

Luca Bergamaschi

Curriculum Vitae

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Personal data and education

Born in Cremona on 21/02/1964. Married, two kids (Michele - 24, Bianca - 17).

Diploma di V anno in Pianoforte

Maturità scientifica with grade 60/60

Apr 1990 MsC Laurea in Information Sciences, University of Pisa

Sep 1994 PhD in Computational Mathematics with a dissertation entitled: *Convergence Study of the Conjugate Gradient Method for Eigenvalue Computation of Sparse Matrices*.

Participation to Courses and Schools

June 1990 Courses of Numerical Analysis (Kershaw), Complex Analysis (Gamelin) and Functional Analysis (Bercovci) at the SMI in Perugia.

June 1991 Venice Summer School on Applied Mathematics

July 1992 Courses: Iterative Methods for Eigenvalue Problems (Saad) and Multigrid (Bramble) at the SMI in Cortona.

June 1994 Summer School on *Parallel Numerical Algorithms*, Peñíscola, Spain.

July 1996 NATO ASI Summer School on *Iterative Methods*, Las Palmas, Spain.

July 1997 Summer School in *Advanced Numerical Approximation of Nonlinear Hyperbolic Equations*, Cetraro

Academic positions

1995 – 2007 Ricercatore universitario (Assistant Professor) SSD: MATH-05/A (Numerical Analysis)

Oct 2007 – Associate Professor (confirmed on Oct 2010), SSD: MATH-05/A, University of Padova, Faculty of Engineering. Since January 1, 2012, he is member of the Department of Civil Environmental and Architectural Engineering, University of Padova

16/12/2013 Declared eligible for a position of full professor by the committee for the National Scientific Habilitation in the MATH-05/A Scientific Sector (Numerical Analysis).

13/04/2021– Declared eligible for a position of full professor by the committee for the National Scientific Habilitation in the MATH-05/A Scientific Sector (Numerical Analysis).

Present responsibilities at the ICEA Department

2018– Member of the teaching staff of the PhD programme in Civil Environmental and Architectural Engineering

2024-25 Member of the board per il Miglioramento della Didattica, progetto Dipartimento di Eccellenza

Programming Languages and Operative Systems

Advanced $\LaTeX$, Linux, Fortran90, Matlab

Intermediate MPI

Software developments

(In collaboration with F. Sartoretto) Parallel *Deflation-accelerated Conjugate Gradient* (PDACG) Fortrant solver for large and sparse symmetric eigenvalue problems. <https://www.dmsa.unipd.it/~sartoret/Pdacg/pdacg/overview.html>

Languages

Italian Mother Tongue

English Excellent (written) Good (oral)

Spanish Excellent, both written and oral

Teaching

Teaching in the Faculty (now School) of Engineering, University of Padua

Unless differently stated, the courses listed below consist in (at least) 48 hours, mostly 72 hours each. Different colors if the course is delivered either in **English** or in **Spanish**.

BsC		MsC	
Course Name	# courses delivered	Course Name	# courses delivered
Calcolo Numerico	40	Calolo Numerico	3
Mathematical Analysis	17	Numerical Methods	1
Statistical Methods ¹	1	Maths II (Environmental Statistics) ¹	4
Mathematics ¹	4	Numerical Methods for Differential Equations	7
# BSC courses	62	# MSC courses	14
1997, 2003–19, 21–24: Summer Courses (20 hrs) in Calcolo Numerico			22

¹ Courses offered by the School of Agricultural Sciences.

JAN 2011 (MsC) **Iterative methods for linear and nonlinear equations**, within the Course: Fundamentos de matematica Aplicada. Polytechnic University of Valencia.

PhD Courses

2017 – present **Numerical Methods** PhD School in Sciences of Civil Environmental & Architectural Engineering.

Feb 2019 **Iterative Methods and Preconditioning**, School of Maths (University of Edinburgh).

2004–17 **Numerical Linear Algebra** PhD School in Sciences of Civil & Environmental Engineering.

Winter 2007 **Métodos Numéricos Avanzados** Polytechnic University of Valencia.

Winter 2006 **Iterative Methods for Large Matrices. Application to PDE and Optimization problems**, School of Maths (University of Edinburgh).

2001–04 **Optimization and Interior Point Methods** PhD School in Computational Mathematics.

2003–04 **Mixed Finite Elements and Finite Volumes for the convection diffusion equation** PhD School in Computational Mathematics.

Recent thesis direction: PhD

2022 Co-supervisor of the student *Fariba Bakrani Balani*, PhD in Applied Mathematics

Recent thesis directions: MsC

2024 Mathematical Engineering: Alessandro Reami

2021 Mathematical Engineering: Andrea Baldina

2019 Mathematical Engineering: Filippo Zanetti

2015 Information Engineering: Alain Tcheuckam

Recent thesis directions: BsC

2022 Aerospace Engineering: Vittorio Candiello

2021 Aerospace Engineering: Riccardo Magri

2019 Mechanical Engineering: Nicolò Cappello

2019 Aerospace Engineering: Filippo Zanetti

2018 Aerospace Engineering: Martino Nozza

2017 Aerospace Engineering: Niccolò Tonicello

2016 Mechanical Engineering: Riccardo Tomelleri

2015 Mechanical Engineering: Michele Zecchin

Scientific Activity

I have been working in the following fields.

Numerical Linear Algebra

Matrix-free preconditioners

1. Parallel polynomial preconditioners for Krylov solvers
2. Matrix-free preconditioners for the dominant λ -modes of a nuclear power reactor

Low-rank update of preconditioners for sequences of linear systems arising from

1. Discretization by Finite Elements of transient PDEs
2. Eigenvalue problems
3. Nonlinear problems
4. Constrained optimization problems solved via the Interior Point method

Sequential and parallel algorithms for large and sparse eigenvalue problems. Development of a CG-based method for computing the leftmost eigenpairs of SPD matrices.

Parallel algorithms based on approximate inverses to accelerate Krylov subspace methods for large and sparse linear systems.

Indefinite block preconditioner for (multiple) saddlepoint linear systems arising in

1. Nonlinear convex constrained optimization by the Interior Point method
2. Mixed Finite Element discretization of the Navier-Stokes equations at high Reynolds number
3. Coupled Consolidation problem (Biot's law)

Discretization of PDEs

High-order implicit Runge-Kutta methods for the Stokes equation

Mixed Finite Elements and Finite Volumes

1. for the Black-Oil Model in reservoir simulations
2. for the coupled flow and transport equations in porous media

Operator Splitting for the transport equation

Nonlinear systems

Newton-like methods for nonlinear systems arising from the Mixed Finite Element discretization of the Richards equation.

Developments of Quasi-Newton preconditioners for the linearized Newton systems

Approximation of $\exp(A)v$

Chebyshev and Leja series expansion of the scalar functions e^x and $\phi(x) = \frac{e^x - 1}{x}$ for the solution of large systems of ODEs through the computation of the exponential of the spatial discretization operator. Application to convection-diffusion-reaction equations.

List of Publications

Il numero d'ordine in rosso enumera le pubblicazioni allegate alla domanda.

