

UNIVERSITÀ DEGLI STUDI DI MILANO

selezione pubblica per n.1 posto/i di Ricercatore a tempo determinato in tenure track (RTT) per il settore concorsuale 01/A5 - Analisi Numerica, settore scientifico-disciplinare MAT/08 - Analisi Numerica presso il Dipartimento di Matematica "Federigo Enriques", (avviso bando pubblicato sulla G.U. n. 93 del 05/12/2023) Codice concorso 5439

Chiara Piazzola

CURRICULUM VITAE

INFORMAZIONI PERSONALI

COGNOME	PIAZZOLA
NOME	CHIARA
DATA DI NASCITA	22/01/1990

TITOLI**TITOLI DI STUDIO**

Laurea Magistrale in Matematica - Università degli Studi di Verona, Italia.

Periodo: 12/2012-07/2015

Tesi: Splitting methods for the Schroedinger equation with vector potential

Relatori: Prof. Marco Caliari, Prof. Alexander Ostermann

Voto: 106/110

Laurea triennale in Matematica Applicata - Università degli Studi di Verona, Italia.

Periodo: 10/2009-12/2012

Tesi: Analisi di un metodo del terzo ordine per il trasporto di funzioni discontinue

Relatore: Prof. Marco Caliari

Voto: 100/110

TITOLO DI DOTTORE DI RICERCA

Ph.D. in Mathematics - University of Innsbruck, Austria.

Doctoral Programme *Computational Interdisciplinary Modeling*

Periodo: 10/2015-10/2019

Tesi: Dynamical low-rank approaches for differential equations

Supervisore: Prof. Alexander Ostermann

Revisori: Prof. Christian Lubich, Prof. Alexander Ostermann

CONTRATTI DI RICERCA, ASSEGNI DI RICERCA O EQUIVALENTI

1. dal 02/2023: Post-doc research fellow

Department of Mathematics, Technical University of Munich, Germania

Finanziamento: Humboldt research fellowship for postdocs (02/2023-01/2025)

Argomento di ricerca: Uncertainty quantification analysis of bifurcation diagrams of PDEs with random coefficients

Supervisori: Prof. Christian Kuehn, Prof. Elisabeth Ullmann

2. dal 03/2020 al 01/2023: Assegnista di ricerca post-doc

Consiglio Nazionale delle Ricerche - Istituto di Matematica Applicata e Tecnologie Informatiche "E. Magenes" (CNR-IMATI) Pavia, Italia

Argomento di ricerca: Forward and inverse uncertainty quantification analysis of PDEs with random coefficients based on stochastic collocation approaches, parameter identifiability of ODEs

Supervisore: Dr. Lorenzo Tamellini

FINANZIAMENTI PERSONALI

1. **04/2024: Bando Visiting Researchers - University of Verona, Italy**
Finanziamento per due settimane di didattica e ricerca (600 EUR)
2. **07/2022: Finanziamento Giovani Ricercatori GNCS 2022 2023**
Titolo progetto: Analisi di quantificazione dell'incertezza e identificabilità dei parametri per EDP
Finanziamento per partecipare a una conferenza (1000 EUR)
3. **02/2023-01/2025: Humboldt Research Fellowship for Postdocs**
Titolo progetto: Uncertainty quantification analysis of random bifurcations diagrams
Borsa di ricerca comprensiva di copertura dei costi della ricerca (approx. 92000 EUR)

SOGGIORNI DI RICERCA

1. **09/2022:** Università di Padova, Italia, Dipartimento di Ingegneria Civile, Edile e Ambientale, gruppo di metodi numerici.
2. **04/2022:** Consiglio Nazionale delle Ricerche - Istituto di Ingegneria del Mare (CNR-INM), Roma, Italia, Dr. A. Serani and Dr. R. Pellegrini.
3. **10/2021:** EPF de Lausanne, Svizzera, chair of Scientific Computing and Uncertainty Quantification, Prof. F. Nobile.
4. **06/2016:** University of Tuebingen, Germania, Department of Mathematics, group of Prof. C. Lubich.
5. **03-06/2015:** University of Innsbruck, Austria, Department of Mathematics, Prof. Alexander Ostermann.

