

CURRICULUM VITAE

Davide Buoso

Up to April 30, 2024

Personal Data

Full name: Davide Buoso

Place of Birth: Portogruaro (VE), Italy

Date of Birth: May 2, 1987

Citizenship: Italian

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Spoken languages: Italian (mother language), English (fluent), French (conversational), Portuguese (conversational), Spanish (conversational), Greek (conversational).

Held Positions

- Since February 3, 2023 (current position): Associate Professor, Dipartimento per lo Sviluppo Sostenibile e la Transizione Ecologica, Università degli Studi del Piemonte Orientale “Amedeo Avogadro” (Italy).
- February 3, 2020 through February 2, 2023: Ricercatore a Tempo Determinato, tipo b (tenure-track researcher), Dipartimento per lo Sviluppo Sostenibile e la Transizione Ecologica (up until December 31, 2021 Dipartimento di Scienze e Innovazione Tecnologica), Università degli Studi del Piemonte Orientale “Amedeo Avogadro” (Italy).
- September 1, 2018 through January 31, 2020: Collaborateur scientifique (PostDoc), École Polytechnique Fédérale de Lausanne (Switzerland). Supervisor: prof. Joachim Stubbe.
- March 1, 2017 through August 31, 2018: Bolseiro de investigação (PostDoc), Grupo de Física Matemática, Universidade de Lisboa (Portugal). Supervisor: prof. Pedro Freitas.
- March 1, 2015 through February 28, 2017: Assegnista di Ricerca (PostDoc), Dipartimento di Scienze Matematiche “G.L. Lagrange”, Politecnico di Torino (Italy). Supervisor: prof. Elvise Berchio.
- September 5, 2012 through June 30, 2013: Visiting Scholar, Department of Mathematics, University of Missouri (USA). Supervisor: prof. Mark S. Ashbaugh.

Curriculum Studiorum

- Dottorato di Ricerca in Scienze Matematiche (Ph.D. in Mathematical Sciences), Università degli Studi di Padova (Italy), April 24, 2015.
Supervisor: prof. Pier Domenico Lamberti. Ph.D. thesis: Shape sensitivity analysis of the eigenvalues of polyharmonic operators and elliptic systems. Ph.D. committee: prof. Gerassimos Barbatis, prof. Filippo Gazzola, prof. Massimo Lanza de Cristoforis.

- Laurea Magistrale in Matematica (Master degree in Mathematics), Università degli Studi di Padova (Italy), September 22, 2011.
Master thesis: On the spectral stability of poly-harmonic operators on variable domains. Supervisor: prof. Pier Domenico Lamberti. Grade: 110/110 e lode.
- Laurea Triennale in Matematica (Bachelor's degree in Mathematics), Università degli Studi di Padova (Italy), September 24, 2009.
Dissertation: Il gruppo fondamentale. Supervisor: prof. Federico Menegazzo. Grade: 110/110 e lode.

Prizes

- Article “On the spectral asymptotics for the buckling problem” (with P. Luzzini, L. Provenzano, and J. Stubbe) awarded *Editor's pick* (December 1, 2021) by the Journal of Mathematical Physics.
- Ph.D. scholarship, 2012-2014.
- “Progetto Lauree Scientifiche” scholarship (awarded by Istituto Nazionale di Alta Matematica “F. Severi” (INdAM), for attending the Bachelor's degree course in Mathematics), A.Y. 2006/07. Re-confirmed A.Y. 2007/08 and A.Y. 2008/09.

Mentoring

PostDoc

- Riccardo Molinarolo, Università del Piemonte Orientale, April 2024-April 2025.

Grants

As Principal Investigator

- PRIN 2022 “Perturbation problems and asymptotics for elliptic differential equations: variational and potential theoretic methods” (28/09/2023 - 27/09/2025). Funded by MUR - Ministero dell'Università e della Ricerca, founded amount 218,850 euros.