Preprints

- 2025 [1] L. Bergamaschi, A. Martínez, J. Pearson and A. Potschka, Eigenvalue bounds for preconditioned symmetric multiple saddle-point matrices, **Linear Algebra and its Applications**, submitted, 2025
- [2] L. Bergamaschi, A. Martínez, and M. Ferronato, Triangular preconditioners for double saddle point linear systems arising in the mixed form of poroelasticity equations **arXiv:2505.06043 [math.NA]**, 2025
- [3] V. Mottola, A. Tamburrino, L. Bergamaschi, A. G. Chiariello, E. Corsaro, C. Forestiere, G. Rubinacci and S. Ventre, QR-recursive compression of volume integral equations for electromagnetic scattering by large metasurfaces **IEEE Transactions on Antennas and Propagation**, submitted, 2025

Papers on Refereed International Journals

- 2025 [4 (1)] L. Bergamaschi, A. Martínez, J. Pearson and A. Potschka, Spectral analysis of block preconditioners for double saddle-point linear systems with application to PDE-constrained optimization **Computational Optimization with Applications**, 61 (2), 423–455, 2025
- 2024 [5 (2)] L. Bergamaschi, S. Leveque, A. Martínez and J Pearson, Parallel-in-time solver for the all-at-once Runge-Kutta discretization. **SIAM Journal on Matrix Analysis and Applications**, 45(4), 1902–1928, 2024
- [7 (3)] F. Bakrani Balani, L. Bergamaschi, A. Martínez and M. Hajarani, Some preconditioning techniques for a class of double saddle point problems **Numerical Linear Algebra with Applications**, 31(4), e2551, 2024
- 2023 [7] L. Bergamaschi, M. Ferronato, G. Isotton, C. Janna and A. Martínez, Parallel matrix-free polynomial preconditioners with application to flow simulations in discrete fracture networks **Computer and Mathematics with Applications**, 146 (2023), pp. 60–70

- [8] F. Balani Bakrani, M. Hajarian, L. Bergamaschi, Two block preconditioners for a class of double saddle point linear systems, *Applied Numerical Mathematics*, 190 (2023), pp. 155–167
- 2022 [9] A. Carreño, L. Bergamaschi, A. Martínez, D. Ginestar, A. Vidal-Ferrándiz, and G. Verdú Strategies of Preconditioner Updates for Sequences of Linear Systems Associated with the Neutron Diffusion *Computational and Mathematical Methods*, 2022, Article ID 3884836
- [10] G. Zilli, and L. Bergamaschi, Block preconditioners for linear systems in interior point methods for convex constrained optimization *Annali dell'Università di Ferrara*, 2022, 68(2), pp. 337–368
- 2021 [11] L. Bergamaschi and A. Martínez, Parallel Newton–Chebyshev polynomial preconditioners for the conjugate gradient method *Computational and Mathematical Methods*, 2021, 3(6), e1153
- [12] L. Bergamaschi, J. Gondzio, A. Martínez, J. Pearson and S. Pougkakiotis, A new preconditioning approach for an interior point-proximal method of multipliers for linear and convex quadratic programming *Numerical Linear Algebra with Applications*, 2021, 28(4), e2361
- 2020 [13] L. Bergamaschi, J. Marín e A. Martínez, Compact Quasi-Newton preconditioners for SPD linear systems. *Numerical Linear Algebra with Applications*, 27(6) e2322, 2020.
- [14] F. Zanetti, L. Bergamaschi, A Scalable Block Preconditioner in Computational Fluid Dynamics at High Reynolds Numbers, *Algorithms*, 13(8), 199, 2020.
- [15 (4)] L. Bergamaschi A survey of Low-Rank updates of preconditioners for sequences of symmetric linear systems. *Algorithms*, 13(4), 100, 2020
- 2019 [16] A. Carreño, L. Bergamaschi, A. Martínez, A. Vidal-Ferrándiz, D. Ginestar e G. Verdú Matrix-free block Newton method to compute the dominant λ -modes of a nuclear power reactor *Mathematical and Computational Applications*, 24(1):6, 2019
- [17] L. Bergamaschi, E. Facca, A. Martínez e M. Putti. Spectral preconditioners for the efficient numerical solution of a continuous branched transport model. *Journal of Computational and Applied Mathematics*, 354:259–270, 2019.
- 2018 [18] (5) L. Bergamaschi, V. De Simone, D. di Serafino e A. Martínez. BFGS-like updates of constraint preconditioners for sequences of KKT linear systems. *Numerical Linear Algebra with Applications*, 25:e2144(5):1–19, 2018.
- [19] L. Bergamaschi e E. Bozzo. Computing the smallest eigenpairs of the graph Laplacian. *SeMA Journal*, 75:1–16, 2018.
- 2017 [20] (6) L. Bergamaschi and A. Martínez. Two-stage spectral preconditioners for iterative eigensolvers. *Numerical Linear Algebra with Applications*, 24(3):1–14, 2017.
- 2015 [21] L. Bergamaschi and A. Martínez. Efficiently preconditioned inexact Newton methods for large symmetric eigenvalue problems. *Optimization Methods & Software*, 30:301–322, 2015.
- 2014 [22] S.-L. Wu, L. Bergamaschi and C.-X. Li. A note on eigenvalue distribution of constraint-preconditioned symmetric saddle point matrices. *Numerical Linear Algebra with Applications*, 21:171–174, 2014.

- 2013 [23] L. Bergamaschi and A. Martínez. Parallel RFSAI-BFGS preconditioners for large symmetric eigenproblems. *Journal of Applied Mathematics*, 2013, Article ID 767042, 10 pp., 2013.
- [24] L. Bergamaschi, R. Bru, A. Martínez, J. Mas and M. Putti. Low-rank update of preconditioners for the nonlinear Richard's equation. *Mathematical and Computer Modelling*, 57(7–8):1933–1941, 2013.
- 2012 [25] L. Bergamaschi and A. Martínez. Banded target matrices and recursive FSAI for parallel preconditioning. *Numerical Algorithms*, 61(2):223–241, 2012.
- [26 (7)] L. Bergamaschi and A. Martínez. RMCP: Relaxed mixed constraint preconditioners for saddle point linear systems arising in geomechanics. *Computer Methods in Applied Mechanics and Engineering*, 221–222:54–62, 2012.
- [27] L. Bergamaschi, A. Martínez and G. Pini. Parallel Rayleigh Quotient optimization with FSAI-based preconditioning. *Journal of Applied Mathematics*, 2012, Article ID 872901, 14 pp., 2012.
- [28] (8) L. Bergamaschi. Eigenvalue distribution of constraint-preconditioned symmetric saddle point matrices. *Numerical Linear Algebra with Applications*, 19(4):754–772, 2012.
- [29] L. Bergamaschi, R. Bru, A. Martínez and M. Putti. Quasi-Newton acceleration of ILU preconditioners for nonlinear two-phase flow equations in porous media. *Advances in Engineering Software*, 46(1):63–68, 2012.
- 2011 [30] L. Bergamaschi and A. Martínez. FSAI-based parallel mixed constraint preconditioners for saddle point problems arising in geomechanics. *Journal of Computational and Applied Mathematics*, 236(3):308–318, 2011.
- [31] L. Bergamaschi, J. Gondzio, M. Venturin and G. Zilli. Erratum to: Inexact constraint preconditioners for linear systems arising in interior point methods. *Computational Optimization with Applications*, 49(2):401–406, 2011.
- [32] L. Bergamaschi, R. Bru and A. Martínez. Low-rank update of preconditioners for the inexact Newton method with SPD jacobian. *Mathematical and Computer Modelling*, 54(7–8):1863–1873, 2011.
- 2010 [33] L. Bergamaschi, M. Ferronato and G. Gambolati. Performance and robustness of block constraint preconditioners in finite element coupled consolidation problems. *International Journal for Numerical Methods in Engineering*, 81(3):381–402, 2010.
- 2009 [34] L. Bergamaschi, A. Martínez and G. Pini. An efficient parallel MLPG method for poroelastic models. *CMES: Computer and Modeling in Engineering & Sciences*, 49(3):191–216, 2009.
- [35] A. Martínez, L. Bergamaschi, M. Caliarì and M. Vianello. A massively parallel exponential integrator for advection-diffusion models. *Journal of Computational and Applied Mathematics*, 231(1):82–91, 2009.
- 2008 [36 (9)] L. Bergamaschi, M. Ferronato and G. Gambolati. Mixed constraint preconditioners for the solution to FE coupled consolidation equations. *Journal of Computational Physics*, 227(23):9885–9897, 2008.
- 2007 [37] L. Bergamaschi, M. Caliarì and M. Vianello. The LEM exponential integrator for advection-diffusion-reaction equations. *Journal of Computational and Applied Mathematics*, 210(1–2):56–63, 2007.

