

# SANDRA PIERACCINI

Curriculum vitae

## EDUCATION

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<b>Master Degree in Mathematics</b> Università degli Studi di Firenze	April 1997 Florence, Italy
<b>PhD in Computational Mathematics and Operations Research</b> Università Statale di Milano	January 2001 Milan, Italy

## RESEARCH IDS

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<b>OrcID</b>	0000-0002-0077-6285
<b>Publons/Researcher ID</b>	F-9231-2013
<b>Scopus author ID</b>	6603390564

## POSITIONS - CURRENT AND PREVIOUS

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<b>Associate Professor</b> Department of Mechanical and Aerospace Engineering, Politecnico di Torino	2018– Torino, Italy
<b>Assistant Professor</b> Dep. of Mechanical and Aerospace Eng. & Dep. of Mathematical Sciences, Politecnico di Torino	2006-2018 Torino, Italy
<b>Assistant Professor (non permanent position)</b> Dep. of Mathematical Sciences, Politecnico di Torino	2002-2006 Torino, Italy
<b>Research Fellow</b> Department of Energy Engineering, Università di Firenze	2001-2002 Florence, Italy

## MAIN RESEARCH INTERESTS

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Deep learning  
Numerical Methods for underground flow simulations in fractured media  
Numerical Optimization  
Uncertainty Quantification

## PROJECTS

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Principal Investigator of two national projects: INdAM-GNCS project (2015/2016) and CINECA ISCRA project 2016/2017

Principal Investigator of two local teaching projects: MATCOL (Computational mathematics online, 2013-2015) and ALG.OL (Numerical linear algebra online, 2016-2018)

Team member of several national and international projects (from 1999 on):

- 7 Italian PRIN or COFIN projects (1998, 2003, 2004, 2005, 2008, 2012, 2017)
- 4 INdAM-GNCS projects (2013, 2016, 2017, 2018)
- 2 INDAM projects (2003, 2005)
- 2 bilateral (Italy-France) Galileo projects
- AIRTOLYMI project funded by Regione Piemonte

## CONFERENCES AND SUMMER SCHOOL ORGANIZATION

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Mini-symposia organization at several international conferences (Interpore 2016, 2017, 2018; SIAM GS 2015, 2017, 2019, 2021)

Member of the organizing committee of five editions of the summer school *Methods and Models of Kinetic Theory*, Porto Ercole (Grosseto, Italy).

## INSTITUTIONAL RESPONSIBILITIES

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<b>Member of the board of the UMI AI&amp;ML&amp;MAT activity group</b>	2020–
UMI (Italian Mathematical Association) activity group on mathematics, artificial intelligence and machine learning	Italy
<b>Member of the Central committee for the Admission tests</b>	2006–
Responsible for all the admission tests for candidate students at Politecnico di Torino	Torino, Italy
<b>Member of the Department library committee</b>	2007-2017
Department of mathematical Sciences, Politecnico di Torino	Torino, Italy
<b>Department contact person for the institutional publications' platform</b>	2012–
Dep. of Mathematical Sciences & Dep. of Mech. and Aerospace Engineering, Politecnico di Torino	Torino, Italy
<b>Department contact person for the institutional open access deposit</b>	2012–
Dep. of Mathematical Sciences & Dep. of Mech. and Aerospace Engineering, Politecnico di Torino	Torino, Italy

## MEMBERSHIPS

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<b>European Women in Mathematics</b>	2021–
<b>SIAM member (SIAM-UQ activity group)</b>	2019–
<b>SIMAI member (Italian Society for Applied and Industrial Mathematics)</b>	2016–
<b>UMI member (Italian Mathematical Association)</b>	2016–

