecniche Adattative nella Simulazione Numerica e nel Trattamento di Dati.*
SIMAI 2002, Chia Laguna, May 29 (organization joined with C. Canuto and S. Micheletti).
2. *Anisotropic Mesh Adaptation and Error Estimation.*
ECCOMAS 2004, Jyväskylä, July 26 (organization joined with L. Formaggia).
3. *A Posteriori Error Control in Finite Element Procedures.*
ADMOS 2005, Barcelona, September 9 (organization joined with L. Formaggia).
4. *Multi-Model Approximation.*
MAFELAP 2006, Brunel University, London, June 16 (organization joined with A. Ern).
5. *Matematica e Impresa - L'Esperienza al MOX.*
SIMAI 2008, Roma, September 15 (organization joined with A. Quarteroni and M. Verani).
6. *Anisotropic Adaptive Meshes: Error Analysis and Applications.*
ENUMATH 2009, Uppsala, June 29 (organization joined with T. Coupez).
7. *Anisotropic Adaptive Meshing: from Error Analysis to Applications.*
ECCM 2010, Paris, May 19 (organization joined with T. Coupez and Y. Mesri).

8. *Numerical Methods for Fluid Mechanics.*
CMWR 2010, Barcelona, June 24.
9. *Domain Decomposition Methods, Iterative Solvers and Adaptive Methods.*
SIMAI 2010, Cagliari, June 22-23 (organization joined with B.A. de Dios, S. Scacchi and M. Verani).
10. *Unstructured Mesh Generation and Adaptivity.*
FEF 2011, Munich, March 23-24 (organization joined with O. Hassan).
11. *Recent Developments in Mesh Adaptation.*
ENUMATH 2011, Leicester, September 7-8 (organization joined with P.E. Farrell and S. Micheletti).
12. *Numerical Methods in the Context of Model Reduction.*
ENUMATH 2011, Leicester, September 6 (organization joined with M. Ohlberger and K. Smetana).
13. *Adaptive Meshing and Error Estimation (in honor of J. Tinsley Oden's 75th birthday).*
WCCM 2012, Sao Paulo, July 9-10 (organization joined with T. Coupez, S. Prudhomme and K.G. van der Zee).
14. *Error Estimation and Adaptive Mesh Generation.*
ECCOMAS 2012, Vienna, September 13-14 (organization joined with S. Prudhomme, K.G. van der Zee and E.H. van Brummelen).
15. *Anisotropic Meshes: Generation, Adaptation and Error Analysis.*
ADMOS 2013, Lisbon, June 4 (organization joined with T. Coupez).
16. *Adaptive Finite Elements.*
ENUMATH 2013, Lausanne, August 27-28 (organization joined with S. Micheletti and M. Picasso).
17. *Surrogate Modeling Approaches for PDEs.*
ENUMATH 2013, Lausanne, August 26 (organization joined with K. Smetana and A. Veneziani).
18. *Multiphysics Simulations with Industrial Applications.*
ECMI 2014, Taormina, June 9-10 (organization joined with S. Micheletti).
19. *Model Order Reduction and Highly Demanding Applications.*
First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao, June 30-July 1, 2014 (organization joined with F. Auricchio, P. Díez and A. Huerta).
20. *Mathematical and Numerical Solution of PDEs on Manifolds.*
2015 SIAM Conference on Computational and Mathematical Issues in the Geosciences, Stanford, CA, July 2 (organization joined with S. Lanzoni and M. Putti).
21. *Mesh & Adaptivity.*
ADMOS 2015, Nantes, June 8-9 (organization joined with T. Coupez).
22. *Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics.*
USNCCM13, San Diego, CA, July 28-29 , 2015 (organization joined with P.J. Blanco and A. Veneziani).
23. *Advanced Numerical Methods for Partial Differential Equations and Applications.*
SIMAI 2016, Milano, September 15 (organization joined with M. Falcone and G. Rozza).
24. *Model Reduction: Methods, Algorithms, Applications.*
SIMAI 2016, Milano, September 16 (organization joined with M. Falcone and G. Rozza).
25. *Model and Solution Reduction Methods in Computational Mechanics: Challenges and Perspectives.*
CSE17, Atlanta, GA, March 3 (organization joined with A. Veneziani).
26. *Geometry Modeling, Mesh Generation and Adaptation.*
FEF 2017, Rome, April 5-7 (organization joined with S. Shontz, H. Speleers and J. Zhang).
27. *Recent Advances in Numerical Methods for Micro and Macro Models in Fluid-Dynamics* (**flag event CECAM**).
FEF 2017, Rome, April 7 (organization joined with M. Falcone, G. Ciccotti and G. Rozza).
28. *Advanced Models and Methods in CFD.*
COUPLED PROBLEMS 2017, Rhodes, June 13-14 (organization joined with A. Quaini, G. Rozza).
29. *Advances in Reduced Basis Techniques for Flow Problems in Analysis, Control and Optimization.*
ECCM-ECFD 2018, Glasgow, June 13 (organization joined with M. Fossati, A. Quaini, G. Rozza).
30. *Advanced Models and Methods in CFD.*
ICOSAHOM 2018, London, July 9 (organization joined with A. Quaini, G. Rozza).
31. *Reduced Order Methods for Parametric CFD Problems.*