- [38] L. Bergamaschi, G. Gambolati and G. Pini. A numerical study of inverse preconditioning for the parallel iterative solution to 3d finite element flow equations. *Journal of Computational and Applied Mathematics*, 210(1–2):64–70, 2007.
- [39 (10)] L. Bergamaschi, M. Ferronato and G. Gambolati. Novel preconditioners for the iterative solution to FE-discretized coupled consolidation equations. *Computer Methods in Applied Mechanics and Engineering*, 196(25–28):2647–2656, 2007.
- [40] L. Bergamaschi, J. Gondzio, M. Venturin and G. Zilli. Inexact constraint preconditioners for linear systems arising in interior point methods. *Computational Optimization with Applications*, 36(2–3):136–147, 2007.
- 2006 [41 (11)] L. Bergamaschi, R. Bru, A. Martínez and M. Putti. Quasi-Newton preconditioners for the inexact Newton method. *Electronic Trans. Num. Anal.*, 23:76–87, 2006.
- [42] L. Bergamaschi, A. Martínez and G. Pini. Parallel preconditioned conjugate gradient optimization of the Rayleigh quotient for the solution of sparse eigenproblems. *Applied Mathematics and Computation*, 175(2):1694–1715, 2006.
- 2005 [43] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel eigenanalysis of multiaquifer systems. *International Journal for Numerical Methods in Engineering*, 63(15):2069–2085, 2005.
- 2004 [44] M. Caliarì, M. Vianello and L. Bergamaschi. Interpolating discrete advection-diffusion propagators at spectral Leja sequences. *Journal of Computational and Applied Mathematics*, 172(1):79–99, 2004.
- [45 (12)] L. Bergamaschi, J. Gondzio and G. Zilli. Preconditioning indefinite systems in interior point methods for optimization. *Computational Optimization with Applications*, 28(2):149–171, 2004.
- 2003 [46] L. Bergamaschi, G. Pini and F. Sartoretto. Computational experience with sequential and parallel preconditioned Jacobi Davidson for large sparse symmetric matrices. *Journal of Computational Physics*, 188(1):318–331, 2003.
- [47] L. Bergamaschi, M. Caliarì and M. Vianello. Efficient approximation of the exponential operator for discrete 2d advection-diffusion problems. *Numerical Linear Algebra with Applications*, 10(3):271–289, 2003.
- 2002 [48 (13)] L. Bergamaschi and M. Putti. Numerical comparison of iterative eigensolvers for large sparse symmetric matrices. *Computer Methods in Applied Mechanics and Engineering*, 191(45):5233–5247, 2002.
- [49] A. Mazzia, L. Bergamaschi, C. N. Dawson and M. Putti. Godunov mixed methods on triangular grids for advection-dispersion equations. *Comput. Geosci.*, 6(2):123–139, 2002.
- 2001 [50] L. Bergamaschi, I. Moret and G. Zilli. Inexact quasi-Newton methods for sparse systems of nonlinear equations. *Journal of Future Generation Computer Systems*, 18(1):41–53, 2001.
- [51] G. Pace, A. Berton and L. Bergamaschi. Bi-quadratic surface response for quantitative determination of analytes leading to partially overlapped chromatographic peaks. *Journal of Chromatography A*, 907:81–88, 2001.
- [52] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel preconditioning of a sparse eigensolver. *Parallel Computing*, 27:963–976, 2001.
- [53] A. Mazzia, L. Bergamaschi and M. Putti. On the reliability of numerical solutions for density dependent flow and transport in groundwater. *Transport in Porous Media*, 43(1):65–86, 2001.

- 2000 [54] L. Bergamaschi and G. Zilli. Parallel inexact Newton and interior point method. *Annali dell'Università di Ferrara – Sez. VII – Scienze Matematiche*, XLV:467–478, 2000.
- [55] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel flow evaluation and preconditioning of gradient eigensolvers. *Annali dell'Università di Ferrara – Sez. VII – Scienze Matematiche*, XLV:191–202, 2000.
- [56] L. Bergamaschi, G. Gambolati, A. Mazzia, G. Pini and M. Putti. Mixed finite elements and finite volumes for density dependent flow and transport in groundwater. *Annali dell'Università di Ferrara – Sez. VII – Scienze Matematiche*, XLV:179–190, 2000.
- [57] L. Bergamaschi, G. Pini and F. Sartoretto. Approximate inverse preconditioning in the parallel solution of sparse eigenproblems. *Numerical Linear Algebra with Applications*, 7(3):99–116, 2000.
- [58] (14) L. Bergamaschi and M. Vianello. Efficient computation of the exponential operator for large, sparse, symmetric matrices. *Numerical Linear Algebra with Applications*, 7(1):27–45, 2000.
- [59] A. Mazzia, L. Bergamaschi and M. Putti. A time-splitting technique for advection-dispersion equation in groundwater. *Journal of Computational Physics*, 157(1):181–198, 2000.
- 1999 [60 (15)] L. Bergamaschi and M. Putti. Mixed finite elements and Newton-type linearization for the solution of Richard's equation. *International Journal for Numerical Methods in Engineering*, 45(8):1025–1046, 1999.
- [61] G. Zilli and L. Bergamaschi. Parallel Newton methods for sparse systems of nonlinear equations. *Rendiconti del circolo Matematico di Palermo*, II(58):247–257, 1999.
- 1998 [62 (16)] L. Bergamaschi, S. Mantica and G. Manzini. A mixed finite element-finite volume formulation of the Black-Oil model. *SIAM Journal on Scientific Computing*, 20(3):970–997, 1998.
- 1997 [63] L. Bergamaschi, G. Gambolati and G. Pini. Asymptotic convergence of conjugate gradient methods for the partial symmetric eigenproblem. *Numerical Linear Algebra with Applications*, 4(2):69–84, 1997.
- 1996 [64] L. Bergamaschi, G. Gambolati and G. Pini. Spectral analysis of large finite element problems by optimization methods. *Journal of Shock and Vibrations*, 1(6):529–540, 1994.
- [65] L. Bergamaschi, R. Bevilacqua and P. Zellini. Symplectic factorization and parallel iterative algorithms for tridiagonal systems of equations. *Calcolo*, 29:159–191, 1992.

