ANDREA GIORGINI

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ACADEMIC POSITIONS

Assistant Professor - RTDb

Dipartimento di Matematica Politecnico di Milano

Chapman Fellow Department of Mathematics Imperial College London

Zorn Postdoctoral Fellow

Department of Mathematics & Institute for Scientific Computing and Applied Mathematics Indiana University Mentor: Prof. Roger Temam

Research Assistant

Dipartimento di Matematica "F. Casorati" Università di Pavia Mentor: Prof. Elisabetta Rocca

EDUCATION

PhD in Mathematical Models and Methods in Engineering

Politecnico di Milano, Italy Thesis: *Mathematical analysis of some diffuse interface models for binary fluids* Advisor: Prof. Maurizio Grasselli Discussion date: February 23, 2018 Final grade: cum Laude

MSc in Mathematical Engineering Politecnico di Milano, Italy

Thesis: *On the Swift-Hohenberg equation with slow and fast dynamics: well-posedness and longtime behavior* Advisor: Prof. Maurizio Grasselli Final grade: 110/110 cum Laude

BSc in Mathematical Engineering

Politecnico di Milano, Italy Thesis: *Nonlinear oscillators and the Littlewood boundedness problem* Advisor: Prof. Gianmaria Verzini Final grade: 110/110 cum Laude September 2022-present

September 2021-September 2022

August 2018-May 2021

September 2017-August 2018

November 2014–October 2017

October 2012–October 2014

September 2009–September 2012

AWARDS

National Scientific Qualification - Associate Professor Abilitazione Scientifica Nazionale: seconda fascia Settore Concorsuale 01/A3: analisi matematica, probabilità e statistica matematica	9 Nov 2020 - 9 Nov 2029
Cuozzo Prize 2018	December 2018
Awarded for the Ph.D. thesis in Mathematics from Università degli Studi di Roma "To	or Vergata"
2018 AIMS Student Paper Competition: first place	June 2018
Awarded at the 12th AIMS Conference on Dynamical Systems, Differential Equations	and Applications
Carlo Cercignani Prize 2014 <i>Awarded for the MSc thesis in Mathematical Engineering at Politecnico di Milano</i>	March 2015

GRANTS

AMS Simons Travel Grant (\$4000)	June 2019-June 2022
SIAM Travel Award (\$2500)	July 2019
Oberwolfach Leibniz Graduate Student	April 2018
PI of the GNAMPA-INdAM Project 2018 (€ 5000) "Mathematical analysis of diffuse interface models for complex fluids"	March 2018
LIA-LYSM AMU-CNRS-ECM-INdAM Travel grant	February 2017
PhD Scholarship - Politecnico di Milano	November 2014-October 2017

PUBLICATIONS

Submitted papers

25. A. Giorgini, On the separation property and the global attractor for the nonlocal Cahn-Hilliard equation in three dimensions, arXiv:2303.06013, 2023.

24. G. Bevilacqua & A. Giorgini, *Global Solutions for Two-Phase Complex Fluids with Quadratic Anchoring in Soft Matter Physics*, arXiv:2302.07196, 2023.

Accepted and published papers

23. A. Giorgini, A. Ndongmo Ngana, T. Tachim Medjo & R. Temam, *Existence and regularity of strong solutions to a nonhomogeneous Kelvin-Voigt-Cahn-Hilliard system*, Journal of Differential Equations **372** (2023), 612-656.

22. C.G. Gal, A. Giorgini, M. Grasselli & A. Poiatti, *Global well-posedness and convergence to equilibrium for the Abels-Garcke-Grün model with nonlocal free energy*, Journal de Mathématiques Pures et Appliquées **178** (2023), 46-109.

21. H. Abels, H. Garcke & A. Giorgini, *Global regularity and asymptotic stabilization for the incompressible Navier-Stokes-Cahn-Hilliard model with unmatched densities*, Mathematische Annalen, 2023. DOI: 10.1007/s00208-023-02670-2.

20. A. Giorgini & P. Knopf, *Two-phase flows with bulk-surface interaction: thermodynamically consistent Navier-Stokes-Cahn-Hilliard models with dynamic boundary conditions*, J. Math. Fluid Mech. **25** (2023), no. 3, 65.

19. C.G. Gal, A. Giorgini & M. Grasselli, *The separation property for 2D Cahn-Hilliard equations: Local, nonlocal, and fractional energy cases*, Discrete Contin. Dyn. Syst. **43**:6 (2023), 2270–2304.

