

# MICHELE COTI ZELATI

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Citizenship: Italian

## EMPLOYMENT

2022–            **Reader**, Imperial College London, UK  
2019–2022      **Senior Lecturer**, Imperial College London, UK  
2017–2019      **Chapman Fellow**, Imperial College London, UK  
2014–2017      **Brin Postdoctoral Fellow**, University of Maryland, College Park, MD

## EDUCATION

2009–2014      **PhD in Mathematics**, Indiana University, Bloomington, IN  
2006–2008      **M.S. in Mathematical Engineering**, Politecnico di Milano, Italy  
2003–2006      **B.S. in Mathematical Engineering**, Politecnico di Milano, Italy

## ACADEMIC HONORS AND AWARDS

2023–2028      **ERC Starting Grant STABLE-CHAOS** [funded by **EPSRC** due to UK non-association]  
2022–            **London Mathematical Society**, membership  
2022–2023      **Royal Society** Enhanced Research Expenses (RF\ERE\210298)  
Feb. 2021        **Fellow of the Higher Education Academy**, Descriptor 2  
2021–2023      **Royal Society** International Exchanges 2020 Cost Share (IEC\R2\202029)  
Nov. 2020        **Abilitazione Scientifica Nazionale**, habilitation to full professor in Italy  
2020              **GNAMPA** project Co-I, National Institute of Mathematics, Italy  
2019–2024      **Royal Society** University Research Fellowship (URF\R1\191492)  
2017–2018      **NSF Research grant** DMS-1713886  
Spring 2014      **Rothrock Teaching Award**, Indiana University  
Spring 2013      **Charles H. Stammer Fellowship**, Indiana University

## EDITORIAL BOARDS

2023–            Journal of Functional Analysis  
2023–            Journal of Hyperbolic Differential Equations  
2022–            Proceedings of the Royal Society of Edinburgh Section A: Mathematics

## SUPERVISION AND MENTORING

Postdocs        Joonhyun La (2022–2023), Michele Dolce (2020–2022)  
PhD Students   David Villringer (2022–), Augusto Del Zotto (2020–), Marc Nualart Batalla (2020–), Michele Dolce (2018–2020)  
MSc Students   Averkios Averkiou (2022), Chia-Chun Lo (2022), Giordano Scarciotti (2020)  
UROP Students   Munazza Sarwar (2021), Chun-Hei Lam (2020)