As member

- Progetto GNAMPA 2023 “Operatori differenziali e integrali in geometria spettrale” (01/05/2023 - 30/04/2024). PI: Paolo Luzzini.
- Progetto GNAMPA 2022 “Modelli del 4o ordine per la dinamica di strutture ingegneristiche: aspetti analitici e applicazioni” (01/06/2022 - 31/05/2023). PI: Maurizio Garrione.
- Project NATIONAL SWISS FUND “Bounds for the Neumann and Steklov Eigenvalues of the Biharmonic Operator” (01/09/2018 - 31/01/2020). PI: Joachim Stubbe.
- Project ptdc/mat-cal/4334/2014 “Extremal spectral quantities and related problems ” (01/03/2017 - 31/08/2018). PI: Pedro Freitas.
- Progetto GNAMPA 2016 “Proprietà quantitative e qualitative di soluzioni di equazioni ellittiche e paraboliche” (01/01/2016 - 31/12/2016). PI: Angela Alberico.
- FIR Starting Grant 2013 “Geometric and qualitative aspects of PDE's” (01/03/2015 - 28/02/2017). PI: Elvise Berchio.
- Progetto di Ateneo (PR.AT. Università degli Studi di Padova) “Singular perturbation problems for differential operators” (01/01/2012 - 12/12/2014). PI: Pier Domenico Lamberti.

Organization

- Member of the organizing committee of Perturbations, Asymptotics, and related Tools, Matera (Italy), September 3-6, 2024.
- Member of the organizing committee of the Mini-courses in Mathematical Analysis 2024, Padua (Italy), June 24-28, 2024.
- Co-organizer of the session *Spectral geometry and related topics* in the conference *9th ECM*, Seville (Spain), July 15-19, 2024.
- Member of the organizing committee of the Mini-courses in Mathematical Analysis 2023, Padua (Italy), June 19-23, 2023.
- Member of the organizing committee of the Mini-courses in Mathematical Analysis 2022, Padua (Italy), June 20-24, 2022.
- Member of the organizing committee of the Online Mini-courses in Mathematical Analysis 2021, Padua (Italy), June 21-25, 2021.
- Assistant to the organization of the Online Mini-courses in Mathematical Analysis 2020, Padua (Italy), September 14-17, 2020.
- Co-organizer of the session *Spectral theory of partial differential equations* in the conference *12th ISAAC Congress*, Aveiro (Portugal), July 29-August 2, 2019.
- Assistant to the organization of IMSE 2016, Padua (Italy), July 25-29, 2016.

Invited talks at conferences

- New perspectives in Shape and Topology Optimization, Vienna (Austria), December 11-15, 2023. Communication: Inequalities and asymptotics for polyharmonic eigenvalues.
- AMS-EMS-SMF 2022, Grenoble (France), July 18-22, 2022. Communication: Inequalities and asymptotics for polyharmonic eigenvalues.
- Recent Trends in Geometric Analysis and Spectral Theory, Rome (Italy), June 13-14, 2022. Communication: Inequalities and asymptotics for polyharmonic eigenvalues.
- Mini-courses in Mathematical Analysis 2019, Padua (Italy), June 24-28, 2019 (45 minutes lecture in substitution of prof. Stubbe).
- Geometric spectral theory, Neuchâtel (Switzerland), June 19-23, 2017. Communication: Eigenvalues of free plates.
- Partial Differential Equations and Related Topics, Alghero (Italy), September 12-16, 2016. Communication: Eigenvalues of free plates.
- IMSE 2016, Padova (Italy), July 25-29 2016. Communication: Shape optimization for the deck of a suspension bridge.

Other invites

- Series of invitations from the Grupo de Física Matemática, Universidade de Lisboa (Portugal), October 2018-ongoing.
- Dipartimento di Scienze di Base e Applicate per l'Ingegneria, Sapienza Università di Roma (Italy), January 22-26, 2024. Communication: Bulk-boundary eigenvalue problems: a review.