18. A. Giorgini, M. Grasselli & H. Wu, On the mass-conserving Allen-Cahn approximation for incompressible binary fluids, J. Functional Analysis **283** (2022) 109631.

17. A. Giorgini, *Existence and stability of strong solutions to the Abels-Garcke-Grün model in three dimensions*, Interfaces Free Bound. **24** (2022), no. 4, pp. 565–608.

16. Y. Cao, A. Giorgini, M. Jolly & A. Pakzad, *Continuous data assimilation for the 3D Ladyzhenskaya model: analysis and computations*, Nonlinear Analysis: Real World Applications, **68** (2022), 103659.

15. A. Giorgini & R. Temam, *Attractors for the Navier-Stokes-Cahn-Hilliard system*, Discrete Contin. Dyn. Syst. Ser. S **15** (2022), 2249-2274. Issue on Mathematics, Models & Applications: Dedicated to Professor Maurizio Grasselli, on the Occasion of His 60th Birthday.

14. A. Giorgini, K.F. Lam, E. Rocca & G. Schimperna, On the existence of strong solutions to the Cahn-Hilliard-Darcy system with mass source, SIAM J. Math. Anal. **54** (2022), 737–767.

13. A. Giorgini, Well-posedness of the two-dimensional Abels-Garcke-Grün model for two-phase flows with unmatched densities, Calc. Var. Partial Diff. Equ. 60:100 (2021), 40 pp.

12. A. Giorgini, R. Temam & X.-T. Vu, *The Navier-Stokes-Cahn-Hilliard equations for mildly compressible binary fluid mixtures*, Discrete Contin. Dyn. Syst. Ser. B **26** (2021), 337–366. Issue for the 20 years anniversary of DCDS-B.

11. A. Giorgini & R. Temam, Weak and strong solutions to the nonhomogeneous incompressible Navier-Stokes-Cahn-Hilliard system, J. Math. Pures Appl. **144** (2020), 194–249.

10. A. Giorgini, Well-posedness for a diffuse interface model for two-phase Hele-Shaw flows, J. Math. Fluid Mech. 22 (2020), no. 1, 36 pp.

9. M. Conti & A. Giorgini, *Well-posedness for the Brinkman-Cahn-Hilliard system with unmatched viscosities*, J. Differential Equations **268** (2020), 6350–6384.

8. A. Giorgini, A. Miranville & R. Temam, Uniqueness and regularity for the Navier-Stokes-Cahn-Hilliard system, SIAM J. Math. Anal. **51** (2019), 2535–2574.

7. F. Della Porta, A. Giorgini & M. Grasselli, *The nonlocal Cahn-Hilliard-Hele-Shaw system with logarithmic potential*, Nonlinearity **31** (2018), 4851–4881.

6. A. Giorgini, M. Grasselli & H. Wu, *The Cahn-Hilliard-Hele-Shaw system with singular potential*, Ann. Inst.
H. Poincaré Anal. Non Linéaire 35 (2018), 1079–1118.

5. F. Di Plinio, A. Giorgini, V. Pata & R. Temam, *Navier-Stokes-Voigt equations with memory in 3D lacking instantaneous kinematic viscosity*, J. Nonlinear Sci. **28** (2018), 653–686.

4. A. Giorgini, M. Grasselli & A. Miranville, *The Cahn-Hilliard-Oono equation with singular potential*, Math. Models Methods Appl. Sci. **27** (2017), 2485–2510.

3. C.G. Gal, A. Giorgini & M. Grasselli, *The nonlocal Cahn-Hilliard equation with singular potential: well-posedness, regularity and strict separation property*, J. Differential Equations **263** (2017), 5253–5297.

2. M. Conti, A. Giorgini & M. Grasselli, *Phase-field crystal equation with memory*, J. Math. Anal. Appl. **436** (2016), 1297–1331.

1. A. Giorgini, On the Swift-Hohenberg equation with slow and fast dynamics: well-posedness and longtime behavior, Comm. Pure Appl. Anal. 15 (2016), 219–241.