WCCM2018, New York City, July 26-27 (organization joined with A. Quaini, G. Rozza).
32. *Reduced Order Modeling for Parametric CFD Problems.*
SIAM-CSE 2019, Spokane, WA, February 27 (organization joined with A. Quaini, G. Rozza).
33. *Enhancing Flow Simulations: Stabilization, Adaptivity, Model Reduction.*
FEF 2019, Chicago, IL, April 2-3 (organization joined with D. Marini, G. Rozza).
34. *Advances in Optimization Problems Based on Error Estimators and Mesh Adaptation.*
ADMOS 2019, El Campello (Alicante), May 28-29 (organization joined with M. Giacomini).
35. *Model Reduction in Computational Mechanics.*
COUPLED PROBLEMS 2019, Sitges (Barcelona), June 4 (organization joined with A. Reali, A. Veneziani).
36. *Mathematical Methods for Optimal Design of Structures.*
Sim-AM 2019, Pavia, September 12 (organization joined with M. Giacomini).
37. *Space and Time Adaptation for PDEs: from Theory to Practice.*
ENUMATH 2019, Egmond aan Zee, October 4 (organization joined with M. Falcone).
38. *M2P - Math 2 Product.*
WCCM-ECCOMAS 2020, online, January 11, 2021 (organization joined with M. Giacomini, G. Rozza).
39. *Model order reduction methods for parametrized mechanical systems.*
WCCM-ECCOMAS 2020, online, January 11, 2021 (organization joined with A. Iollo, T. Taddei).
40. *Accelerating the design optimization process.*
WCCM-ECCOMAS 2020, online, January 13, 2021 (organization joined with O. Amir, C. Youngsoo, N. Ferro, G. Yoon).
41. *Optimal design of structures and metamaterials: innovative techniques for engineering applications.*
COUPLED PROBLEMS 2021, online, June 14-15 (organization joined with R. Ferrante, N. Ferro).
42. *Math 2 Product.*
SIMAI 2020, Parma, September 1, 2021 (organization joined with G. Rozza, M. Giacomini).
43. *Challenges and progress in computational science and engineering: from industry 4.0 to sustainable development.*
ECCOMAS Congress 2022, Oslo, June 5 (organization joined with G. Rozza, M. Giacomini).
44. *Efficiency and reliability in biomedical modeling: computational and mathematical advances.*
WCCM XV – APCOM VIII, Yokohama, July 31- August 5, 2022 (organization joined with N. Ferro, H. Suito).
45. *Adaptive methods for CFD: from theory to industrial applications.*
IACM CFC 2023, Cannes, April 25-28 (organization joined with M. Picasso, T. Coupez, F. Alauzet).
46. *Advanced mathematical modeling, methods and algorithms for sustainability.*
COUPLED PROBLEMS 2023, Chania, Crete, June 5- 7 (organization joined with T.C. Rebollo, M. Matteucci, N. Ferro).