PARTECIPAZIONE A GRUPPI DI RICERCA NAZIONALI E INTERNAZIONALI

1. **03/2020-01/2023:** PRIN 2017 - Numerical Analysis for Full and Reduced Order Methods for the efficient and accurate solution of complex systems governed by Partial Differential Equations (finanziato dal Ministero dell'Università e della Ricerca).
PI: G. Rozza, Coordinatore unità CNR-IMATI: L. Tamellini, Ruolo: assegnista post-doc.
2. **10/2015-09/2016:** Solution of large-scale Lyapunov differential equations (finanziato da FWF - Austrian Science Fund).
PI: H. Mena, Ruolo: studente di dottorato.

APPARTENENZA A SOCIETÀ PROFESSIONALI

- Society for Industrial and Applied mathematics (SIAM) and Activity Group on Uncertainty Quantification (SIAG-UQ)
- Società Italiana di Matematica Applicata e Industriale (SIMAI)
- Gesellschaft fuer angewandte Mathematik und Mechanik (GAMM) and Activity Group on Uncertainty Quantification (GAMM-AG-UQ)

ATTIVITÀ DIDATTICA A LIVELLO UNIVERSITARIO IN ITALIA O ALL'ESTERO

CORSI DI DOTTORATO

4. *Corso: Uncertainty Quantification of Partial and Ordinary Differential Equations with random coefficients*, Pavia - Milano Bicocca - INdAM Ph.D. program in Mathematics, 12/04-31/05/2021, 13 ore - esercitazioni.

CORSI DI LAUREA MAGISTRALE

1. Seminario: *Multilevel Monte Carlo Methods for Uncertainty Quantification*, Technical University of Munich - Master's Degree in Mathematics, semestre invernale 2023/24, 3 ECTS - co-supervisione con E. Ullmann.
2. Corso: *Numerical methods for Uncertainty Quantification*, Technical University of Munich - Master's degree in Mathematics, summer term 2023, 4 ore - "guest lecture".
3. Corso: *Splitting Methods and Geometric Integration*, University of Innsbruck - Master's degree in Mathematics, semestre estivo 2018, con A. Ostermann, 22 ore - lezione frontale.
4. Seminario: *Introduction to Higher Numerical Mathematics*, University of Innsbruck - Master's degree in Technical Mathematics, semestre invernale 2017/18, 3.5 ECTS, 28 ore - progettazione del corso e supervisione studenti.

CORSI DI LAUREA TRIENNALE

1. Seminario: *Linear Algebra and Analytic Geometry*, University of Innsbruck - Bachelor's degree in Technical Mathematics, semestre estivo 2019, 4 ECTS, 28 ore - progettazione del corso, supervisione studenti, esame finale.
2. Seminario: *Linear Algebra*, University of Innsbruck - Bachelor's degree in Physics, semestre invernale 2018/19, 2.5 ECTS, 30 ore - progettazione del corso, supervisione studenti, esame finale.
3. Seminario: *Linear Algebra*, University of Innsbruck - Bachelor's degree in Atmosphere Science, semestre invernale 2018/19, 2.5 ECTS, 30 ore - progettazione del corso, supervisione studenti, esame finale.
4. Seminario: *Analysis 2*, University of Innsbruck - Bachelor's degree in Physics, semestre estivo 2017, 4 ECTS, 26 ore - progettazione del corso, supervisione studenti, esame finale.

SUPERVISIONE STUDENTI

1. Research Internship of M. Wagner - co-supervisione (in corso, Technical University of Munich).
2. Tesi di laurea magistrale di M. Chiappetta - co-supervisione (2022, Università di Pavia).

ATTIVITÀ DI RELATORE

LEZIONI - SU INVITO

1. *Numerical methods for Uncertainty Quantification*.
Master's Degree in Mathematics and in Data Science, University of Verona and PhD programme in Mathematics, University of Trento and Verona, 04/2024, Verona, Italy.
2. *Multi-fidelity computational approaches for the uncertainty quantification of ship performance*.
Doctoral College Computational Interdisciplinary Modeling and Doctoral Program Dynamics of Complex Continua summer school of the University of Innsbruck, 26-30/07/2021, Obergurgl, Austria.

