Giulio Giuseppe Giusteri, PhD

Contact information

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Professional Experience

Summary

- Researcher and educator in Mathematics and Physics
- Worked and developed collaborations in three continents
 Interests: Applied mathematics, Complex fluids, Nonlinear analysis, Thin elastic structures, Data-driven modeling,
 Quantum dynamics on networks, Mathematical physics

2022–present	Associate Professor at the Department of Mathematics "Tullio Levi-Civita", Università degli Studi di Padova, Padova, Italy
2019-2021	Assistant Professor (RTD-B L. 240/2010) at the Department of Mathematics "Tullio Levi-Civita", Università degli Studi di Padova, Padova, Italy
2018	Research Associate at MOX, Department of Mathematics, Politecnico di Milano, Italy
2015-2017	Postdoctoral Researcher at the Mathematics, Mechanics, and Materials Unit (formerly Mathematical Soft Matter Unit), Okinawa Institute of Science and Technology , Japan
2012-2017	Researcher (RTD-A L. 240/2010, <i>on leave since September 2015</i>) at the Department of Mathematics and Physics "Niccolò Tartaglia", Università Cattolica del Sacro Cuore , Brescia, Italy
2014, 1 mo.	Visiting Researcher at the Mathematical Soft Matter Unit, Okinawa Institute of Science and Technology Graduate University, Japan
2012, 6 mos.	Visiting Lecturer (with research duties) at the Department of Mechanical Engineering, Univer- sity of Washington, Seattle, United States
2009-2015	Adjunct Professor at the Department of Mathematics and Physics "Niccolò Tartaglia", Università Cattolica del Sacro Cuore, Brescia, Italy

Education

2012 PhD in Pure and Applied Mathematics at Università degli studi di Milano-Bicocca

Thesis: Higher-gradient theories for fluids and concentrated effects. Advisor: Alfredo Marzocchi

- 2009 Master's degree in Physics cum laude Università Cattolica del Sacro Cuore, Brescia, Italy
- 2007 Master's degree in Mathematics cum laude Università Cattolica del Sacro Cuore, Brescia, Italy
- 2006 Bachelor's degree in Physics cum laude Università Cattolica del Sacro Cuore, Brescia, Italy

Grants and Awards

- 2023 **P.I.** National Coordinator of *Mathematical models for viscoelastic biological matter* funded by the Italian Government within the call **PRIN 2022** (€ 217,380)
- 2023 Italian National Scientific Habilitation as Full Professor in Mathematical Physics (valid until Feb 6, 2033)
- 2022 **P.I. Industrial research contract** funded by Tenaris Connections B.V. for the project *Mathematical modelling of stick-slip phenomena* (€ 70,000)
- 2022 Team Member Industrial research contract funded by ENI (€ 80,000, P.I. Prof. Mario Putti)
- 2021 P.I. GNFM-INDAM Young Researchers Projects 2020 (€ 3,920)
- 2020 **P.I.** Industrial research contract funded by Tenaris Connections B.V. for the project *Mathematical modelling and simulation of drill-string systems* (€ 125,000)
- 2013 P.I. GNFM-INDAM Young Researchers Projects 2013 (€ 2,000)
- 2008 Master's degree thesis award from the foundation Ateneo di Brescia

Teaching and Mentoring

Department of Industrial Engineering - Università degli Studi di Padova2019-2022Instructor for Topics in Linear Algebra and Geometry (Undergraduate, ~150 students/year)

Department of Physics and Astronomy - Università degli Studi di Padova

2019–2021 *Teaching Assistant for* **Institutions of Mathematical Physics** (Undergraduate, ~80 students/year)

Department of Mathematics - Università degli Studi di Padova

2022-2023	Instructor for Special Functions and Applications (Course of the Doctoral School, ~10 students)
2018-2019	
2021-2022	Teaching Assistant for Mathematical Physics (Undergraduate course, \sim 100 students per year)
2018-2020	
2021-2023	Instructor for Computational Laboratory (Undergraduate course, \sim 20 students)

School of Mathematical, Physical, and Natural Sciences - Università Cattolica del Sacro Cuore