SERVICE

Memberships
1. member of Gruppo Divulgazione SIMAI-DMA (2008-2016);
2. member of SIMAI and INdAM-GNCS (since 2001);
3. member of the network EU-MORNET (since 2014);
4. member of AIM-PoliMi (since July 2016).

Scientific and Steering Committees' Member
1. member of the Teaching Committee of the Department of Mathematics, Politecnico di Milano (February 2009 - December 2016);
2. member of the Scientific Board of the Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano (since 2012);
3. member of the Program Committee of the International Conference NUMGRID-2018/VORONOI-150, Moscow, December 3-5, 2018;

4. member of the Scientific Committee of ADMOS 2019 Conference, El Campello (Alicante), May 27-29, 2019;
5. member of the Scientific Committee of COUPLED PROBLEMS 2019 Conference, Sitges (Barcelona), June 3-5, 2019;
6. member of the International Scientific Committee of YIC 2021, Valencia, July 7-9, 2021;
7. member of the Advisory Scientific Council of CIMNE (2021-2024);
8. member of the Scientific Committee of COUPLED PROBLEMS 2023 Conference, Chania, (Crete), June 5-7, 2023.
9. member of the Scientific Committee of Sim-Am 2023 Conference, Munchen, July 26-28, 2023.

Evaluation Panels' Member
1. member of the Evaluation Panel for the selection of an assistant professor position in Numerical Analysis (SSD MAT/08) at the Department of Mathematics of Sapienza Università di Roma, February 2008;
2. member of the Evaluation Committee for the Ph.D. in Mathematical Models and Methods in Engineering, Department of Mathematics, Politecnico di Milano: July 2012 (XXVIII cycle); July 2015 (XXXI cycle);
3. member of the Evaluation Panel for the Ph.D. dissertation of I. Mazzieri, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, March 26, 2012;
4. member of the Evaluation Panel for the Ph.D. dissertation of L. Tamellini, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, March 26, 2012;
5. member of the ECCOMAS Ph.D. Award Committee, Barcelona, May 9, 2014;
6. member of the Evaluation Panel for the Ph.D. dissertation of G. El Jannoun, Doctorat ParisTech, CEMEF-Ecole des Mines de Paris, Sophia Antipolis, September 22, 2014;
7. member of the Evaluation Panel for the Ph.D. dissertation of J. Zhao, Ph.D. in Sciences Fondamentales et Appliquées, Ecole Centrale de Nantes, March 3, 2016;
8. member of the Evaluation Panel for the Ph.D. dissertation of A. Tagliabue, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, March 16, 2016;
9. member of the Evaluation Panel for the Ph.D. dissertation of D. Cagnoni, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, March 16, 2016;
10. member of the Evaluation Panel for the Ph.D. dissertation of E. Boey, Faculty of Graduate and Postdoctoral Studies, University of Ottawa, November 17, 2016;
11. member of the Evaluation Panel for the Ph.D. dissertation of R. García-Blanco, Programa de Doctorat de Matemàtica Aplicada, UPC, Barcelona, February 9, 2017;
12. member of the Evaluation Panel for the assignment of the research grant Progetto Premiale FOE 2015 on "Ottica Adattiva", at Istituto Nazionale di Alta Matematica Francesco Severi, Roma, November 24, 2017;
13. member of the Evaluation Panel for the Ph.D. dissertation of G. Alaimo, V. Mercuri, R.M. Romarowski, X. Zou, Ph.D. in Civil Engineering and Architecture, University of Pavia, March 12, 2018;
14. member of the Evaluation Panel for the Ph.D. dissertation of P.C. Africa, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, February 8, 2019;
15. member of the Evaluation Panel for the Ph.D. dissertation of D. Riccobelli, Ph.D. in Mathematical Models and Methods in Engineering, Politecnico di Milano, February 8, 2019;
16. member of the Evaluation Panel for the selection of an RTDA assistant professor at SISSA, Trieste (competition closed on November 18, 2019);
17. member of the Evaluation Committee for the Ph.D. in Mathematical Analysis, Modelling and Applications at SISSA Scuola Internazionale Superiore di Studi Avanzati, Trieste: September 2020 (XXXVI cycle);
18. member of the Evaluation Panel for the final exam of the Master in Mathematical and Physical Methods for Space Sciences, Università degli Studi di Torino, October 19, 2020;
19. member of the Evaluation Panel for the selection of an assistant professor position (RTD a - junior) in Numerical Analysis (SSD MAT/08) at the Department of Mathematics of Università degli Studi di Bologna, November 2020;
20. member of the Evaluation Panel for the Ph.D. dissertation of L. Khoun, École Doctorale de Sciences Mathématiques de Paris-Centre, Sorbonne Université, January 22, 2021;