Book Chapters

- 2019 [66] L. Bergamaschi and A. Martínez. Generalized block tuned preconditioners for SPD eigensolvers. Editori: D. Bini *et al.*, *Structured Matrices in Numerical Linear Algebra, Analysis Algorithms and Applications*. Springer INdAM Series, 30:237–252, 2019
- 2018 [67] L. Bergamaschi and A. Martínez. Spectral acceleration of parallel iterative eigensolvers for large scale scientific computing. Editori: S. Bassini *et al.*, *Parallel Computing is Everywhere, Advances in Parallel Computing*, Vol. 32, pp. 107–116, 2018.
- 2010 [68] L. Bergamaschi. Numerical methods for saddle point problems arising in geomechanics. Editori: B. H. V. Topping *et al.*, *Developments and Applications in Engineering Computational Technology*, cap. 15, pp. 337–361. Saxe-Coburg Publications, Stirlingshire, UK, 2010.

Awards

- 2005 [69] L. Bergamaschi, J. Gondzio and G. Zilli. COAP 2004 Best Paper Award. *Computational Optimization with Applications*, 31(3):361–363, 2005.

Lecture Notes in Computer Sciences (LNCS)

- 2011 [70] L. Bergamaschi and A. Martínez. Parallel inexact constraint preconditioners for saddle point problems. Editori R. N. E. Jeannot and J. Roman, *Euro-Par 2011, Bordeaux (France)*, volume 6853, Part II of *LNCS*, pp. 78–89, Springer, Heidelberg, 2011.
- 2006 [71] L. Bergamaschi, M. Caliarì, A. Martínez and M. Vianello. Comparing Leja and Krylov approximations of large scale matrix exponentials. In *Computational Sciences, ICCS 2005, Reading (UK)*, volume 3994 of *LNCS*, pp. 685–692. Springer-Verlag Heidelberg, 2006.
- 2005 [72] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel solution of sparse linear systems arising in flow and transport problems. In *Euro-Par 2005, Parallel Processing, 11th Int. Euro-Par Conference. Lisbon (Portugal)*, volume 3648 of *LNCS*, pp. 804–814. Springer-Verlag Heidelberg, 2005.
- [73] L. Bergamaschi and A. Martínez. Parallel acceleration of Krylov solvers by factorized approximate inverse preconditioners. In M. Daydè et al., *VECPAR 2004*, volume 3402 of *LNCS*, pp. 623–636, Springer-Verlag, Heidelberg, 2005.
- [74] L. Bergamaschi, M. Caliarì, A. Martínez and M. Vianello. A parallel exponential integrator for large-scale discretizations of advection-diffusion models. In *Recent Advances in PVM and MPI, 12th European PVM/MPI Users' Group Meeting, Sorrento*, volume 3666 of *LNCS*, pp. 483–492. Springer-Verlag Heidelberg, 2005.
- 2004 [75] L. Bergamaschi, M. Caliarì and M. Vianello. The ReLPM exponential integrator for FE discretizations of advection-diffusion equations. Editori M. Bubak et al., *Computational Science - ICCS 2004: 4th International Conference Krakow, Poland, Proceedings, Part IV*, volume 3036 of *LNCS*, pp. 434–442. Springer-Verlag Heidelberg, 2004.
- 2003 [76] L. Bergamaschi, A. Martínez, G. Pini and F. Sartoretto. Eigenanalysis of finite element 3d flow models by parallel Jacobi Davidson. Editori J. Dongarra et al., *Euro PVM/MPI 2003*, volume 2840 of *LNCS*, pp. 565–569, Springer-Verlag, Heidelberg, 2003.
- 2001 [77] L. Bergamaschi and G. Zilli. Inexact Newton methods and mixed non linear complementary problems. Editori L. Vulkov et al., *Proceedings of: Large Scale Scientific Computations of Engineering and Environmental Sciences*, volume 2657 of *LNCS*, pp. 84–92, Springer-Verlag, Heidelberg, 2001.
- 1997 [78] G. Zilli and L. Bergamaschi. Truncated block Newton and quasi-Newton methods for sparse systems of nonlinear equations. Experiments on parallel platforms. Editori M. Bubak et al., *Recent Advances in PVM and MPI*, volume 1332 of *LNCS*, pp. 390–397. Springer-Verlag, 1997.

Articles in Conference Proceedings

- 2017 [79] L. Bergamaschi, A. Martínez and F. Zanetti. A two-stage Jacobi-Davidson method with spectral preconditioners for the eigensolution of large SPD matrices. Editore J. Vigo-Aguiar, *Proceedings of the 17th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2017*, pp. 300–303, 2017.

- [80] L. Bergamaschi, E. Facca, A. Martínez and M. Putti. Spectral preconditioners for the efficient numerical solution of sequences of linear systems. Editore J. Vigo-Aguiar, *Proceedings of the 17th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2017*, pp. 1380–1391, 2017.
- 2010 [81] L. Bergamaschi, M. Venturin and G. Zilli. Inexact jacobian constraint preconditioners in optimization. Editori B. H. V. Topping *et al.*, *Proceedings of the 7th International Conference on Engineering Comput. Technology, Paper # 34*. Civil-Comp Press, 2010. CD-ROM.
- [82] L. Bergamaschi, A. Martínez and G. Pini. Parallel mixed constraint preconditioners for the iterative solution of coupled consolidation problems. Editori B. H. V. Topping *et al.*, *Proceedings of the 7th International Conference on Engineering Comput. Technology, Paper # 33*. Civil-Comp Press, 2010. CD-ROM.
- 2008 [83] L. Bergamaschi, R. Bru, A. Martínez and M. Putti. Quasi-Newton preconditioners for the solution of large nonlinear systems in porous media. Editori M. Papadrakakis and B. H. V. Topping, *Proceedings of the 6th International Conference on Engineering Comput. Technology. Paper # 75*. Civil-Comp Press, 2008. CD-ROM.
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- 2001 [87] L. Bergamaschi, G. Pini and F. Sartoretto. Preconditioning of sequential and parallel Jacobi-Davidson. Editori G. R. Joubert *et al.*, *Parallel Computing. Fundamentals & Applications*, pp. 282–289, Imperial College Press, London, UK, 2001.
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- 2000 [89] L. Bergamaschi, A. Mazzia and M. Putti. A time-splitting technique for the solution of density dependent flow and transport in groundwater. Editori L. R. Bentley *et al.*, *Computational methods in Water Resources*, pp. 75–82, Balkema, Rotterdam, 2000.
- [90] L. Bergamaschi, G. Pini and F. Sartoretto. Factorized approximate inverse preconditioning of a sparse eigensolver. Editori E. H. Hollander *et al.*, *Parallel Computing. Fundamentals & Applications*, pp. 267–274, Imperial College Press, London, UK, 2000.
- [91] A. Mazzia, L. Bergamaschi and M. Putti. Triangular finite volume-mixed finite element discretization for the advection-diffusion equation. Editori M. Griebel *et al.*, *Large Scale Scientific Computations of Engineering and Environmental Sciences*, pp. 371–378, Vieweg, Braunschweig (Ger), 2000.