2009–2015 2011–2015 2013–2015	Instructor for Fluid Mechanics (~10 students per year) Instructor for Stochastic Processes (~10 students per year) Instructor for Mathematics Education Lab (~100 attendees per year)
2012-2015	<i>Teaching Assistant for</i> Rational Mechanics (Undergraduate course, \sim 40 students per year)
2010-2012	<i>Teaching Assistant for</i> Galois Theory (Graduate course, \sim 10 students per year)
2008-2009	Teaching Assistant for Mathematical Models and Methods for Applications (Undergraduate course, \sim 10 students)

School of Engineering - Università degli Studi di Brescia

2009–2010 *Teaching Assistant for* **Statistics and Calculus** (Undergraduate course, ~80 students)

Secondary School "Istituto Cesare Arici"

2007–2009 *Teacher of* Science

Mentoring experience

2010-2020	Undergraduate students. Supervised and co-supervised a total of thirteen Bachelor's theses on
	topics related to Quantum Transport, Fluid Mechanics, and Dynamical Systems

2012–2021	 Graduate students. Eight Master's theses supervised: — Three on financial applications of stochastic differential equations: Dario Fontana (PhD in Economics, Applied Mathematics and Operational Research, University of Bergamo), Annalisa Bonetti, Elisabetta Benzi (Quantitative Analyst) — Gradient-flow formulation of the Fokker-Planck equation and its applications: Giada Ronchi — Motion of deformable bodies in viscous fluids: Filippo Recrosi (PhD in Math at GSSI, L'Aquila)
	 Remodeling of poroelastic continua: Simone D'Arco Cooperative phenomena in open quantum systems: Filippo Recrosi (PhD in Math at GSSI, L'Aquila) Analysis of a model for viscoelastic fluids: Alessio Gabriele Soggiu
2019-	Doctoral students. Pietro De Checchi (2023–, quantum algorithms for open quantum syaytems). Laura Rinaldi (2022–, digital twins and modelling). Muhanna Ali H Alrashdi (2021–, continuum models for viscoelasticity). Francesca Tedeschi (2019–2022, multiscale methods for complex fluids).
0001	Destdestand scholars Some Calesse (2022) Luce Sontalli (2021, 2022)

2021– **Postdoctoral scholars.** Sara Galasso (2023–). Luca Santelli (2021–2022).