- Department of Mathematics, Czech Technical University in Prague (Czechia), January 8-12, 2024. Communication: Spectral convergence analysis for the Reissner-Mindlin system.
- Geometric Analysis and PDE's, Cortona (Italy), June 5-9, 2023.
- Departamento de Matemáticas, Universidad Autónoma de Madrid (Spain), March 13-17, 2023. Communication: Inequalities and asymptotics for polyharmonic eigenvalues.
- Institut de Mathématiques, École Polytechnique Fédérale de Lausanne (Switzerland), February 6-10, 2023.
- On-line seminar Spectral geometry in the clouds, September 21, 2020. Communication: The Bilaplacian with Robin boundary conditions.
- Dipartimento di Matematica, Università degli Studi di Padova (Italy), October 28-31, 2019. Communication: Biharmonic eigenvalues on annuli and rectangles.
- Institut de Mathématiques, Aix-Marseille Université (France), January 7-11, 2019. Communication: The Biharmonic operator with tension: eigenvalues' behavior and asymptotics.
- Dipartimento di Matematica, Università degli Studi di Padova (Italy), February 21, 2018. Communication: The Biharmonic operator with tension: eigenvalues' behavior and asymptotics.
- Institut de Mathématiques, Université de Neuchâtel (Switzerland), May 17, 2017. Communication: Isoperimetric inequalities for the eigenvalues of the Laplacian and of the Bilaplacian.
- Institut de Mathématiques, École Polytechnique Fédérale de Lausanne (Switzerland), May 16-18, 2017. Communication: Quantitative isoperimetric inequalities for the eigenvalues of elliptic operators.
- Departamento de Matemática, Universidade de Lisboa (Portugal), July 11-15, 2016. Communication: Shape sensitivity analysis for vibrating plates.
- Dipartimento di Matematica, Politecnico di Milano (Italy), October 30, 2015. Communication: Shape sensitivity analysis for vibrating plates.
- Dipartimento di Matematica, Politecnico di Milano (Italy), September 25, 2015.
- Departamento de Matemática, Universidade de Aveiro (Portugal), December 1-5, 2014. Communication: Shape sensitivity analysis for vibrating plate models.
- Dipartimento di Scienze Matematiche, Politecnico di Torino (Italy), November 6, 2014. Communication: A new Steklov-type problem for the biharmonic operator.
- Department of Mathematics, University of Missouri in Columbia (USA), September 5, 2012-June 30, 2013. Visiting scholar, supervisor: prof. Mark S. Ashbaugh (within the Ph.D. program). Communication: Eigenvalues of polyharmonic operators on variable domains.

Other conferences

- Two-day Workshop on Nonlinear Analysis, Turin (Italy), April 29-30, 2024.
- Miniconference Young researchers in spectral geometry II, on-line, March 21-22, 2021.
- Miniconference Young researchers in spectral geometry, on-line, August 3-4, 2020.
- Asymptotic analysis & Spectral theory, Orsay (France), September 30-October 4, 2019. Communication: Semiclassical bounds for spectra of biharmonic operators.
- Workshop on Spectral Geometry and Analysis of Differential Operators, Padua (Italy), September 9-11, 2019. Communication: Semiclassical bounds for spectra of biharmonic operators.