21. member of the committee for the assignment of the exercise classes in Numerical Analysis (SSD MAT/08), Department of Mathematics, Politecnico di Milano;
22. member of the Evaluation Panel for the thesis dissertation of Z. Wang, Master Degree in Simulation Science, RWTH Aachen University, December 10, 2021;
23. member of the Evaluation Panel for the Ph.D. dissertation of M. Gavazzoni, Ph.D. in Mechanical Engineering, Politecnico di Milano, March 25, 2022;
24. member of the Evaluation Panel for the HDR defence of Professor C. Ghnatios, Mechanical Engineering Department of the Notre Dame University-Louaize, Spring 2022.

Editorial Activity
1. member of the editorial board of the Electronic Transactions on Numerical Analysis (ETNA) journal (2018-present);
2. member of the editorial board of the Mathematical and Computational Applications (MCA) journal (2020-present);
3. member of the editorial board of the International Journal of Computational Fluid Dynamics (JCFD) journal (2021-present);
4. editor of the volume *New Challenges in Grid Generation and Adaptivity for Scientific Computing*. Series: SEMA SIMAI Springer, Vol. **5**, Springer Cham 2015 (editorship joint with L. Formaggia);
5. guest editor of the special issue on *Model Reduction*. J. Sci. Comput. **81** (2019), no. 1 (editorship joint with T. Lelièvre, G. Rozza, D.A. Di Pietro, A. Ern, L. Formaggia);
6. guest editor of the special issue for the *19th International Conference on Finite Elements in Flow Problems*, Rome, April 5-7, 2017. Comput. & Fluids **179** (2019) (editorship joint with H. van Brummelen, A. Corsini, G. Rozza);
7. editor of the volume *Numerical Methods for Flows. FEF 2017 Selected Contributions*. Series: Lect. Notes Comput. Sci. Eng. Vol. **132**, Springer Cham 2020 (editorship joint with H. van Brummelen, A. Corsini, G. Rozza);
8. guest editor of the special issue on *Reduced Order Models in CFD*. Int. J. Comput. Fluid Dyn. **34** (2020), no. 2 (editorship joint with G. Rozza);
9. editor of the volume *Mesh Generation and Adaptation: Cutting-Edge Techniques*. Series: SEMA SIMAI Springer, Vol. **30**, Springer Nature Switzerland AG 2022 (editorship joint with R. Sevilla, K. Morgan);
10. guest editor of the special issue on *Computational Methods for Coupled Problems in Science and Engineering*. Mathematical and Computational Applications (editorship joint with A. Larese, G. Rozza).