- 1998 [92] L. Bergamaschi and M. Putti. Mixed finite elements for the solution of the variably saturated flow equation. Editori V.N. Burganos and G.P. Karatzas, *Computational Methods in Water Resources XII*, pp. 305–312, Computational Mechanics, Southampton, UK, 1998.
- 1997 [93] L. Bergamaschi and M. Putti. Mixed finite elements for the nonlinear Richard's equation. Editore A. Sydow, *15th IMACS World Congress on Scientific Computation, Modelling and Applied Mathematics*, pp. 69–74, Wissenschaft & Technik Verlag, Berlin, 1997.
- 1996 [94] L. Bergamaschi and M. Putti. Mixed finite elements for the solution of Richard's equation. Editori A. A. Aldama *et al.*, *Computational Methods in Water Resources XI.*, pp. 535–542, Computational Mechanics, Southampton, London, 1996.
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- 1995 [96] L. Bergamaschi, P. Consonni, G. Fotia, S. Mantica, G. Manzini, A. Quarteroni, and A. Rosella. Finite elements and finite volumes approximation of miscible flow. In *Colloque sur les Modélisations et Méthodes Numériques en Ingénierie Pétrolière*, Tunisi, 1995.
- [97] L. Bergamaschi, S. Mantica and G. Manzini. A mixed finite element-finite volume approach for reservoir simulation. Editori M. Morandi Cecchi *et al.*, *Finite Elements in Fluids*, pp. 1213–1222, Dip. Matematica Pura e Applicata, University of Padova, 1995.
- [98] L. Bergamaschi, C. Gallo, G. Manzini, C. Paniconi and M. Putti. A mixed finite element/TVD finite volume scheme for saturated flow and transport in groundwater. Editori M. Morandi Cecchi *et al.*, *Finite Elements in Fluids*, pp. 1223–1232, Dip. Matematica Pura e Applicata, University of Padova, 1995.
- 1994 [99] L. Bergamaschi, G. Gambolati, G. Pini and M. Putti. Gradient eigenanalysis on nested finite elements. Editori M. Papadrakakis and B. H. V. Topping, *Advances in Computational Mechanics*, pp. 225–238, Civil-Comp Press, Edinburgh, UK, 1994.
- [100] L. Bergamaschi, G. Gambolati and G. Pini. Asymptotic convergence of a new spectral method for the solution in time of finite elements flow equations. Editori A. Peters *et al.* *Computational Methods in Water Resources, Vol. 1*, pp. 19–26, Kluwer Academic, Dordrecht, 1994.
- 1992 [101] G. Gambolati and L. Bergamaschi. Partial eigensolution for transient groundwater flow equations. Editori T. R. Russell *et al.*, *ICCMWR IX. Vol. 1: Numerical Methods in Water Resources*, pp. 175–192, Computational Mechanics, Southampton, 1992.

Other publications

- 2011 [102] L. Bergamaschi, R. Bru, A. Martínez, J. Mas and M. Putti. Low-rank update of preconditioners for nonlinear Richards equation. Editore L. Jódar, *Proceedings of Modelling for Addictive Behaviour, Medicine ad Engineering 2011*, pp. 211–206. Instituto de Matemática Multidisciplinar, 2011.
- 2010 [103] L. Bergamaschi, R. Bru, A. Martínez and M. Putti. Low-rank update of preconditioners for the inexact Newton method with SPD jacobian. Editore L. Jódar, *Proceedings of Modelling for Addictive Behaviour, Medicine ad Engineering 2010*, pp. 21–25. Instituto de Matemática Multidisciplinar, 2010.
- 2007 [104] L. Bergamaschi and R. Bru. Low-rank acceleration of the inexact Newton method. In *Science and Supercomputing in Europe – report 2007*, pp. 787–791. Cineca, Bologna, 2007.

- [105] A. Martínez, L. Bergamaschi, G. Pini and R. Bru. An efficient parallel meshless method for geomechanical models. In *Science and Supercomputing in Europe – report 2007*, pp. 814–819. Cineca, Bologna, 2007.
- 2006 [106] L. Bergamaschi and A. Martínez. Parallel preconditioners for large scale nonlinear systems arising in optimization. In *Science and Supercomputing in Europe – report 2006*, pp. 528–531. Cineca, Bologna, 2006.
- [107] A. Martínez and L. Bergamaschi. Parallel exponential integrator for advection-diffusion models. In *Science and Supercomputing in Europe – report 2006*, pp. 549–553. Cineca, Bologna, 2006.
- [108] L. Bergamaschi, R. Bru, A. Comerlati, A. Martínez and M. Putti. Quasi-Newton preconditioners for the iterative solution of nonlinear equations in porous media. In *Proceedings of the 9th Copper Mountain Conference on Iterative Methods*, 2006.
- 2005 [109] L. Bergamaschi, A. Martínez, G. Pini and F. Sartoretto. Parallel solution of sparse linear systems and eigenvalue problems arising in diffusion equations. In *Science and Supercomputing at CINECA*, pp. 403–406. Cineca, Bologna, 2005.
- [110] L. Bergamaschi, M. Caliarì, A. Martínez and M. Vianello. Parallel solution of large-scale discretizations of advection-diffusion models. In *Science and Supercomputing at CINECA*, pp. 407–410. Cineca, Bologna, 2005.
- 2003 [111] L. Bergamaschi, A. Martínez, G. Pini, M. Putti and F. Sartoretto. Parallel eigensolution of large finite element problems. In *Science and Supercomputing at CINECA*, pp. 382–385. Cineca, Bologna, 2003.
- 2002 [112] L. Bergamaschi, J. Gondzio and G. Zilli. Preconditioners for iterative solvers used in interior point methods. In *APMOD Conference*, 2002.
- 2001 [113] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel eigensolution sparse eigenproblems. In *Science and Supercomputing at CINECA*, pp. 431–432. Cineca, Bologna, 2001.
- 2000 [114] L. Bergamaschi, G. Gambolati and M. Putti. Iterative methods for the partial symmetric eigenproblem. In *Proceedings of the 2000 Copper Mountain Conference on Iterative Methods*, 2000.
- 1999 [115] L. Bergamaschi, G. Pini and F. Sartoretto. Parallel preconditioning of sparse symmetric eigenproblems. In *Proceedings of the Ninth SIAM Conference on Parallel Processing for Scientific Computing*, March, 1999. (CD-ROM).
- [116] L. Bergamaschi and M. Putti. Efficient parallelization of PCG schemes for matrices arising from discretizations of diffusion equations. In *Proceedings of the Ninth SIAM Conference on Parallel Processing for Scientific Computing*, March, 1999. (CD-ROM).
- 1998 [117] L. Bergamaschi and M. Vianello. Efficient computation of the exponential operator for large, sparse, negative definite matrices. In *Proceedings of the 1998 Copper Mountain Conference on Iterative Methods*, volume I, 1998.
- 1997 [118] L. Bergamaschi and G. Zilli. Newton-type linearizations and parallel row-projection solvers for nonlinear systems of equations. In *Science and Supercomputing at CINECA*, pp. 533–538. Cineca, Bologna, 1997.
- 1997 [119] L. Bergamaschi, P. Consonni, G. Fotia, S. Mantica, G. Manzini, A. Quarteroni, and A. Rosella. Finite elements and finite volumes approximation of miscible flow. In *Colloque sur les Modélisations et Méthodes Numériques en Ingénierie Pétrolière*, Tunis, 1995.

Theses

- 1994 [120] L. Bergamaschi. *Studio di Convergenza del Metodo del Gradiente Coniugato per il Calcolo di Autovalori di Matrici Sparse (in Italian)*. PhD thesis, University of Padova, Sep 1994.
- 1990 [121] L. Bergamaschi. *Metodi iterativi per la risoluzione di sistemi lineari tridiagonali (in Italian)*. MsC thesis, University of Pisa, Apr 1990.