Scientific Publications

Published papers

- 24. G. G. GIUSTERI, F. MARCUZZI, L. RINALDI. Replacing voids and localized parameter changes with fictitious forcing terms in boundary-value problems, *Results Appl. Math.* 20, 100402 (2023)
- 23. G. G. GIUSTERI, R. PENTA. Periodic rhomboidal cells for symmetry-preserving homogenization and isotropic metamaterials, *Mech. Res. Commun.* 126, 104001 (2022)
- 22. F. MATTIOTTI, M. SAROVAR, G. G. GIUSTERI, F. BORGONOVI, G. L. CELARDO. Efficient light harvesting and photon sensing via engineered cooperative effects, *New J. Phys.* 24, 013027 (2022)
- 21. G. G. GIUSTERI, E. MIGLIO, N. PAROLINI, M. PENATI, R. ZAMBETTI. Simulation of viscoelastic Cosserat rods based on the geometrically exact dynamics of special Euclidean strands, Int. J. Numer. Meth. Eng., 123(2), 396-410 (2022)
- F. TEDESCHI, G. G. GIUSTERI, L. YELASH, M. LUKÁČOVÁ-MEDVID'OVÁ. A multi-scale method for complex flows of non-Newtonian fluids, *Math. Eng.*, 4(6), 1–22 (2022)
- 19. G. G. GIUSTERI, R. SETO. Shear jamming and fragility of suspensions in a continuum model with elastic constraints, *Phys. Rev. Lett.*, 127, 138001 (2021)
- 18. R. SETO, G. G. GIUSTERI. Normal stress differences in dense suspensions, J. Fluid Mech., 857, 200-215 (2018)
- 17. G. G. GIUSTERI, R. SETO. A theoretical framework for steady-state rheometry in generic flow conditions, *J. Rheol.*, 62(3), 713–723 (2018)
- 16. G. G. GIUSTERI, E. FRIED. Importance and effectiveness of representing the shapes of Cosserat rods and framed curves as paths in the special Euclidean algebra, *J. Elast.*, 132(1), 43–65 (2018)
- 15. R. SETO, G. G. GIUSTERI, A. MARTINIELLO. Microstructure and thickening of dense suspensions under extensional and shear flows, J. Fluid Mech., 825, R3 (2017)
 ★ Featured in Focus on Fluids with an article by H. Wilson. J. Fluid Mech., 836 (2018), doi:10.1017/jfm.2017.744 ★
- 14. G. G. GIUSTERI, F. RECROSI, G. SCHALLER, G. L. CELARDO. Interplay of different environments in open quantum systems: Breakdown of the additive approximation, *Phys. Rev. E*, 96(1), 012113 (2017)
- 13. G. G. GIUSTERI, P. PODIO-GUIDUGLI, E. FRIED. Continuum balances from extended Hamiltonian dynamics, *J. Chem. Phys.*, 146, 224102 (2017)
- G. G. GIUSTERI, L. LUSSARDI, E. FRIED. Solution of the Kirchhoff-Plateau problem, J. Nonlinear Sci., 27(3), 1043– 1063 (2017)
- 11. G. SCHALLER, G. G. GIUSTERI, G. L. CELARDO. Collective couplings: Rectification and super-transmittance, *Phys. Rev. E*, 94(3), 032135 (2016)
- 10. G. G. GIUSTERI, P. FRANCESCHINI, E. FRIED. Instability paths in the Kirchhoff-Plateau problem, J. Nonlinear Sci., 26(4), 1097-1132 (2016)
- 9. G. G. GIUSTERI, F. BORGONOVI, G. L. CELARDO. Optimal efficiency of quantum transport in a disordered trimer, *Phys. Rev. E*, 93(3), 032136 (2016)
- 8. G. G. GIUSTERI, F. MATTIOTTI, G. L. CELARDO. Non-Hermitian Hamiltonian approach to quantum transport in disordered networks with sinks: Validity and effectiveness, *Phys. Rev. B*, 91(9), 094301 (2015)
- 7. G. G. GIUSTERI, A. MARZOCCHI, A. MUSESTI. Steady free fall of one-dimensional bodies in a hyperviscous fluid at low Reynolds number, *Evol. Equat. Control Theory*, 3(3), 429–445 (2014)
- 6. G. G. GIUSTERI, A. MARZOCCHI, A. MUSESTI. Nonlinear free fall of one-dimensional rigid bodies in hyperviscous fluids, *Discrete Contin. Dyn. Syst. Ser. B*, 19(7), 2145–2157 (2014)
- 5. G. L. CELARDO, G. G. GIUSTERI, F. BORGONOVI. Cooperative robustness to static disorder: Superradiance and localization in a nanoscale ring to model light-harvesting systems found in nature, *Phys. Rev. B*, 90(7), 075113 (2014)
- 4. G. G. GIUSTERI, E. FRIED. Slender-body theory for viscous flow via dimensional reduction and hyperviscous regularization, *Meccanica*, 49(9), 2153–2167 (2014)

- 3. G. G. GIUSTERI. The multiple nature of concentrated interactions in second-gradient dissipative liquids, *Z. Angew. Math. Phys. ZAMP*, 64(2), 371–380 (2013)
- 2. G. G. GIUSTERI, A. MARZOCCHI, A. MUSESTI. Nonsimple isotropic incompressible linear fluids surrounding onedimensional structures, *Acta Mech.*, 217(3-4), 191–204 (2011)
- 1. G. G. GIUSTERI, A. MARZOCCHI, A. MUSESTI. Three-dimensional nonsimple viscous liquids dragged by onedimensional immersed bodies, *Mech. Res. Commun.*, 37(7), 642–646 (2010)