VISITING EXPERIENCE

7. Department of Mathematics, University of Regensburg, Germany	July 4-9, 2022
6. Department of Mathematics, Imperial College London, UK	June 24-28, 2019
5. School of Mathematical Sciences, Fudan University, China	June 3-14, 2019
4. Department of Mathematics, Florida International University, USA	June 5-29, 2017
3. Laboratoire de Mathématiques et Applications, Université de Poitiers, France	March 12-20, 2017
2. Department of Mathematics, City University of Hong Kong, Hong Kong	May 16-17, 2016
1. School of Mathematical Sciences, Fudan University, China	March-June 2016

TALKS AT UNIVERSITY SEMINARS

21. Applied Math Seminar, Florida International University	April 5, 2023
20. Analysis Seminar, Politecnico di Milano	January 19, 2023
19. Colloquium Erlangen-Regensburg (GRK 2339 IntComSin), University of Regensburg	July 8, 2022
18. PDE-Applied Math Seminar, University of Maryland	April 13, 2022
17. PDE Seminar, Università degli Studi di Milano Statale	April 7, 2022
16. Applied PDE Seminar, Imperial College London	November 5, 2021
15. Harmonic Analysis and PDE's Seminar, CUNY	May 7, 2021
14. Applied Mathematics Seminar, Tulane University	March 26, 2021
13. Multiscale Seminar, Illinois Institute of Technology	March 11, 2021
12. PDE/Applied Math Seminar, Indiana University	March 8, 2021
11. Analysis and PDE Seminar, University of Southern California	November 13, 2020
10. Applied Math Seminar, University of Alabama	October 23, 2020
9. PDE/Applied Math Seminar, Indiana University	November 11, 2019
8. Multiscale Seminar, Illinois Institute of Technology	September 13, 2019
7. Department Colloquium, University of Memphis	November 9, 2018
6. PDE/Applied Math Seminar, Indiana University	October 22, 2018
5. Colloquium Erlangen-Regensburg (GRK 2339 IntComSin), University of Regensburg	April 27, 2018
4. PDE Seminar, IMATI-CNR Università di Pavia	November 28, 2017
3. PDE Seminar, Fudan University	June 16, 2016
2. PDE Seminar, Fudan University	June 7, 2016
1. PDE Seminar, City University of Hong Kong	May 16, 2016

TALKS AT CONFERENCES

20. XXII Congresso dell'Unione Matematica Italiana Problemi diretti e inversi in scienza dei materiali, biomedicina e climatologia Pisa, Italy	September 5, 2023
 19. 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications Nonlinear Evolution Equations and Related Topics Wilmingtong, USA 	June 1, 2023
18. 9th AMARENA Days Amiens-Milano-Poitiers Reunion on Numerical and Mathematical Analysis Université de Picardie Jules Verne, Amiens, France	May 11, 2023
17. Modelling cell and tissue biomechanics (MOCETIBI) Workshop LJLL, Sorbonne Université, Paris, France	October 12, 2022
16. INdAM Workshop PHAME2022 <i>PHase field MEthods in applied sciences</i> Rome, Italy	May 26, 2022
15. AMS Fall Western Sectional Meeting (formerly at University of New Mexico) Elliptic and Parabolic Equations on Topics Arising from Models in Materials Science Virtual	October 24, 2021
14. 15th International Conference on Free Boundary Problems: Theory and Applications Interface in fluids Virtual	September 15, 2021
13. AMS Central Fall Virtual Sectional Meeting Theoretical and Computational Studies of PDEs Related to Fluid Mechanics Virtual	September 13, 2020
12. 2019 SIAM Conference on Analysis of Partial Differential Equations Recent progress in Fluid Mechanics: classical flows, geophysical models and complex fluid La Quinta, California, USA	December 12, 2019 ids
11. AMS Fall Western Sectional Meeting <i>Fluids Dynamics: from Theory to Numerics</i> University of California, Riverside, USA	November 9, 2019
10. ICIAM 2019 Recent developments in nonlinear PDEs of hydrodynamics and mathematical biology Valencia, Spain	July 15, 2019
9. NSF-CBMS Conference <i>The Cahn-Hilliard Equation: Recent Advances and Applications</i> Burns, Tennessee, USA	May 22, 2019
8. AMS Fall Central Sectional Meeting Analytical and Numerical Aspects of Turbulent Transport University of Michigan, Ann Arbor, USA	October 20, 2018
7. 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications Analytic properties and numerical approximation of differential models arising in applica Taipei, Taiwan	July 7, 2018 tions
6. 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications <i>Nonlinear Evolution PDEs, Interfaces and Applications</i>	July 6, 2018