## TEACHING

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<b>Lecturer/course coordinator of several Bachelor degree courses</b>	2002–
<i>Numerical methods</i>	Politecnico di Torino, Italy
<b>Lecturer of several Bachelor degree courses</b>	2012–
<i>Numerical linear algebra, Coding and scientific computing</i>	Politecnico di Torino, Italy
<b>Lecturer/course coordinator of several Master degree courses</b>	2002–
<i>Numerical methods and Scientific computing, Numerical optimization for large scale problems, Numerical and statistical methods</i>	Politecnico di Torino, Italy
<b>Lecturer/course coordinator of PhD courses</b>	2012,2014,2019,2021
<i>Numerical methods for nonlinear equations and Numerical optimization for large scale problems</i>	Politecnico di Torino, Italy

## REFERENCES

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- [1] S. Berrone, F. Della Santa, S. Pieraccini, and F. Vaccarino. Machine learning for flux regression in discrete fracture networks. *GEM*, 12, 2021.
- [2] S. Berrone, D. Grappein, S. Pieraccini, and S. Scialò. A three-field based optimization formulation for flow simulations in networks of fractures on non-conforming meshes. *SIAM JOURNAL ON SCIENTIFIC COMPUTING*, 43:381–404, 2021.
- [3] F. Colombo, F. Della Santa, and S. Pieraccini. Multi-objective optimisation of an aerostatic pad: design of position, number and diameter of the supply holes. *JOURNAL OF MECHANICS*, 36:347–360, 2020.

- [4] S. Berrone, J. D. Hyman, and S. Pieraccini. Multilevel monte carlo predictions of first passage times in threedimensional discrete fracture networks: a graphbased approach. *WATER RESOURCES RESEARCH*, 56, 2020.
- [5] S. Pieraccini. Uncertainty quantification analysis in discrete fracture network flow simulations. *GEM*, 11, 2020.
- [6] S. Berrone, A. Borio, S. Pieraccini, and S. Scialò. New strategies for the simulation of the flow in three dimensional poro-fractured media. In *Numerical Mathematics and Advanced Applications - ENUMATH 2017*, volume 126, pages 715–723. Springer, 2019.
- [7] B. Wang, Y. Feng, S. Pieraccini, S. Scialò, and C. Fidelibus. Iterative coupling algorithms for large multi-domain problems with the boundary element method. *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*, 117:1–14, 2019.
- [8] S. Berrone, M. F. Benedetto, A. Borio, S. Pieraccini, and S. Scialò. The virtual element method for the transport of passive scalars in discrete fracture networks. In *Numerical Mathematics and Advanced Applications ENUMATH 2017*, volume 126, pages 501–508. Springer, 2019.
- [9] C. Canuto, S. Pieraccini, and D. Xiu. Uncertainty quantification of discontinuous outputs via a non-intrusive bifidelity strategy. *JOURNAL OF COMPUTATIONAL PHYSICS*, 398, 2019.
- [10] S. Berrone, C. Canuto, S. Pieraccini, and S. Scialò. Uncertainty quantification in discrete fracture network models: stochastic geometry. *WATER RESOURCES RESEARCH*, 54:1338–1352, 2018.
- [11] S. Berrone, C. Fidelibus, S. Pieraccini, S. Scialò, and F. Vicini. Unsteady advection-diffusion simulations in complex discrete fracture networks with an optimization approach. *JOURNAL OF HYDROLOGY*, 566:332–345, 2018.
- [12] S. Berrone, A. Borio, C. Fidelibus, S. Pieraccini, S. Scialò, and F. Vicini. Advanced computation of steady-state fluid flow in discrete fracture-matrix models: Fem-bem and vem-vem fracture-block coupling. *GEM*, 9:377–399, 2018.
- [13] S. Berrone, S. Pieraccini, and S. Scialò. Non-stationary transport phenomena in networks of fractures: effective simulations and stochastic analysis. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*, 315:1098–1112, 2017.
- [14] S. Berrone, S. Pieraccini, and S. Scialò. Flow simulations in porous media with immersed intersecting fractures. *JOURNAL OF COMPUTATIONAL PHYSICS*, 345:768–791, 2017.
- [15] M. F. Benedetto, S. Berrone, A. Borio, S. Pieraccini, and S. Scialò. The virtual element method for discrete fracture network flow and transport simulations. In *ECCOMAS Congress 2016 - Proceedings of the 7th European Congress on Computational Methods in Applied Sciences and Engineering*, volume 2, pages 2953–2970. National Technical University of Athens, 2016.
- [16] S. Pieraccini and S. Scialò. *On a PDE-Constrained Optimization Approach for Flow Simulations in Fractured Media*, pages 27–45. Springer, 2016.
- [17] M. F. Benedetto, S. Berrone, Andrea Borio, S. Pieraccini, and S. Scialò. Order preserving supg stabilization for the virtual element formulation of advection-diffusion problems. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*, 311:18–40, 2016.
- [18] M. F. Benedetto, S. Berrone, A. Borio, S. Pieraccini, and S. Scialò. A hybrid mortar virtual element method for discrete fracture network simulations. *JOURNAL OF COMPUTATIONAL PHYSICS*, 306:148–166, 2016.
- [19] S. Berrone, S. Pieraccini, and S. Scialò. Towards effective flow simulations in realistic discrete fracture networks. *JOURNAL OF COMPUTATIONAL PHYSICS*, 310:181–201, 2016.