- 12th ISAAC Congress, Aveiro (Portugal), July 29-August 2, 2019. Communication: Semiclassical bounds for spectra of biharmonic operators.
- Topics in Nonlinear Analysis: Calculus of Variations and PDEs, Lisbon (Portugal), October 10-12, 2018. Communication: The Biharmonic operator with tension: eigenvalues' behavior and asymptotics.
- Mini-courses in Mathematical Analysis 2018, Padua (Italy), July 2-6, 2018. Communication: Eigenvalues of the Biharmonic operator with tension.
- Mini-courses in Mathematical Analysis 2017, Padua (Italy), June 12-16, 2017. Communication: A minimaxmax problem for improving the torsional stability of rectangular plates.
- International Conference on Elliptic and Parabolic Problems, Gaeta (Italy), May 22-26, 2017. Communication: A minimaxmax problem for improving the torsional stability of rectangular plates.
- Spectral Days 2017, Stuttgart (Germany), April 3-7, 2017.
- Shape Optimization and Isoperimetric and Functional Inequalities, Marseille (France), November 21-25, 2016.
- Mini-courses in Mathematical Analysis 2016, Padova (Italy), June 27-July 1 2016.
- School and Workshop "PDEs and Applications", Naples (Italy), February 8-12, 2016. Poster: Shape sensitivity analysis for vibrating plate models.
- Modelli Matematici per Ponti Sospesi, Turin (Italy), September 17-18, 2015.
- Workshop in Nonlinear PDEs, Brussels (Belgium), September 7-11, 2015. Communication: A new Steklov-type problem for the biharmonic operator.
- EquaDiff 2015, Lyon (France), July 6-10, 2015. Poster: Shape differentiability of the eigenvalues of the biharmonic operator.
- Mini-courses in Mathematical Analysis 2015, Padova (Italy), June 22-26, 2015.
- Mini-workshop "Nonlinear Meeting in Turin 2015", Turin (Italy), June 16-17, 2015.
- Geometric Properties for Parabolic and Elliptic PDE's - 4th Italian-Japanese Workshop, Palinuro (Italy), May 25-29, 2015. Poster: A new Steklov-type problem for the biharmonic operator.
- Winter school/workshop "Spectral theory and shape optimization problems for elliptic PDEs", Milan (Italy), February 9-13, 2015.
- XXV Convegno Nazionale di Calcolo delle Variazioni, Levico Terme (Italy), February 2-6, 2015.
- IMSE 2014, Karlsruhe (Germany), July 21-25, 2014. Communication: Shape sensitivity analysis of the eigenvalues of the Reissner-Mindlin system.
- ERC School on Free Discontinuity Problems, Pisa (Italy), July 7-11, 2014.
- ERC Workshop on Existence and Regularity for Nonlinear Systems of Partial Differential Equations, Pisa (Italy), June 30-July 4, 2014.
- Mini-courses in Mathematical Analysis 2014, Padova (Italy), June 23-27, 2014.
- Calculus of Variations and Optimization. A conference to celebrate the 60th birthday of Giuseppe Buttazzo, Pisa (Italy), May 21-23, 2014.
- Workshop on Partial Differential Equations and Applications, Pisa (Italy), February 20-21, 2014.
- XXIV Convegno Nazionale di Calcolo delle Variazioni, Levico Terme (Italy), January 27-31, 2014.

- New Trends in Calculus of Variations and Partial Differential Equations, Napoli (Italy), November 21-23, 2013.
- New Trends in Shape Optimization, Erlangen (Germany), September 23-27, 2013. Communication: Shape optimization problems for vibrating plates.
- Isaac 9th Congress, Krakow (Poland), August 5-9, 2013. Communication: Spectral perturbation for vibrating plate models.
- Mini-courses in Mathematical Analysis 2012, Padova (Italy), June 18-22, 2012. Communication: Eigenvalues of polyharmonic operators on variable domains.
- Geometric and Analytic Techniques in Calculus of Variations and Partial Differential Equations: Shape Optimization, Pisa (Italy), June 3-8, 2012.
- Workshop on Nonlinear Partial Differential Equations, Perugia (Italy), May 28-June 1, 2012.
- Mini-courses in Mathematical Analysis 2011, Padova (Italy), June 13-17, 2011.