Bibliometric indices

Sources: ISI Web of Knowledge (WOS), Scopus, MathSciNet (MathSci), Google Scholar (GSchol).

Last Update: July 1, 2025

WOS	Scopus	MathSci	GSchol	
24	26	25	–	Articles
169	197	108	325	Citations
20	20	15	26	h-index

Present research collaborations

Parallel in time solvers and preconditioners for the all-at-once Runge Kutta discretization in fluid dynamics with J. Pearson, University of Edinburgh, S. Leveque, SNS Pisa, A. Martínez, University of Trieste.

Preconditioners for multiple saddle-point linear systems J. Pearson, University of Edinburgh, A. Potschka, TU Clausthal, A. Martínez, University of Trieste.

Preconditioners for dense linear systems arising in huge electromagnetic scattering S. Ventre, Università di Cassino

Membership

Member of the following institutions:

GNCS Italian Group for Scientific Computing.

SIAM Also member of the following groups: LA – OPT – GS – CSE – SC

UMI Italian Mathematical Union.

SIMAI Italian Applied Mathematical Society.

EMS European Mathematical Society.

ILAS International Linear Algebra Society

Research visits

1993 Applied Mathematics and Simulation Group, CRS4, Cagliari. Project: *Numerical Methods for Reservoir Simulation* (6 months)

1994 Applied Mathematics and Simulation Group, CRS4, Cagliari (5 months)

1995 Applied Mathematics and Simulation Group, CRS4, Cagliari (4 months)

2006 School of Maths (University of Edinburgh) under the European project HPC-Europa. (5 weeks)

2007 Polytechnic University of Valencia, under the European project HPC-Europa. (4 weeks)

2008– present Short visits at the Applied Mathematics Department, Polytechnic University of Valencia, collaboration with prof. Rafael Bru and with prof. José Marín.

Awards

2004 **Best paper award**, year 2004, *Computational Optimization and Applications*.

Projects headed as Principal Investigator

- 2024 – 26 Local **PI** of the PRIN project 2022 cod. 2022AKNSE4_005 (settore PE1) – CUP C53D23002420006, *Variational and analytical aspects of geometric PDEs* (67.5 KEuros)
- 2024 – 25 **PI** of the B-type ISCRA project: *ARKEVO: All-at-Once Runge Kutta methods for EVOLutionary models*.
- 2022 – 24 **PI** of the University of Padua (BIRD) project *Linear and nonlinear algebra in physics-informed neural networks with application to real life models* (20 KEuros)
- 2022 – 23 **PI** of the C-type ISCRA project: *PRESTO*
- 2021 – 26 **PI** of the Ministry of University funded project (DOR) *Discretization methods and iterative solvers for the simulation of mechanical and fluid-dynamics processes in porous media*. (approx. 100 KEuros)
- 2019 – 21 **Group Leader** of the project *Matrix-Free Preconditioners for Large-Scale Convex Constrained Optimization Problems (PRECOOP)* in the framework of the “Visiting Programme” funded by the CaRiPaRo foundation. (25 KEuros)
- 2019 – 21 **PI** of the Ministry of University funded project (DOR) *Discretization methods and iterative solvers for the simulation of mechanical and fluid-dynamics processes in porous media*. (approx. 35 KEuros)
- 2018 – 19 **PI** of the C-type project: *UPdates of SCALable preconditioners in geomechanical applications (UPSCALE)* under the ISCRA (*Italian SuperComputing Resource Allocation*) CINECA project.
- 2017 – 18 **PI** of the C-type ISCRA project: *Low-rank acceleration of parallel preconditioners (LOWRA)*
- 2017 – 18 **PI** of the GNCS project *Numerical methods for large constrained optimization problems and applications*
- 2016 – 18 **PI** of the University of Padua (BIRD) project *Stable and efficient discretizations of the mechanics of faults*. (25 KEuros)
- 2013 – 15 **PI** of the Ministry of University funded project (DOR) *Methods and numerical algorithms for the simulation of processes in porous media*. (approx. 65 KEuros)
- 2014 **PI** of the C-type ISCRA project: *Scalable PREconditioners for Advanced Discretizations of geomechanical models (SPREAD)*.

Participation to projects (most recent/important)

- 2018 – 20 Progetto finanziato dal Ministero Spagnolo per la Ricerca Scientifica: *Problemas matriciales: computación, teoría y aplicaciones*
- 2020 – 21 Progetto GNCS *Ottimizzazione e algebra lineare avanzata per problemi governati da PDE*
- 2019 – 20 Progetto GNCS *Tecniche innovative e parallele per sistemi lineari e non lineari di grandi dimensioni, funzioni ed equazioni matriciali ed applicazioni*
- 2018 – 19 Progetto GNCS *Metodi numerici per equazioni lineari, non lineari e matriciali con applicazioni*

- 2010 – 12 Progetto MTM2010-1.974 finanziato dal Ministero Spagnolo per la Ricerca Scientifica: *Solución iterativa de sistemas lineales y aplicaciones*
- 2007 – 09 Progetto PRIN 2007: *Metodi e modelli numerici avanzati con applicazioni di fluidodinamica e geomeccanica ambientale* .
- 2004 – 06 Progetto PRIN 2004: *Modelli numerici per flussi multifase e deformazione del suolo* .
- 2000 – 02 Progetto PRIN 2000: *Metodi e modelli numerici per la soluzione dei problemi di contaminazione di acquiferi e subsidenza del sottosuolo dovuta a estrazione di fluidi*.
- 1997-2001 RACOS Project: *Radionuclide Contamination of Soils and Groundwater at the Lake Karachai Waste Disposal Site (Russia) and the Chernobyl Accident Site (Ukraine): Field Analysis and Modeling Study*. FP4 Inco-Copernicus, finanziato dall'Unione Europea.
- 1997-1999 Progetto PRIN 1997: *Studio di metodi non lineari per modelli FEM di flusso, trasporto e deformazione di mezzi porosi*.
-

Conference Organization and participation to editorial boards

- 2025 Organizer of the minisymposium: *Iterative methods and preconditioners for (multiple) saddle point linear systems* at the 30th Biennial Conference on Numerical Analysis, Glasgow, June 2025
- 2024 Member of the Scientific/Organizing Committee of the workshop *PINN-PAD: Physics Informed Neural Networks in PADova*, Padova February 2024
Member of the Scientific Committee of the *8^o Encuentro ALAMA: Álgebra Lineal, Análisis Matricial y Aplicaciones*, Gijon (Spain) June 2024
- 2021 **Guest Editor** of the Special Issue Entitled *Linear Algebra, Matrix Analysis and Applications*. Journal: Computational and Mathematical Methods.
Organizer of the minisymposium: *Recent advances in polynomial preconditioner for Linear Algebra Problems* at the SIAM Applied Linear Algebra Conference, New Orleans.
- 2020 Co-Organizer of the Workshop: Numerical Linear Algebra for PDEs and Large Scale Optimization, Padova, 17–18 February
- 2019 Co-Organizer of a miniworkshop within the ICIAM conference, Valencia, Spain
Co-Organizer of the Workshop: Advances in Linear Algebra and Huge-Scale Optimization, Edinburgh, 1–2 July
- 2018 – 2022 **Associate Editor** of the Journal **Computational and Mathematical Methods**, Wiley.
- 2018 Co-Organizer of a miniworkshop within the CMMSE conference, Cadiz, Spain
Co-Organizer of a miniworkshop within the SIAM Applied Linear Algebra Conference, Hong Kong.
Co-Organizer of the Italian Workshop on Numerical Linear Algebra: **Due giorni di Algebra Lineare Numerica**, Padova.
- 2017 Co-Organizer of a miniworkshop within the CMMSE conference, Cadiz, Spain
- 2013 Co-Organizer of the **SIAM Conference on Mathematical and Computational methods in the Geosciences**. Padova.
- 2012 Co-Organizer of a miniworkshop within the SIAM Applied Linear Algebra Conference, Valencia.