PRESENTAZIONI A CONGRESSI, CONVEGNI E WORKSHOP NAZIONALI E INTERNAZIONALI - SU INVITO

1. *Bifurcation diagrams of PDEs with parametric uncertainty*.
SIAM Conference on Uncertainty Quantification, 27/02--1/03/2024, Trieste, Italy. MS: Learning high-dimensional functions: approximation, sampling and algorithms (S. Brugiapaglia, N. Dexter, L. Scarabosio, and W. van Harten).
2. *Bifurcation diagrams of PDEs with parametric uncertainty*.
ENUMATH 2023, 4--8/09/2023, Lisbon, Portugal. MS: Theoretical and numerical developments for high-dimensional parametric PDEs (Y. Kazashi and T. Vanzan).
3. *Response-surface-based Bayesian inversion for engineering applications*.
7th ECCOMAS Young Investigators Conference - YIC 2023, 19--21/06/2023, Porto, Portugal. MS: Scientific Machine Learning techniques for complex engineering systems (A. Badiás, F. Masi, B. Moya, M. Giacomini).
4. *Comparing Multi-Fidelity Radial Basis Function and Multi-Index Stochastic Collocation surrogates for ship resistance uncertainty quantification*.
GIMC-SIMAI young Workshop, 29--30/09/2022, Pavia, Italy. MS: Kernel methods for computational sciences and simulation (F. Marchetti and G. Santin).
5. *Comparing two multi-fidelity methods for forward UQ of ship resistance*.
ECCOMAS 2022, European Congress on Computational Methods in Applied Sciences and Engineering, 5--9/06/2022, Oslo, Norway. MS: Multi-fidelity methods for and optimization (M. Diez, A. Gorodetsky, J. Jakeman, and L. Tamellini).
6. *Comparing Multi-Index Stochastic Collocation and Multi-Fidelity Stochastic Radial Basis Functions for Forward Uncertainty Quantification of Ship Resistance*.
SIAM Conference on Uncertainty Quantification, 12--15/04/2022, online. MS: Recent Advances in Multifidelity UQ (M. Eldred, G. Geraci, T. Portone, and A. Gorodetsky).
7. *A Comparison of Two Multi-Fidelity Computational Approaches for the Uncertainty Quantification of Ship Performance*.
Congresso Nazionale SIMAI 2020+2021, 30/08--3/09/2021, Parma, Italy. MS: Trending Topics in Uncertainty Quantification (F. Bonizzoni, A. Manzoni, and L. Tamellini).
8. *A comparison of Multi-Index Stochastic Collocation and Stochastic Radial Basis Function Surrogates for Ship Performance Assessment*.
VI ECCOMAS Young Investigators Conference - YIC 2021, 7--9/07/2021, online. MS: Uncertainty Quantification of differential equations with random parameters: methods and applications (C. Schillings, B. Sprungk, and L. Tamellini).
9. *The Multi-Index Stochastic Collocation method for PDEs with random coefficients*.
GAMM Workshop 2021 - Young Academics Workshop, 25--26/03/2021, online (R. Altmann).
10. *The Multi-index stochastic Collocation method for PDEs with random coefficients*.

- SIAM Conference on Computational Science and Engineering, 1--5/03/2021, online. MS: Dynamical Low-rank and other complexity reduction techniques for high dimensional PDEs (L. Einkemmer and R. McClarren).
11. *Dynamical low-rank integrators for PDEs.*
SciCADE, International Conference on Scientific Computation and Differential Equations, 22--26/07/2019, Innsbruck, Austria. MS: Low-rank methods for matrix- and operator-valued differential equations (T. Stillfjord and H. Mena).
 12. *A low-rank integrator for the Vlasov--Maxwell equations.*
GAMM Workshop 2019 - Young Academics Workshop, 24--30/03/2019, Sion, Switzerland (R. Altmann and R. Maier).
 13. *A dynamical low-rank integrator for the Vlasov--Maxwell equations.*
Workshop ``Nonlinear Evolution Equations: Analysis and Numerics'', 3--9/02/2019, Oberwolfach Research Institute for Mathematics, Germany (M. Hochbruck, H. Koch, S.-J. Oh, and A. Ostermann).
 14. *Dynamical low-rank integrator for high-dimensional differential equations.*
Workshop ``Integrating the Integrators for Nonlinear Evolution Equations, from Analysis to Numerical Methods, High-Performance Computing and Applications'', 3--7/12/2018, Banff International Research Station, Canada (A. Ostermann and M. Tokman).
 15. *A low-rank integrator for semilinear stiff matrix differential equations.*
20th European Congress on Mathematics for Industry, 18--22/06/ 2018, Budapest, Hungary. MS: Differential Equations in Numerical Modelling: From Theory to Application (P. Csomós).
 16. *Low-rank solution of matrix differential equations.*
SciCADE, International Conference on Scientific Computation and Differential Equations, 11--15/09/2017, Bath, UK. MS: Tensor approximations of multi-dimensional PDEs (B. Khoromskij and S. Dolgov).