Proceedings

- A. MUSESTI, G. G. GIUSTERI, A. MARZOCCHI. Predicting Ageing: On the Mathematical Modelization of Ageing Muscle Tissue, in G. Riva et al. (Eds.), *Active Ageing and Healthy Living*, Chapter 17
- G. L. CELARDO, A. BIELLA, G. G. GIUSTERI, F. MATTIOTTI, Y. ZHANG, L. KAPLAN. Superradiance, disorder, and the non-Hermitian Hamiltonian in open quantum systems, *AIP Conf. Proc.*, 1619, 64–72 (2014)

Invited presentations

- May 25, **2023** *Continuum modelling of dense suspensions*, during the Workshop on Discrete Simulation and Continuum Modeling of Granular Matter (Fasano)
- May 11, **2023** *Evolving relaxed states and the role of elasticity in fluid models*, during the Workshop Applications of Linear and nonlinear Elasticity (Brescia)
- Dec 7, 2022 Tensorial transport equations for viscoelasticity and jamming, during CoMFoS22 (Online)
- Jun 1, **2022** *Local models for materials that gain and lose memory*, during the Workshop on Discrete and Continuum Modeling of Natural Systems (Fasano)
- May 6, 2022 Local models for materials that gain and lose memory, during GNFM meeting (Montecatini)
- Oct 27, **2020** Modeling shear jamming and fragility of dense suspensions by means of unilateral constraints, Continuum Mechanics Webinar.
- Nov 4, **2019** *Interplay of multiple environments in open quantum systems*, during the Gathering on Non-Hermitian Quantum Systems (Cuernavaca)
- Feb 7, 2019 Plateau, the Cosserat, and the mechanics of shapes, Applied Mathematics Seminar, Glasgow
- Dec 17, 2018 Solution of the Kirchhoff-Plateau problem, at the Università degli Studi di Milano
- Nov 9, 2018 Plateau, the Cosserat, and the mechanics of shapes, at the Politecnico di Torino
- Nov 6, 2018 From stress projections to material functions for complex fluids, at Kyoto University
- Jun 20, 2018 Rheometric framework for the data-driven modeling of fluids, at the University of Mainz
- Dec 8, **2017** *Rheometric and modeling frameworks for complex fluids*, during the MIMS workshop on Modeling and Numerical Analysis of Nonlinear Phenomena (Tokyo)
- Nov 23, 2017 *Rheological models for complex materials*, during the workshop Recent Advances in Mechanics and Mathematics of Materials (Rome)
- Nov 21, 2017 Rheometry and modeling of complex fluids, at the Department of Mathematics, Politecnico di Milano
- Apr 14, **2017** *Mathematical modeling and characterization of non-Newtonian viscous fluids*, Nonlinear Analysis Seminar, Kanazawa University
- Jan 13, 2017 Paths in the special Euclidean algebra and rod shapes, at NCTS (Taipei)
- Oct 15, 2016 The shapes of a rod are traced in a Lie algebra, workshop Geometry and Materials Sciences (Okinawa)
- May 23, 2016 Instability paths in the Kirchhoff-Plateau problem, at EPFL (Lausanne)
- May 23, **2014** Modeling the sedimentation of filaments in viscous fluids via dimensional reduction and hyperviscous regularization, at Okinawa Institute of Science and Technology (Okinawa)
- Mar 20, **2014** *Modeling the sedimentation of filaments in viscous fluids with a second-gradient dissipation functional,* during EUROMECH Colloquium 563 (Cisterna di Latina)
- Feb 26, **2013** *Concentrated interactions in second-gradient dissipative liquids*, at the international research center M&MoCS (Cisterna di Latina)

Contributed presentations (selected)