- [20] S. Berrone, S. Pieraccini, S. Scialò, and F. Vicini. A parallel solver for large scale dfn flow simulations. *SIAM JOURNAL ON SCIENTIFIC COMPUTING*, 37:C285–C306, 2015.
- [21] S. Bellavia and S. Pieraccini. On affine scaling inexact dogleg methods for bound-constrained nonlinear systems. *OPTIMIZATION METHODS & SOFTWARE*, 30:276–300, 2015.
- [22] M. F. Benedetto, S. Berrone, A. Borio, S. Pieraccini, and S. Scialò. The virtual element method for large scale discrete fracture network simulations: fracture-independent mesh generation. In *Special issue: 86th annual meeting of the international association of applied mathematics and mechanics (GAMM)*, pages 19–22. Wiley, 2015.
- [23] S. Berrone, C. Canuto, S. Pieraccini, and S. Scialò. Uncertainty quantification in discrete fracture network models: stochastic fracture transmissivity. *COMPUTERS & MATHEMATICS WITH APPLICATIONS*, 70:603–623, 2015.
- [24] M. F. Benedetto, S. Berrone, S. Pieraccini, S. Scialò, F. Vicini, and C. Fidelibus. A family of methods with arbitrary meshes for dfn flow simulations. In *Proceedings, DFNE 2014*, 2014.
- [25] S. Berrone, S. Pieraccini, and S. Scialò. An optimization approach for large scale simulations of discrete fracture network flows. *JOURNAL OF COMPUTATIONAL PHYSICS*, 256:838–853, 2014.
- [26] S. Berrone, C. Fidelibus, S. Pieraccini, and S. Scialò. Simulation of the steady-state flow in discrete fracture networks with non conforming meshes and extended finite elements. *ROCK MECHANICS AND ROCK ENGINEERING*, 47:2171–2182, 2014.
- [27] M. F. Benedetto, S. Berrone, S. Pieraccini, and S. Scialò. The virtual element method for discrete fracture network simulations. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*, 280:135–156, 2014.
- [28] S. Berrone, S. Pieraccini, and S. Scialò. On simulations of discrete fracture network flows with an optimization-based extended finite element method. *SIAM JOURNAL ON SCIENTIFIC COMPUTING*, 35:A908–A935, 2013.
- [29] S. Berrone, S. Pieraccini, and S. Scialò. A pde-constrained optimization formulation for discrete fracture network flows. *SIAM JOURNAL ON SCIENTIFIC COMPUTING*, 35:B487–B510, 2013.
- [30] R. Monaco and S. Pieraccini. A mathematical model for environment evaluations in landscape ecology. *NOTE DI MATEMATICA*, 32:147–157, 2012.
- [31] S. Bellavia, M. Macconi, and S. Pieraccini. Constrained dogleg methods for nonlinear systems with simple bounds. *COMPUTATIONAL OPTIMIZATION AND APPLICATIONS*, 53:771–794, 2012.
- [32] S. Berrone, F. De Santi, S. Pieraccini, and M. Marro. Coupling traffic models on networks and urban dispersion models for simulating sustainable mobility strategies. *COMPUTERS & MATHEMATICS WITH APPLICATIONS*, 64:1975–1991, 2012.
- [33] S. Pieraccini and G. Puppo. Microscopically implicit-macroscopically explicit schemes for the bgk equation. *JOURNAL OF COMPUTATIONAL PHYSICS*, 231:299–327, 2012.
- [34] A. Belleni Morante, R. Monaco, and S. Pieraccini. Photon transport in a time-dependent interstellar cloud. *MATHEMATICAL METHODS IN THE APPLIED SCIENCES*, 33:1245–1256, 2010.
- [35] S. Pieraccini and G. Puppo. Numerical schemes for the bgk kinetic model. *OBERWOLFACH REPORTS*, 5, 2009.
- [36] S. Bellavia and S. Pieraccini. Numerical solution of kkt systems in pde-constrained optimization problems via the affine scaling trust-region approach. *INTERNATIONAL JOURNAL OF COMPUTER MATHEMATICS*, 86:2122–2142, 2009.