SEMINARI - SU INVITO

1. *Uncertainty quantification and identifiability of ODE-based systems.*
CNR-INM, 5/04/2022, Roma, Italy.
2. *Dynamical low-rank approaches for time-dependent PDEs.*
MATHICSE seminar - EPF de Lausanne, 5/10/2021, Lausanne, Switzerland.
3. *Uncertainty quantification and identifiability of SIR-like dynamical systems.*
Oberseminar Dynamics - Technical University of Munich, 14/09/2021, online.
4. *Comparing Multi-Index Stochastic Collocation and Radial Basis Function Surrogates for Ship Resistance UQ.*
UQ hybrid seminar - RWTH Aachen University, Germany, 9/02/2021, online.

CONTRIBUTI A CONGRESSI E CONVEGNI NAZIONALI E INTERNAZIONALI

1. *Uncertainty quantification and identifiability of ODE-based systems.*
SIAM Conference on Applications of Dynamical Systems, 14--18/05/2023, Portland, Oregon, U.S.
2. *The Multi-Index Stochastic Collocation Method for surrogate modeling and uncertainty quantification of parametric PDEs.*
SciCADE, International Conference on Scientific Computation and Differential Equations, 25--29/07/2022, Reykjavik, Iceland.
3. *Comparing Multi-Index Stochastic Collocation and Radial Basis Function Surrogates for Ship Resistance Uncertainty Quantification.*
UQ@DIITET/CNR Workshop, 2/10/2020, online.
4. *A dynamic low-rank integrator for the Vlasov--Maxwell equations.*
9th International Congress on Industrial and Applied Mathematics - ICIAM 2019, 15-19/07/2019, Valencia, Spain.
5. *A low-rank splitting integrator for matrix differential equations.*
Conference on the Numerical Solution of Differential and Differential-Algebraic Equations, 3--7/09/2018, Halle, Germany.
6. *A splitting approach for the magnetic Schroedinger equation.*
Conference on Mathematics for Wave Phenomena, 23--27/07/2018, Karlsruhe, Germany.
7. *A low-rank integrator for semilinear stiff matrix differential equations.*
Austrian Numerical Analysis Day, 3--4/05/2018, Klagenfurt, Austria.
8. *Solution of large-scale Lyapunov differential equations.*
9th Workshop Numerical Analysis of Evolution Equations, 8--11/11/2016, Innsbruck, Austria.
9. *Efficient simulation of El-Nino.*
7th European Congress of Mathematics, 18--22/07/2016, Berlin, Germany.

POSTER

1. *Uncertainty quantification and identifiability of SIR-like dynamical systems.*

KAUST Workshop on Stochastic numerics and Statistical Learning: Theory and Applications", 21/05--1/06/2023, online.

ORGANIZZAZIONE DI CONFERENZE E MINI-SIMPOSI

COMITATO ORGANIZZATORE LOCALE

1. SciCADE, International Conference on Scientific Computation and Differential Equations}, July 22--26, 2019, Innsbruck, Austria.

MINI-SIMPOSI

1. K. Lux, C. Piazzola, Quantifying Parameter Uncertainty in Random Differential Equations, SIAM Conference on Uncertainty Quantification, 27/02--1/03/2024, Trieste, Italy (12 speakers).
2. C. Piazzola, B. Sprungk, L. Tamellini, Uncertainty quantification of differential equations with random parameters: methods and applications, 7th ECCOMAS Young Investigators Conference - YIC 2023, 19--21/06/2023, Porto, Portugal (14 speakers).
3. K. Lux, C. Piazzola, Uncertainty Quantification for Random Differential Equations, SIAM Conference on Applications of Dynamical Systems, 14--18/05/2023, Portland, Oregon, U.S. (4 speakers).
4. R. Pellegrini, C. Piazzola, Enabling Technologies in Uncertainty Quantification and Optimization in Real-World Applications, GIMC-SIMAI young Workshop, 29--30/09/2022, Pavia, Italy (10 speakers).

ATTIVITÀ DI REFERAGGIO PER RIVISTE SCIENTIFICHE

- Engineering Computations
- International Journal for Uncertainty Quantification
- International Journal on Geomathematics
- Journal of Computational and Applied Mathematics
- Journal of Computational Physics
- Journal of Mathematical Biology
- SIAM/ASA Journal on Uncertainty Quantification

PRODUZIONE SCIENTIFICA

PUBBLICAZIONI IN PREPARAZIONE

1. C. Kuehn, C. Piazzola, E. Ullmann. Uncertainty quantification analysis of bifurcations of the Allen--Cahn equation with random coefficients. Submission expected in early 2024.