## PUBLICATIONS

42. E. BRUÈ, M. COTI ZELATI & E. MARCONI, *Enhanced dissipation for two-dimensional Hamiltonian flows*, submitted (2022).
41. J. BEDROSSIAN, M. COTI ZELATI & M. DOLCE, *Taylor dispersion and phase mixing in the non-cutoff Boltzmann equation on the whole space*, submitted (2022).
40. M. COTI ZELATI, H. DIETERT & D. GÉRARD-VARET, *Orientation mixing in active suspensions*, submitted (2022).
39. A. BLUMENTHAL, M. COTI ZELATI & R.S. GVALANI, *Exponential mixing for random dynamical systems and an example of Pierrehumbert*, submitted (2022).
38. M. COTI ZELATI & T. GALLAY, *Enhanced dissipation and Taylor dispersion in higher-dimensional parallel shear flows*, submitted (2021).
37. J. BEDROSSIAN, R. BIANCHINI, M. COTI ZELATI & M. DOLCE, *Nonlinear inviscid damping and shear-buoyancy instability in the two-dimensional Boussinesq equations*, submitted (2021).
36. M. COTI ZELATI, M. DOLCE, Y. FENG & A.L. MAZZUCATO, *Global existence for the two-dimensional Kuramoto-Sivashinsky equation with a shear flow*, *Journal of Evolution Equations* **21** (2021), 5079–5099.
35. M. COLOMBO, M. COTI ZELATI & K. WIDMAYER, *Mixing and diffusion for rough shear flows*, *Ars Inveniendi Analytica* (2021), Paper No. 2, 21pp.
34. M. COTI ZELATI & G.A. PAVLIOTIS, *Homogenization and hypocoercivity for Fokker-Planck equations driven by weakly compressible shear flows*, *IMA Journal of Applied Mathematics* **85** (2020), 951–979.
33. M. COTI ZELATI, T.M. ELGINDI & K. WIDMAYER, *Stationary Structures near the Kolmogorov and Poiseuille Flows in the 2d Euler Equations*, *Archive for Rational Mechanics and Analysis* **247** (2023), Paper No. 12.
32. R. BIANCHINI, M. COTI ZELATI & M. DOLCE, *Linear inviscid damping for shear flows near Couette in the 2D stably stratified regime*, *Indiana University Mathematics Journal* **71** (2022), 1467–1504.
31. M. COTI ZELATI & M. HAIRER, *A noise-induced transition in the Lorenz system*, *Communications in Mathematical Physics*, **383** (2021), 2243–2274.
30. M. COTI ZELATI & T.D. DRIVAS, *A stochastic approach to enhanced diffusion*, *Annali della Scuola Normale Superiore di Pisa, Classe di Scienze* **22** (2021), 811–834.
29. M. COTI ZELATI, *Stable mixing estimates in the infinite Péclet number limit*, *Journal of Functional Analysis* **279** (2020), 108562.
28. M. COTI ZELATI & M. DOLCE, *Separation of time-scales in drift-diffusion equations on  $\mathbb{R}^2$* , *Journal de Mathématiques Pures et Appliquées* **142** (2020), 58–75.
27. J. BEDROSSIAN, M. COTI ZELATI, S. PUNSHON-SMITH & F. WEBER, *Sufficient conditions for dual cascade flux laws in the stochastic 2d Navier-Stokes equations*, *Archive for Rational Mechanics and Analysis* **237** (2020), 103–145.
26. M. COTI ZELATI, T.M. ELGINDI & K. WIDMAYER, *Enhanced dissipation in the Navier-Stokes equations near the Poiseuille flow*, *Communications in Mathematical Physics* **378** (2020), 987–1010.
25. M. COTI ZELATI, M.G. DELGADINO & T.M. ELGINDI, *On the relation between enhanced dissipation time-scales and mixing rates*, *Communications on Pure and Applied Mathematics* **73** (2020), 1205–1244.
24. J. BEDROSSIAN, M. COTI ZELATI, S. PUNSHON-SMITH & F. WEBER, *A sufficient condition for the Kolmogorov 4/5 law for stationary martingale solutions to the 3D Navier-Stokes equations*, *Communications in Mathematical Physics* **367** (2019), 1045–1075.