Taipei, Taiwan

 Workshop on Special Materials and Complex Systems- SMACS2018 Gargnano, Italy 	June 18, 2018
4. Conference on Mathematical Fluid Dynamics Bad Boll, Germany	May 8, 2018
3. Oberwolfach Workshop Challenges in Optimal Control of Nonlinear PDE-Systems Oberwolfach, Germany	April 10, 2018
2. International Conference on Elliptic and Parabolic Problems Nonlinear PDEs for multiphase materials and complex fluids Gaeta, Italy	May 24, 2017
1. SIMAI 2016 <i>Modeling Dissipative Phenomena</i> Politecnico di Milano, Italy	September 13, 2016

TEACHING EXPERIENCE

Politecnico di Milano	
Analisi Matematica II per Ingegneria Biomedica	Spring 2023
Imperial College London	
• MATH60021/70021/97026 Advanced Topics in Partial Differential Equations	Spring 2022
Indiana University	
• M301 Linear Algebra and Applications (Online)	Spring 2021
• M119 Brief Survey of Calculus 1 (Online)	Spring 2021
• M441 Partial Differential Equations and Applications I (Online)	Fall 2020
• M343 Introduction to Differential Equations with Applications I (Two sections)	Spring 2020
• M441 Partial Differential Equations and Applications I	Fall 2019
• M365 Introduction to Probability and Statistics	Spring 2019
• M343 Introduction to Differential Equations with Applications I (Two sections)	Fall 2018
Università di Pavia	
• Teaching Assistant, Advanced Mathematical Methods for Engineers	Fall 2017
• Teaching Assistant, Mathematical Analysis 1	Fall 2017
Università degli Studi di Milano	
• Teaching Assistant, Mathematics and Statistics	Fall 2016
Politecnico di Milano	
• Tutor, Mathematical Analysis 1	Fall 2017
• Tutor, Mathematical Analysis 1	Fall 2016
• Tutor, Mathematical Analysis 1	Fall 2015

• Teaching Assistant, Mathematical Analysis 1 and Geometry	Fall 2015
• Teaching Assistant, Mathematical Analysis 1 and Geometry	Fall 2014

SUPERVISION

Master thesis

- Muhammed Ali Mehmood (Imperial College London)
 Spring 2022
 "Well-posedness of the Navier-Stokes Phase-Field Crystal model"
 Winner of the Prize for the best Poster Presentation in the MSc Pure Mathematics Summer Research Fair
- Christos Constantinou (Imperial College London) "The Cahn-Hilliard equation: well-posedness and regularity"

Undergraduate Projects

• Year 2 Group Project (M2R) at Imperial College London (5 students) "The Lorentz system: a portrait of chaos"

Summer 2022

Spring 2022

PROFESSIONAL SERVICE

◊ Personal Tutor of 8 undergraduate students at Imperial College London in Fall 2021 and Spring 2022.

♦ Member of the colloquium committee at Indiana University, Department of Mathematics in Fall 2019 and Spring 2020.

♦ Co-organizer of the mini symposium "*Recent progress in Fluid Mechanics: classical flows, geophysical models and complex fluids*" (3 sections) at the 2019 SIAM Conference on Analysis of Partial Differential Equations.

◊ Co-organizer of the special sessions "*Phase field models and real world applications*" (4 sections) at the 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications (2023).

◊ Reviewing activity since 2016: Advances in Nonlinear Analysis, Asymptotic Analysis, Communication in Mathematical Sciences, Evolution Equations and Control Theory, Discrete and Continuous Dynamical System -Series A & B, Indiana University Mathematics Journal, Journal de Mathématiques Pures et Appliquées, Journal of Differential Equations, Journal of Evolution Equations, Journal of the European Mathematical Society, Journal of the London Mathematical Society, Journal of Mathematical Fluid Mechanics, Mathematical Models in Applied Sciences, Mathematical Models and Methods in Applied Sciences, Nonlinear Analysis, Nonlinear Analysis: Real World Applications, Nonlinearity, Physica D, Proceedings A of the Royal Society of Edinburgh, Science China Mathematics.

♦ Tutoring at College Camplus (Milano) from 2013 until 2017. Subjects: Calculus 1 and 2, Linear Algebra and Geometry, PDEs and Numerical Analysis.