PUBBLICAZIONI INVIATE A RIVISTA

1. M. Chiappetta, C. Piazzola, L. Tamellini, A. Reali, F. Auricchio, and M. Carraturo. Data-informed uncertainty quantification for laser-based powder bed fusion additive manufacturing. Submitted, Nov. 2023. arXiv:2311.03823

ARTICOLI PEER-REVIEWED

1. C. Piazzola, L. Tamellini. The Sparse Grids Matlab kit-a Matlab implementation of sparse grids for high-dimensional function approximation and uncertainty quantification. *ACM Trans. Math. Softw.*, 2023. DOI: 10.1145/3630023
2. M. Chiappetta, C. Piazzola, M. Carraturo, L. Tamellini, A. Reali, and F. Auricchio. Sparse-grids uncertainty quantification of part-scale additive manufacturing processes. *Int. J. Mech. Sci.* 256, 108476, 2023. DOI: 10.1016/j.ijmecsci.2023.108476
3. C. Piazzola, L. Tamellini, R. Pellegrini, R. Broglia, A. Serani, and M. Diez. Comparing Multi-Index Stochastic Collocation and Multi-Fidelity Stochastic Radial Basis Functions for Forward Uncertainty Quantification of Ship Resistance. *Eng. Comp.* 39, 2209--2237, 2023. DOI: 10.1007/s00366-021-01588-0
4. C. Piazzola, L. Tamellini, R. Tempone. A note on tools for prediction under uncertainty and identifiability of SIR-like dynamical systems for epidemiology. *Math. Biosci.*, 332, 108514, 2021. DOI: 10.1016/j.mbs.2020.108514

5. L. Einkemmer, A. Ostermann, and C. Piazzola. A low-rank projector-splitting integrator for the Vlasov--Maxwell equations with divergence correction. *J. Comput. Phys.*, 403, 109063, 2020. DOI: 10.1016/j.jcp.2019.109063
6. A. Ostermann, C. Piazzola, and H. Walach. Convergence of a low-rank Lie--Trotter splitting for stiff matrix differential equations. *SIAM J. Numer. Anal.* 57, 1947--1966, 2019. DOI: 10.1137/18M1177901
7. H. Mena, A. Ostermann, L.-M. Pfurtscheller, and C. Piazzola. Numerical low-rank approximation of matrix differential equations. *J. Comput. Appl. Math.* 340, 602--614, 2018. DOI: 10.1016/j.cam.2018.01.035
8. M. Caliri, A. Ostermann, and C. Piazzola. A splitting approach for the magnetic Schroedinger equation. *J. Comput. Appl. Math.* 316, 74--85, 2017. DOI: 10.1016/j.cam.2016.08.041

CONFERENCE PROCEEDINGS

1. C. Piazzola, L. Tamellini, R. Pellegrini, R. Broglia, A. Serani, and M. Diez. Uncertainty Quantification of Ship Resistance via Multi-Index Stochastic Collocation and Radial Basis Function Surrogates: A Comparison. *Proceedings of the AIAA Aviation Forum 2020*, June 15--19, 2020. DOI: 10.2514/6.2020-3160
2. L. Einkemmer, A. Ostermann, and C. Piazzola. A dynamical low-rank integrator for the Vlasov--Maxwell equations. *Oberwolfach reports* 16, 379--381, 2019. DOI: 10.4171/OWR/2019/5

TESI

1. C. Piazzola. Dynamical low-rank approaches for differential equations. PhD Thesis, University of Innsbruck, 2019. Available online: Digital Library - University of Innsbruck.

SOFTWARE

1. L. Tamellini, C. Piazzola, F. Nobile, B. Sprungk, G. Porta, D. Guignard, and F. Tesei. Sparse Grids Matlab kit v.23-5 "Robert". <https://sites.google.com/view/sparse-grids-kit>, 2011-2023. Available free of charge under BSD-2 Clause Licence.

COMPETENZE INFORMATICHE

Windows, Linux
Matlab, C, C++
LaTeX, Office, GIT, SVN

LINGUE

Italiano: madrelingua
Inglese: avanzato
Tedesco: intermedio

Data

03/01/2024

Luogo

Muenchen