23. M. COTI ZELATI, N. GLATT-HOLTZ & K. TRIVISA, *Invariant measures for the stochastic one-dimensional compressible Navier-Stokes equations*, Applied Mathematics and Optimization **83** (2021), 1487–1522.
22. M. COTI ZELATI & C. ZILLINGER, *On degenerate circular and shear flows: the point vortex and power law circular flows*, Communications in Partial Differential Equations **44** (2019), 110–155.
21. J. BEDROSSIAN, M. COTI ZELATI & V. VICOL, *Vortex axisymmetrization, inviscid damping, and vorticity depletion in the linearized 2D Euler equations*, Annals of PDE **5** (2019), Art. 4, 192.
20. M. COTI ZELATI, *Long time behavior and critical limit of subcritical SQG equations in scale-invariant Sobolev spaces*, Journal of Nonlinear Science **28** (2018), 305–335.
19. M. COTI ZELATI & P. KALITA, *Smooth attractors for weak solutions of the SQG equation with critical dissipation*, Discrete and Continuous Dynamical Systems - Series B **22** (2017), 1857–1873.
18. J. BEDROSSIAN & M. COTI ZELATI, *Enhanced dissipation, hypoellipticity, and anomalous small noise inviscid limits in shear flows*, Archive for Rational Mechanics and Analysis **224** (2017), 1161–1204.
17. P. CONSTANTIN, M. COTI ZELATI & V. VICOL, *Uniformly attracting limit sets for the critically dissipative SQG equation*, Nonlinearity **29** (2016), 298–318.
16. J. BEDROSSIAN, M. COTI ZELATI & N. GLATT-HOLTZ, *Invariant measures for passive scalars in the small noise inviscid limit*, Communications in Mathematical Physics **348** (2016), 101–127.
15. M. COTI ZELATI & V. VICOL, *On the global regularity for the supercritical SQG equation*, Indiana University Mathematics Journal **65** (2016), 535–552.
14. M. COTI ZELATI & C.G. GAL, *Singular limits of Voigt models in fluid dynamics*, Journal of Mathematical Fluid Mechanics **17** (2015), 233–259.
13. M. COTI ZELATI & P. KALITA, *Minimality properties of set-valued processes and their pullback attractors*, SIAM Journal on Mathematical Analysis **47** (2015), 1530–1561.
12. M. COTI ZELATI, A. HUANG, I. KUKAVICA, R. TEMAM & M. ZIANE, *The primitive equations of the atmosphere in presence of vapor saturation*, Nonlinearity **28** (2015), 625–668.
11. A. BOUSQUET, M. COTI ZELATI & R. TEMAM, *Phase transition models in atmospheric dynamics*, Milan Journal of Mathematics **82** (2014), 99–128.
10. M. COTI ZELATI, M. FRÉMOND, R. TEMAM & J. TRIBBIA, *The equations of the atmosphere with humidity and saturation: uniqueness and physical bounds*, Physica D **264** (2013), 49–65.
9. M. COTI ZELATI, *Remarks on the approximation of the Navier-Stokes equations via the implicit Euler scheme*, Communications on Pure and Applied Analysis **12** (2013), 2829–2838.
8. M. COTI ZELATI, F. DELL’ORO & V. PATA, *Energy decay of type III linear thermoelastic plates with memory*, Journal of Mathematical Analysis and Applications **401** (2013), 357–366.
7. M. COTI ZELATI, *On the theory of global attractors and Lyapunov functionals*, Set-Valued and Variational Analysis **21** (2013), 127–149.
6. M. COTI ZELATI & F. TONE, *Multivalued attractors and their approximation: applications to the Navier-Stokes equations*, Numerische Mathematik **122** (2012), 421–441.
5. M. COTI ZELATI & R. TEMAM, *The atmospheric equation of water vapor with saturation*, Bollettino dell’Unione Matematica Italiana **5** (2012), 309–336.
4. M. COTI ZELATI, V. PATA & R. QUINTANILLA, *Regular global attractors of type III thermoelastic extensible beams*, Chinese Annals of Mathematics **31** (2010), 619–630.
3. M. COTI ZELATI, C. GIORGI & V. PATA, *Steady states of the hinged extensible beam with external load*, Mathematical Models and Methods in Applied Sciences **20** (2010), 43–58.

2. M. CONTI & M. COTI ZELATI, *Attractors for the Cahn–Hilliard equation with memory in 2D*, *Nonlinear Analysis* **72** (2010), 1668–1682.
1. M. COTI ZELATI, *Global and exponential attractors for the singularly perturbed extensible beam*, *Discrete and Continuous Dynamical Systems* **25** (2009), 1041–1060.

#### SCHOOLS AND MINI-COURSES

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|-----------|--|
| Jun. 2023 | <b>New trends in mathematical fluid dynamics</b> , Université Grenoble Alpes, France |
| Jan. 2023 | <b>Stabilizing and destabilizing mechanisms in fluid flows</b> , Hurghada, Egypt     |
| Nov. 2022 | <b>AIMS Senegal</b> , Mbour, Senegal   |