- Sept 22, **2023** *Periodic rhomboidal cells for symmetry-preserving homogenization and isotropic metamaterials*, during ICCB 2023 (Vienna)
- Aug 1, 2023 Continuum modeling of dense suspensions with evolving relaxed states, during ICR 2023 (Athens)
- Jul 14, **2022** *Local models for materials that gain and lose memory*, during the Workshop on The Evolving Nonlinear Continuum Panorama (Castro Urdiales)
- Jun 17, 2022 Modeling shear jamming and fragility of concentrated suspensions, during STAMM 2022 (Brescia)
- Mar 26, 2022 Flow-type dependent rheologies and multiscale simulations, during AERC 2022 (Sevilla)
- Aug **2021** Modeling and simulation of Cosserat rods based on the Special Euclidean algebra with applications to the analysis of pipes, during ICTAM 2020+1 (Online)
- Apr 2021 Tensorial models for shear jamming and yielding for generic geometries, during AERC 2021 (Online)
- Dec 2020 Shear jamming and fragility in a continuum model with unilateral constraints, during ICR 2020 (Online)
- Jul 4, **2019** *Stress projections and data-driven modelling*, during the International Workshop on The Multiscale Spectrum of Constitutive Modeling in Solid Mechanics (Castro Urdiales)
- Apr 10, **2019** Normal stress differences and flow-type dependence in dense suspensions, during AERC 2019 (Portorož).
- Apr 18, 2018 Theoretical framework for the data-driven modeling of fluids, during AERC 2018 (Sorrento)
- Jul 1, 2015 Optimal energy transfer in disordered quantum networks, during QuEBS 2015 (Florence)
- May 23, **2013** *LHI-RC complexes of Rhodobacter Sphaeroides: Superradiance, high efficiency, and adaptability,* during the workshop Transport in Open Quantum Systems (Porquerolles)
- Apr 6, **2013** *Hyperviscous regularization of the Navier-Stokes equation and the motion of slender swimmers*, during the IV International Conference on New Trends in Fluid and Solid Models (Vietri sul Mare)
- Oct 5, **2012** *Slender-body theory for viscous flow via dimensional reduction and hyperviscous regularization*, during the annual meeting of GNFM (Montecatini)
- Sept 2, 2010 Non-simple linear fluids surrounding 1D structures, during STAMM 2010 (Berlin)

Organization and Service

2022-2023	Member of the Scientific Committee of the Dept. of Mathematics of the University Padua
2020-2023	Selection Committee for several PhD and Postdoc positions and two Assistant Professor positions
2023	Organizer of the minisymposium on Multiscale Methods for Complex Fluids, ICIAM 2023 Tokyo
2022	Organizer of the workshop Evolution in discrete and continuous mechanics in Bressanone
2020-2023	Member of the Didactic Planning Committee of the Dept. of Mathematics of the University Padua
2019	Organizer of the workshop A Thermodynamics Day 2019 at the University of Padua
2017	Organizer of the workshop Viscoelasticity and Dissipative Dynamics of Rods and Membranes
2016	Postdoctoral Researchers' representative in the OIST Faculty Assembly
2016	Grant Writing Peer Support Group for OIST researchers
2015-2016	OIST Open Campus and Science Festival
since 2011	Peer reviewer activity certified on my Publons profile and Reviewer for Mathematical Reviews
2009-2015	Evaluation Committee for approximately a hundred Bachelor's and Master's degrees
2009-2015	Organizing Committee of Disfida Matematica, a math contest for high-school students

Memberships

since 2010	National Group for Mathematical Physics of Istituto Nazionale di Alta Matematica "F. Severi" (Italy)
since 2013	International Research Center for Mathematics & Mechanics of Complex Systems (M&MoCS)
2014-2017	Group Dynamics and non-equilibrium states of complex systems: Mathematical methods and physical concepts of Istituto Nazionale di Fisica Nucleare (Italy)
since 2018	European Society of Rheology and Italian Society of Rheology
since 2020	Padua Quantum Technology Research Center
since 2022	National Centre for HPC, Big Data and Quantum Computing

Professional Development

- 2016 Communicating Effectively in English: Building Linguistic and Cultural Strategies for Scientists. Certified Course
- 2016 Introduction to Project Management. Certified Course
- 2019 Teaching4Learning: residential course on higher education. Certified Course
- 2021 Teaching 4Learning 2.0: residential course on higher education. Certified Course

Language Skills

- Italian: full professional proficiency (mother tongue)
- English: full professional proficiency
- Japanese: basic oral proficiency

October 23, 2023