Papers

Articles

- Semiclassical estimates for eigenvalue means of Laplacians on spheres (with P. Luzzini, L. Provenzano, and J. Stubbe), *J. Geom. Anal.*, **33** (2023), 280.
- Bulk-Boundary eigenvalues for Bilaplacian problems (with C. Falcó, M.d.M. Gonzalez, and M. Miranda), *Discrete Contin. Dyn. Syst.* **43** (2023), no. 3&4, 1175-1200.
- Semiclassical bounds for spectra of biharmonic operators (with L. Provenzano and J. Stubbe), *Rend. Mat. Appl.* (7) **43** (2022), no. 4, 267-314.
- The Bilaplacian with Robin boundary conditions (with J. Kennedy), *SIAM J. Math. Anal.* **54** (2022), no. 1, 36-78.
- On the spectral asymptotics for the buckling problem (with P. Luzzini, L. Provenzano, and J. Stubbe), *J. Math. Phys.* **62** (2021), no. 12, Paper No. 121501, 18 pp.
- The buckling eigenvalue problem in the annulus (with E. Parini), *Commun. Contemp. Math.*, **23** (2021), no. 4, 2050044, 19 pp.
- Extremal eigenvalues of the Dirichlet biharmonic operator on rectangles (with P. Freitas), *Proc. Amer. Math. Soc.* **148** (2020), no. 3, 1109-1120.
- On the behaviour of clamped plates under large compression (with P. Antunes and P. Freitas), *SIAM J. Appl. Math.*, **79** (2019), 1872-1891.
- On the stability of some isoperimetric inequalities for the fundamental tones of free plates (with L.M. Chasman and L. Provenzano), *J. Spectr. Theory* **8** (2018), no. 3, 843-869.
- A minimax problem for improving the torsional stability of rectangular plates (with E. Berchio, F. Gazzola, and D. Zucco), *J. Optim. Theory Appl.*, **177** (2018), no. 1, 64-92.
- On the variation of longitudinal and torsional frequencies in a partially hinged rectangular plate (with E. Berchio and F. Gazzola), *ESAIM: COCV*, **24** (2018), 1, 63-87.
- A few shape optimization results for a biharmonic Steklov problem (with L. Provenzano), *J. Differential Equations*, **259** (2015), no. 5, 1778-1818.
- Generalizations of Aitken's process for a certain class of sequences (with A. Karapiperi and S. Pozza), *Appl. Numer. Math.*, **90** (2015), 38-54.

- Shape sensitivity analysis of the eigenvalues of the Reissner-Mindlin system (with P.D. Lamberti), *SIAM J. Math. Anal.*, 47 (2015), 407-426.
- Shape deformation for vibrating hinged plates (with P.D. Lamberti), *Math. Methods Appl. Sci.*, 37 (2014), no. 2, 237-244.
- Eigenvalues of polyharmonic operators on variable domains (with P.D. Lamberti), *ESAIM Control Optim. Calc. Var.*, 19 (2013), no. 4, 1225-1235.

Congress proceedings

- A measure of the torsional performances of partially hinged rectangular plates (with E. Berchio and F. Gazzola), in: *Integral methods in science and engineering. Vol. 1*, Birkhäuser/Springer, 2017.
- Analyticity and criticality results for the eigenvalues of the biharmonic operator, in: *Geometric Properties for Parabolic and Elliptic PDE's: GPPEPDEs*, Palinuro, Italy, May 2015, Springer, 2016.
- On a classical spectral optimization problem in linear elasticity (with P.D. Lamberti), in: *New Trends in Shape Optimization*, Birkhäuser, 2015.
- Shape differentiability of the eigenvalues of elliptic systems, in: *Integral Methods in Science and Engineering: Theoretical and Computational Advances*, Birkhäuser, 2015.
- On the eigenvalues of a biharmonic Steklov problem (with L. Provenzano), in: *Integral Methods in Science and Engineering: Theoretical and Computational Advances*, Birkhäuser, 2015.

Teaching experiences

- Matematica I (Calculus I, Bachelor's in Applied Physics), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2023, 72 hours.
- Matematica (Calculus I and II and Linear Algebra, Bachelor's in Green Chemistry), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2023, 80 hours.
- Matematica II (Linear Algebra and Calculus II, Bachelor's in Green Chemistry), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2022, 40 hours.
- Analisi Matematica (Calculus I, Bachelor's in Computer Science), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2022, 48 hours.
- Matematica II (Linear Algebra and Calculus II, Bachelor's in Green Chemistry), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2021, 40 hours.
- Analisi Matematica (Calculus I, Bachelor's in Computer Science), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2021, 48 hours.
- Statistica (Statistics, Master's in Biology), Università degli Studi del Piemonte Orientale "A. Avogadro", spring semester 2021, 24 hours.
- Matematiche I e II mod. B (Linear Algebra and Calculus II, Bachelor's in Material Science), Università degli Studi del Piemonte Orientale "A. Avogadro", spring semester 2021, 40 hours.
- Analisi Matematica I (Calculus I, Bachelor's in Computer Science), Università degli Studi del Piemonte Orientale "A. Avogadro", fall semester 2020, 48 hours.
- Statistica (Statistics, Master's in Biology), Università degli Studi del Piemonte Orientale "A. Avogadro", spring semester 2020, 48 hours.