#### TALKS AT UNIVERSITY SEMINARS AND COLLOQUIA

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| 2023 | Bocconi University (Analysis Seminar), Institute of Advanced Studies (Analysis & Mathematical Physics Seminar), Queen Mary University of London (Geometry, Analysis and Gravitation Seminar), UC Davis (PDE and Applied Math Seminar)  |
| 2022 | AIMS-Senegal (PDE seminar), ICMAT (PDE seminar), SISSA (Analysis Seminar), University of Cambridge (PDE Seminar)   |
| 2021 | Karlsruhe Institute of Technology (PDE Seminar), Mathematical Institute of the Czech Academy of Sciences (Necas PDE seminar), Université Claude Bernard Lyon 1 (Séminaire MACS), Gran Sasso Science Institute (Colloquium)   |
| 2020 | Princeton University (Analysis of Fluids and Related Topics Seminar), University of Minnesota (PDE Seminar), Brown University (PDE Seminar), Old Dominion University (Colloquium), Stanford University (Applied Math Seminar), University of Bath (Analysis Seminar), MIT (PDE/Analysis Seminar), NYU Abu Dhabi (Colloquium), Durham University (Analysis & PDE seminar), SISSA (Analysis Seminar) |
| 2019 | Courant Institute NYU (Analysis Seminar), University of Maryland (PDE-Applied Math Seminar), Universidad de Sevilla (Fluid Conversations), ETH Zurich (Analysis Seminar), University of Warwick (PDEs and their applications Seminar)  |
| 2018 | University of Basel (The BZ Seminar), University of Cambridge (Geometrical Analysis and PDE seminar), EPFL (Analysis Seminar), Imperial College London (Fluid Dynamics Seminar), University of Oxford (PDE CDT Lunchtime Seminar), UC San Diego (Analysis Seminar)   |
| 2017 | Imperial College London (Applied PDEs Seminar), University of Utah (Colloquium)  |
| 2016 | University of Miami (Colloquium), University of Maryland (PDE-Applied Math Seminar), USC (CAMS Colloquium), University of Virginia (Harmonic Analysis & PDEs Seminar), Tulane University (Probability and Statistics Seminar), CUNY (Non-Linear Analysis Seminar), Princeton University (Analysis of Fluids and Related Topics Seminar)  |
| 2015 | University of Maryland–Baltimore County (Applied Math Colloquium), United States Naval Academy (Applied Math Seminar), Brown University (Analysis Seminar), Virginia Tech (Colloquium), University of Maryland (CSCAMM seminar)  |
| 2013 | Indiana University (PDE/Applied Math Seminar), Politecnico di Milano (Mathematics Seminar), University of South Florida (Colloquium)   |
| 2010 | Indiana University (PDE/Applied Math Seminar)  |

**TALKS AT CONFERENCES**

- 2023 Free Boundary Problems (Columbia University), Nonlinear Evolution PDEs, Fluid Dynamics and Transport Equations (Erice, Italy), KineticNet (online seminar), Multiscale Analysis and Methods for Quantum and Kinetic Problems (IMS, National University of Singapore)
- 2022 When Kinetic Theory meets Fluid Mechanics (ETH Zurich), Small scale dynamics in fluid motion (Simons Center for Geometry and Physics, Stony Brook), Long Time Behavior and Singularity Formation in PDEs-Part V (NYU Abu Dhabi), CY Days in Nonlinear Analysis (Maison internationale de la recherche, France), Modelling and analysis of turbulent transport, mixing and scaling (Newton Institute, UK), Transport, Fluids and Mixing (Centro di Ricerca Matematica Ennio De Giorgi, Pisa)
- 2021 12th Forum of Partial Differential Equations (Będlewo, Poland), New Trends in Nonlinear Diffusion: a Bridge between PDEs, Analysis and Geometry (Casa Matemática Oaxaca, Mexico), 8th European Congress of Mathematics (Portorož, Slovenia), SIAM Conference on Applications of Dynamical Systems, Oxbridge PDE Conference
- 2020 Partial differential equations describing far-from-equilibrium open systems (Charles University, Prague), Workshop on Euler and Navier-Stokes Equations (Fields Institute, Toronto), AMS Fall Eastern Sectional I Meeting, PDE Seminar via Zoom, Winter school on Turbulence in PDEs (EPFL)
- 2019 SIAM Conference on Analysis of PDEs (La Quinta, CA), Dynamics, Equations and Applications (University of Science and Technology, Kraków), PDE 2019: Partial Differential Equations in Fluids and Solids (WIAS, Berlin), Mathematical Aspects of Hydrodynamics (MFO, Oberwolfach), Summer School in Analysis of PDEs and Fluid Dynamics (Maxwell Institute, Edinburgh), GMT and PDEs (University of Basel), XVIII Italian Meeting on Hyperbolic Equations (Palermo), Transport, Mixing and Fluids (Westfälische Wilhelms-Universität Münster)
- 2018 Nonlinear PDEs from the Oceanic and Atmospheric Dynamics (CAMIS, Guangzhou, China), The 12th AIMS Conference (Taipei, Taiwan), An Analyst, a Geometer and a Probabilist Walk Into a Bar (Cardiff University), Mathematical fine structures in fluid dynamics (Gran Sasso Science Institute, Italy)
- 2017 SIAM Conference on Analysis of PDEs (Baltimore), Mathematical Congress of the Americas (Montreal), AMS Eastern Sectional Meeting (CUNY, New York), Selected topics in transport phenomena (University of Maryland), Joint Mathematics Meetings (Atlanta)
- 2016 Optimal Control for Evolutionary PDEs and Related Topics (Cortona, Italy), International Conference on Evolution Equations (Vanderbilt University), AIM Workshop on Mixing and nonlinear stability (San Jose, CA), AMS Southeastern Sectional Meeting (University of Georgia), Joint Mathematics Meetings (Seattle, WA)
- 2015 SIAM Conference on Analysis of PDEs (Scottsdale, AZ), Workshop on Stochastic PDEs (University of Pittsburgh), KI-net Young Researchers Workshop (CSCAMM, University of Maryland), AMS Central Sectional Meeting (Loyola University, Chicago), Mathematics of Geophysical Flows and Turbulence (Fudan University, Shanghai, China), EquaDiff 2015 (Université Claude Bernard Lyon 1, France)
- 2014 AMS Western Sectional Meeting (San Francisco State University), The 10th AIMS Conference (Madrid, Spain), AMS Southeastern Sectional Meeting (University of Tennessee, Knoxville), Joint Mathematics Meetings (Baltimore, MD)
- 2013 SIAM Conference on Analysis of PDEs (Lake Buena Vista, FL), AMS Central Sectional Meeting (Washington University, St. Louis, MO), AMS Southeastern Sectional Meeting (University of Louisville)