- [37] A. Alaia, G. Puppo, and S. Pieraccini. Velocity discretization in numerical schemes for bgk equations. In *Hyperbolic problems: theory, numerics, applications*, pages 857–864. Springer, 2008.
- [38] S. Pieraccini, R. Riganti, and A. Belleni Morante. Numerical treatment of a time dependent inverse problem in photon transport. *BOLLETTINO DELL'UNIONE MATEMATICA ITALIANA. B*, 10:195–211, 2007.
- [39] S. Pieraccini and G. Puppo. Implicit-explicit schemes for bgk kinetic equations. *JOURNAL OF SCIENTIFIC COMPUTING*, 32:1–28, 2007.
- [40] C. Baranger and S. Pieraccini. Numerical simulation of models for reacting polytropic gases. In *Proceedings "WASCOM 2005" 13th Conference on Waves and Stability in Continuous Media*, pages 28–34, Singapore, 2006. World Scientific.
- [41] S. Pieraccini, R. Riganti, and A. Belleni Morante. Numerical treatment of a time dependent inverse problem in photon transport. *BOLLETTINO DELL'UNIONE MATEMATICA ITALIANA. B*, 8:773–779, 2005.
- [42] R. Monaco, M. Pandolfi Bianchi, S. Pieraccini, and G. Puppo. Numerical simulations of a reacting gas mixture at the hydrodynamic scale. In *WASCOM 2003: 12TH CONFERENCE ON WAVES AND STABILITY IN CONTINUOUS MEDIA, PROCEEDINGS*, pages 334–340. World Scientific, 2004.
- [43] S. Bellavia and S. Pieraccini. Convergence analysis of an inexact infeasible interior point method for semidefinite programming. *COMPUTATIONAL OPTIMIZATION AND APPLICATIONS*, 29:289–313, 2004.
- [44] S. Pieraccini, M. G. Gasparo, and A. Pasquali. Global newton-type methods and semismooth reformulations for ncp. *APPLIED NUMERICAL MATHEMATICS*, 44:367–384, 2003.
- [45] S. Pieraccini. Hybrid newton-type method for a class of semismooth equations. *JOURNAL OF OPTIMIZATION THEORY AND APPLICATIONS*, 112:381–402, 2002.
- [46] M. G. Gasparo, S. Pieraccini, and A. Armellini. An infeasible interior-point method with nonmonotonic complementarity gaps. *OPTIMIZATION METHODS & SOFTWARE*, 17:561–586, 2002.