- 2010 Member of the Editorial Board of the **7th Conference on Engineering and Computational Technology**, Valencia.
- 2000 Organizer of a miniworkshop within the SIAM Applied Linear Algebra Conference, Raleigh, USA.

— Talks at Conferences (in boldface if invited)

- 2024 – Mathematical Modelling in Engineering & Human Behaviour, Valencia, July 2024. *Preconditioner for double saddle-point linear systems with applications in Geomechanics*
 - ALAMA2024 meeting. Linear Algebra, Matrix Analysis and Applications, Gijón, Spain, June 2024. **Spectral analysis of block preconditioners for double saddle-point linear systems. Applications to PDE-constrained optimization**
- 2023 – Conference: Exploiting Algebraic and Geometric Structure in Time-Integration Methods, Pisa, **Parallel-in-Time Solvers for the All-at-Once Runge-Kutta discretization**
 - 24th SIAM Conference on Applied Linear Algebra, Paris, May 2024. **A Survey on Block Preconditioners for Linear Systems in Interior Point Methods for Convex Constrained Optimization**
 - Convegno SIMAI, Matera. *Parallel-in-Time Solvers and SVD-based preconditioners for the Runge-Kutta discretization of the All-at-Once Stokes Problem*
 - Numerical Analysis in the 21st century, Oxford, *Parallel matrix-free polynomial preconditioners for flow simulations in discrete fracture networks*
 - 26th Biennial Conference on Numerical Analysis, University of Strathclyde, Glasgow, **Block triangular preconditioners for double saddle point linear systems**
 - GNCS Meeting on Tecniche avanzate per problemi evolutivi: discretizzazione, algebra lineare numerica, ottimizzazione, Bologna, **SVD preconditioners for All-at-Once Runge–Kutta Discretization**
 - SIAM Conference on Computational Sciences and Engineering, Amsterdam. *Parallel-in-Time Solver for the All-at-Once Runge–Kutta Discretization*
- 2022 – ALAMA 2022–ALN2gg Linear Algebra, Matrix Analysis and Applications Alcalá de Henares, *Parallel Matrix-free polynomial preconditioners for fractured porous media models*
- 2021 – 14th WCCM – ECCOMAS, **Massively parallel polynomial preconditioners for large linear systems arising in structural mechanics**
 - 23th SIAM Conference on Applied Linear Algebra, **Parallel Newton-Chebyshev Polynomial Preconditioners**
 - SIAM Conference on Mathematical and Computational Issues in the Geosciences, **HPC Polynomial Preconditioners for Block Linear Systems Arising in Large-Scale Geoscience Applications**
 - EURO 2021, **A New Preconditioning Approach for an Interior Point–Proximal Method of Multipliers for Linear and Convex Quadratic Programming**
- 2019 – XXI UMI National Conference, Pavia. **Efficient preconditioning of the normal equations for large LPs**
 - IX ICIAM Conference, Valencia **Recent advances in low-rank updates of preconditioners**

- The 18th International Conference on Computational and Mathematical Methods for Science and Engineering, Rota (Cadice). Recent advances in low-rank updates of preconditioners for nonlinear problems
- Workshop: Advances in linear algebra and huge-scale optimization, Edinburgh. **Efficient preconditioning of the normal equations for large LPs**
- V Jornadas ALAMA, Valencia. **Recent advances in low-rank updates of preconditioners: applications to nonlinear systems, eigenvalue problems and sequences of shifted linear system**
- 2018 – New directions in applied linear algebra, numerical methods for PDEs, and applications, Edinburgh. **Low-rank update of preconditioners for sequences of linear systems.**
- SIAM Applied Linear Algebra, Hong Kong. **Spectral preconditioners for sequences of ill-conditioned linear systems.**
- The 18th International Conference on Computational and Mathematical Methods for Science and Engineering, Rota (Cadice). **A combination of full-rank and low-rank update of the constraint preconditioner.**
- The 16th EUROPT Workshop on Advances in Continuous Optimization, Almeria (Spain). *A combination of full-rank and low-rank update of the constraint preconditioner.*
- 2017 – The 17th International Conference on Computational and Mathematical Methods for Science and Engineering, Rota (Cadice). **Spectral acceleration of the Jacobi-Davidson method.**
- Conference on Structured Matrices in Numerical Linear Algebra: Analysis, Algorithms and Applications, Cortona. **Spectral Low-rank Preconditioners for Large Linear Systems and Eigenvalue Problems.**
- Parallel Computing (ParCo2017), Bologna. *Spectral acceleration of parallel iterative eigensolvers for large scale scientific computing.*
- 2016 – The 5th IMA Conference on Numerical Linear Algebra and Optimisation, Birmingham. *BFGS-like updates of constraint preconditioners for the PCG solution of interior point linear systems.*
- 2015 – The 13th EUROPT Workshop on Advances in Continuous Optimization, Edinburgh. *BFGS preconditioners for the normal equations arising in the Interior Point solution of constrained optimization problems.*
- SIAM Applied Linear Algebra, Atlanta. **BFGS-like updates of constraint preconditioners for saddle point linear systems arising in convex quadratic programming.**
- 2014 – First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao (Spain). **Tuned preconditioners for iterative SPD eigensolvers.**
- 2013 – SIAM Computational Science and Engineering, Boston (USA). **Quasi-Newton Update of Preconditioners for the Linearized Newton System Arising from 3d Discretizations of Groundwater Flow Models.**
- Due giorni di algebra lineare numerica, Roma. *Efficiently preconditioned Inexact Newton methods for large symmetric eigenvalue problems.*
- The 11th EUROPT Workshop on Advances in Continuous Optimization, Firenze. **Low-rank updates of preconditioners for symmetric eigenproblems.**