2012	The 9th AIMS Conference (Orlando, FL), SIAM Southeastern Atlantic Section Conference (University of Alabama, Huntsville)
2010	AMS Central Sectional Meeting (University of Notre Dame)
2009	Mathematical models and analytical problems for special materials (Università di Brescia)

#### PROFESSIONAL SERVICE

Feb. 2024	Co-organizer of the conference “Phase mixing, kinetic theory and fluid mechanics”, SwissMAP Research Station, Les Diablerets, Switzerland
Jul. 2023	Co-organizer of the summer school and conference “Stability and dynamics in fluid mechanics and kinetic theory”, Imperial College, London
2022–	Gran Sasso Science Institute, governing board
2020–	EPSRC Associate College Member
2017–	Co-organizer of the Applied PDEs Seminar, Imperial College, London
Dec. 2019	Co-organizer of the special session “Mixing and Stability in Fluids”, SIAM Conference on Analysis of Partial Differential Equations, La Quinta, CA
Oct. 2018	Co-organizer of the special session “Analytical and Numerical Aspects of Turbulent Transport”, AMS Fall Central Sectional Meeting, University of Michigan, Ann Arbor, MI
Oct. 2016	Co-organizer of the special session “Nonlinear and Stochastic Partial Differential Equations”, AMS Fall Western Sectional Meeting, University of Denver, Denver, CO
Dec. 2015	Co-organizer of the special session “Deterministic and Stochastic Aspects of Fluid Dynamics”, SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ
Nov. 2015	Co-organizer of the KI-net Young Researchers Workshop “Kinetic theory with applications in physical sciences”, CSCAMM, University of Maryland, College Park, MD
Aug. 2015	TA at the workshop “Incompressible Fluid Flows at High Reynolds Number”, Mathematical Sciences Research Institute, Berkeley, CA
Mar. 2015	Co-organizer of the special session “Mathematical fluid dynamics and turbulence”, AMS Spring Eastern Sectional Meeting, Georgetown University, Washington, DC

#### TEACHING EXPERIENCE

2022	<b>AIMS Sensegal</b> - Applied PDEs (Modelling)
2017–	<b>Imperial College London</b> - Theory of PDEs, Introduction to PDEs, TCC Introduction to Euler equations of incompressible fluids, Stochastic Differential Equations, MPC1 Maths and Physics for Chemists I
2014–2017	<b>University of Maryland</b> - MATH130/MATH131 Calculus I & II for the Life Sciences, MATH410/MATH411 Advanced Calculus I & II
2012–2013	<b>Indiana University</b> - D117/D118 Introduction to finite math I & II, M118 Finite Mathematics, M027 Precalculus with trigonometry