- Analyse III (Calculus III, Bachelor's in Physics), École Polytechnique Fédérale de Lausanne, fall semester 2019, 30 hours (TP)+7 hours (ordinary class in substitution of the main teacher) (in French).
- Analyse Avancée II (Calculus II, Bachelor's in Physics), École Polytechnique Fédérale de Lausanne, spring semester 2019, 56 hours (TP) (in French).
- Analyse Avancée I (Calculus I, Bachelor's in Physics), École Polytechnique Fédérale de Lausanne, fall semester 2018, 54 hours (TP) (in French).
- Modelli Matematici per l'Ingegneria (Basics of complex analysis, Bachelor's in Physics Engineering and Bachelor's in Electronic Engineering), Politecnico di Torino, spring semester 2016, 20 hours (in Italian).
- Analisi Matematica 1 (Calculus I, Bachelor's in Information Engineering), fall semester 2014, Università degli Studi di Padova, 25 hours (in Italian).
- Fondamenti di Analisi Matematica 2 (Calculus II, Bachelor's in Aerospace Engineering and Bachelor's in Mechanical Engineering), spring semester 2014, Università degli Studi di Padova, 2 hours (in Italian).
- Analisi Matematica I (Calculus I, Bachelor's in Physics and Bachelor's in Astronomy), spring semester 2013, Università degli Studi di Padova, 8 hours (in Italian).
- Calculus Help Session (classes involved: Calculus I, II, III), fall semester 2012, University of Missouri, 35 hours.

Popularization activities

- Seminar for the school “Come l'interazione fa avanzare il pensiero: storia delle equazioni algebriche”, I.I.S. “A. Avogadro”, Vercelli (Italy), November 29, 2023.
- Seminar for the school “Fino a dove può arrivare un'idea semplice: storia della geometria euclidea”, I.I.S. “A. Avogadro”, Vercelli (Italy), May 4, 2023.
- Seminar for the school “Come l'interazione fa avanzare il pensiero: storia delle equazioni algebriche”, I.I.S. “A. Avogadro”, Vercelli (Italy), November 29 and December 13, 2022.
- Seminar for the school “Fino a dove può arrivare un'idea semplice: storia della geometria euclidea”, online seminar , December 14, 2021.
- Seminar for the school “Come l'interazione fa avanzare il pensiero: storia delle equazioni algebriche”, online seminar , November 19, 2021.
- Seminar for the school “Come l'interazione fa avanzare il pensiero: storia delle equazioni algebriche”, online seminar , April 15, 2021.

Administration

- President of the selection commission for a PostDoc (end of works February 5, 2024, R.S. prof. Davide Buoso), Università degli Studi del Piemonte Orientale “A. Avogadro” (Italy).
- Member of the selection commission for a PostDoc (end of works October 30, 2023, R.S. prof. Marco Morandotti), Politecnico di Torino (Italy).
- Member of several judging commissions for awarding teaching positions (since 2021), Università degli Studi del Piemonte Orientale “A. Avogadro” (Italy).

- Member of *Commissione Qualità*, Dipartimento per lo Sviluppo Sostenibile e la Transizione Ecologica, Università degli Studi del Piemonte Orientale “A. Avogadro” (since January 2022).
- Member of *Commissione Internazionalizzazione*, Dipartimento di Scienze e Innovazione Tecnologica, Università degli Studi del Piemonte Orientale “A. Avogadro” (December 2020-December 2021).

Other activities

- Qualifié aux fonctions de Maître de conférences (French qualification, campagne 2016), sections 25 (Mathématique) and 26 (Mathématiques appliquées et applications des mathématiques).
- Reviewer for zbMATH (since September, 2015) and for Mathematical Reviews (since March, 2018).
- Member of the associations: INdAM (GNAMPA), UMI, EMS.