- 2012 – Recent developments in the solution of indefinite systems, TU Eindhoven. **Relaxed Mixed Constraint Preconditioners for Ill-conditioned Symmetric Saddle Point Linear Systems.**
- SIAM Applied Linear Algebra, Valencia. **Relaxed mixed constraint preconditioners for ill-conditioned symmetric saddle point linear systems.**
 - XII SIMAI Conference, Torino. **Quasi-Newton preconditioners for the Inexact Newton method for large eigenproblems.**
- 2011 – Euro-Par 2011, Bordeaux. *Parallel Inexact Constraint Preconditioners for Saddle Point Problems.*
- Mathematical Modelling of Engineering and Human Behaviour, Valencia. **Low rank acceleration of preconditioners for the nonlinear 3D Richard's equation.**
 - SC2011: International Conference on Scientific Computing, Cagliari. *Relaxed Mixed Constraint Preconditioners for Ill-conditioned Symmetric Saddle Point Linear Systems.*
- 2010 – The 7th International Conference on Computational Structures Technology, Valencia.
- **Numerical Methods for Saddle Point Problems Arising in Geomechanics**
 - *Inexact Jacobian Constraint Preconditioners in Optimization.*
- 2006 – The 5th International Conference on Computational Structures Technology, Las Palmas. *Inexact Constraint Preconditioners for Optimization Problems.*
- 2005 – SIAM conference on Optimization, Stoccolma. **Preconditioning Indefinite Systems in Interior Point methods for QP and NLP.**
- Euro-Par 2005, Lisbona. *Parallel Solution of Sparse Linear Systems Arising in Advection-Diffusion Problems.*
 - Euro PVM-MPI, Sorrento. *A Parallel exponential integrator for large-scale discretizations of advection-diffusion models.*
 - II Jornadas da Matematica Multidisciplinar, Valencia. **Preconditioning indefinite systems in interior point methods for large scale optimization.**
- 2004 – VECPAR'04, 6th international meeting, Valencia. *Parallel Acceleration of Krylov Solvers by Factorized Approximate Inverse Preconditioners.*
- VIII SIMAI Conference, Venezia. *Parallel implementation of the ReLPM exponential integrator for FE/FD discretizations of advection-diffusion equations.*
- 2003 – ParCo2003, Dresden. *Parallel Solution of Sparse Eigenproblems by Simultaneous Rayleigh Quotient Optimization with FSAI preconditioning.*
- Numerical Methods for Local and Global Optimization: Sequential and Parallel Algorithms, Cortona. *Preconditioners for Iterative Solvers Used in Interior Point Methods.*
- 2002 – 6th International Conference in Applied Mathematical Optimization and Modelling. Varenna (Como). *Preconditioners for iterative solvers used in interior point methods.*
- 2001 – Workshop on Numerical Methods for Evolutionary Problems, Peschici (Foggia). *Preconditioning of iterative eigensolvers.*
- 2000 – The 6th Conference on Iterative Methods, Copper Mountain USA. *Comparison of iterative methods for the partial symmetric eigenproblem.*

- Conference on Large Scale Scientific Computing, Rousse, Bulgaria. *Inexact Newton methods and mixed nonlinear complementary problems.*
- Workshop: Numerical Analysis and Mathematical Software, Ferrara. *Inexact Newton and Interior Point Methods.*
- Due giorni di algebra lineare numerica, Pisa. *Chebyshev approximation of the exponential operator on large and sparse SPD matrices.*
- 1999 – SIAM Conference on Parallel Processing on Scientific Computing, San Antonio. *Parallel Preconditioning of Sparse Symmetric Eigenproblems*
- 1998 – The 5th Conference on Iterative Methods, Copper Mountain USA. *Efficient computation of the exponential operator for large and sparse SPD matrices.*
- V SIMAI Conference, Giardini Naxos (ME). *Parallel Inexact Newton Methods.*
- The 12th International Conference on Computational Methods in Water Resources, Creta. *Mixed Finite Elements for the solution of the variably saturated flow equation*
- National Numerical Analysis Conference, Montecatini. *Soluzione di Sistemi Lineari e Non-Lineari Derivanti dalla Discretizzazione di Equazioni Differenziali alle Derivate Parziali.*
- 1997 – Numerical Methods in Optimization, Cortona. *Parallel Newton methods for sparse systems of nonlinear equations.*
- The 15th IMACS world congress, Berlino. *Mixed Finite Elements for Variably Saturated Flow in Porous Media*
- Due giorni di algebra lineare numerica, Pavia. *Conjugate Gradient Optimization of the Rayleigh Quotient for the Partial Eigenproblem.*
- 1996 – NATO ASI school on Iterative Methods, Las Palmas, Spain. *Mixed Finite Elements for the Darcy's law in porous media.*
- The 5th International Colloquium on Numerical Analysis, Plovdiv, Bulgaria. **Asymptotic convergence of CG methods for the partial symmetric eigenproblem.**
- The 11th International Conference on Computational Methods in Water Resources, Cancun, Messico.
 - *Efficient Algebraic Solvers for Mixed Finite Element Models of Porous Media Flows*
 - *Mixed Finite Elements for the Solution of Richard's Equation*
 - *Modeling transport and biodegradation of nitrates using a mixed finite elements-finite volumes approach*
- Computational Methods in Oceanic and Atmospheric Flow, Trento. *Mixed and Hybrid Finite Elements for the non-linear Richard's Equation*
- 1995 – The 9th Conference on Finite Elements in Fluids, Venezia.
 - *A Mixed Finite Element/Finite Volume approach for reservoir simulation*
 - *A Mixed Finite Element/TVD Finite Volume scheme for variably saturated flow and transport in groundwater.*
- XV UMI National Conference, Padova. *Preconditioned Indefinite Systems in Reservoir Simulation.*
- 1994 – Summer school on Parallel Numerical Algorithms, Peñíscola, Spain. *Parallel eigensolvers on nested Finite Elements.*

– The 10th International Conference on Computational Methods in Water Resources Heidelberg, Germania. *Asymptotic convergence of a new spectral method for the solution in time of Finite Element flow equations.*

Invited talks

- 2022 – ERGO afternoon, ERGO speaker, **Quasi-Newton preconditioners: Motivation and Theory**, Edinburgh, November 2022.
- 2017 – **Spectral preconditioners for large linear systems and eigenvalue problems** Dipartimento di Matematica, University of Bologna.
- 2012 – **Metodi iterativi per problemi agli autovalori per matrici sparse e di grandi dimensioni** Dipartimento di Matematica, University of Udine.
- 2009 – **Preconditioning Saddle Point Matrices**, Dipartimento di Matematica Applicata, Polytechnic University of Valencia (UPV).
- 2006 – **Quasi Newton preconditioners for the Inexact Newton method**. School of Maths, University of Edinburgh.
 - **Polynomial approximation to the Matrix Exponential for Large Systems of ODEs**, Dipartimento di Matematica Applicata, UPV.
- 2005 – **Iterative methods for Saddle Point problems**, Dipartimento di Matematica Applicata, UPV.
- 2004 – **Iterative methods for the generalized eigenvalue problem**, Dipartimento di Matematica Applicata, UPV.
- 2003 – **Metodi del punto interno in ottimizzazione non lineare**, Modena, Dipartimento di Matematica.
- 2000 – **Introduction to Galerkin Finite Elements for the Diffusion Equation in Porous Media**, Dipartimento di Matematica Applicata, UPV

Review activity

I have been serving as a reviewer for more than 50 Journals in the fields of Numerical Analysis, Optimization and Parallel Computing. A partial list follows

- Applied Mathematics Letters
- BIT Numerical Mathematics
- Computer and Mathematics with Applications
- Computers and Operational Research
- Electronic Transactions on Numerical Analysis (ETNA)
- IMA Journal of Numerical Analysis
- Journal of Computational and Applied Mathematics
- Journal of Supercomputing
- Mathematical Programming
- Numerical Algorithms
- Numerical Mathematics: Theory Methods and Applications
- SIAM Journal on Numerical Analysis
- SIAM Journal on Scientific Computing
- Applied Numerical Mathematics
- Computational Optimization and Applications
- Computer Methods in Applied Mathematics and Engineering
- Electronic Journal of Linear Algebra
- European Journal of Operational Research
- International Journal on Computer Mathematics
- Journal of Parallel and Distributed Computing
- Linear Algebra and its Applications
- MathSciNet
- Numerical Linear Algebra with Applications
- Parallel Computing
- SIAM Journal on Optimization
- SIAM Journal on Matrix Analysis and Applications

Padova, July 1, 2025

Luca Bergamaschi