Review Activity

Journals
1. Advances in Numerical Analysis
2. Advances in Water Resources
3. AIAA Journal
4. Annali di Matematica Pura ed Applicata
5. Applied Mathematics and Computation
6. Applied Mathematical Modelling
7. Applied Numerical Mathematics
8. Calcolo
9. Computational Mechanics
10. Computers and Mathematics with Applications
11. Computer Methods in Applied Mechanics and Engineering
12. Engineering with Computers
13. International Journal of Numerical Analysis and Modeling
14. International Journal for Numerical Methods in Engineering
15. International Journal for Numerical Methods in Fluids

16. Journal of Computational Physics
17. Journal of Mathematical Sciences
18. Journal of Numerical Mathematics
19. Mathematics of Computation
20. M2AN Mathematical Modelling and Numerical Analysis
21. M3AS Mathematical Models and Methods in Applied Sciences
22. Multiscale Modeling and Simulation
23. Numerical Methods for Partial Differential Equations
24. Numerische Mathematik
25. SIAM Journal on Numerical Analysis
26. SIAM Journal on Scientific Computing
27. Vietnam Journal of Mathematics
28. Water Resource Research

Ph.D. Theses
1. *A dimensional reduction approach based on the application of reduced basis methods in the context of hierarchical model reduction*. K. Smetana. Ph.D. in Sciences, Institut für Numerische und Angewandte Mathematik, Münster (May 2013);
2. *Time accurate anisotropic mesh adaptation for unsteady flows*. G. El Jannoun. Doctorat ParisTech, Ècole Nationale Supèrieure des Mines de Paris, Sophia Antipolis (August 2014);
3. *Direct multiphase mesh generation from 3D images using anisotropic mesh adaptation and a redistancing equation*. J. Zhao. Ph.D. in Sciences Fondamentales et Appliquées, Ecole Centrale de Nantes (February 2016);
4. *Anisotropic residual based mesh adaptation for reaction-diffusion systems: applications to cardiac electrophysiology*. E. Boey. Ph.D. at Faculty of Graduate and Postdoctoral Studies, University of Ottawa (October 2016);
5. *Efficient solvers for power flow equations: parametric solutions with accuracy control assessment*. R. Garcia-Blanco. Departament d'Enginyeria Civil i Ambiental, Programa de Doctorat de Matemàtica Aplicada, UPC, Barcelona (December 2016);
6. *Simulation tools for biomechanical applications with PGD-based reduced order models*. X. Zou. Ph.D. in Civil Engineering and Architecture, University of Pavia (March 2018).
7. *Reduced order modelling for parametrized time-domain vibro-acoustic problems*. L. Khoun. École Doctorale de Sciences Mathématiques de Paris-Centre, Sorbonne Université (October 2020).

Master Theses
1. *Metodi di Schwarz multilivello per equazioni alle derivate parziali*. G. Migliorati. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2008-2009);
2. *Local stochastic volatility models*. D. Cozzi. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2011-2012);
3. *A mesh interpolation and upscaling algorithm for three dimensional basin modeling*. L.G. Pasquale. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2012-2013);
4. *Shallow water model of flow in a general topography*. L. Balsemin. Master Degree in in Mathematics, Università degli Studi di Padova (a.y. 2014-2015);
5. *A posteriori analysis of topological model reduction error, with application to mass transport in microcirculationg*. S. Brambilla. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2017-2018);
6. *Mathematical models of functional hyperemia in the human retina*. M. Carbonara. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2018-2019);
7. *Design of bi-fluid heat exchangers using topology optimization*. G. Gargantini. Master Degree in Mathematical Engineering, Politecnico di Milano (a.y. 2019-2020).

HDR Theses

1. *Advanced model and simulation using model reduction techniques and digital twins.* C. Ghnatios. Habilitation à diriger des recherches, Mechanical Engineering Department, Notre Dame University-Louaize, April 2022.

Projects

1. Dutch Innovational Research Incentives Scheme-Veni Grant 2009 Round, NWO Netherlands Organisation for Scientific Research (2009);
2. Dutch Innovational Research Incentives Scheme-Veni Grant 2021 Round, NWO Domain Applied and Engineering Sciences (2021).

Milano, 03/07/2022

(Simona Perotto)