

# Mihaela Ignatova

## Curriculum Vitae

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Department of Mathematics  
Temple University  
1805 N Broad St  
Philadelphia, PA 19122

Office: Wachman 532

Email: [ignatova@temple.edu](mailto:ignatova@temple.edu)

Web: [sites.temple.edu/ignatova/](http://sites.temple.edu/ignatova/)

## Education

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- **University of Southern California**, Los Angeles, CA  
Ph.D. in Mathematics, August 2011  
Advisor: Prof. Igor Kukavica
- **Sofia University “St. Kliment Ohridski”**, Sofia, Bulgaria  
M.Sc. in Mathematics and Mathematical Physics, June 2006  
Advisor: Prof. Emil Horozov
- **Université de Nantes**, Nantes, France  
Maîtrise de Mathématiques, June 2004
- **Sofia University “St. Kliment Ohridski”**, Sofia, Bulgaria  
B.Sc. in Mathematics, June 2004

## Appointments

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- **Temple University**, Philadelphia, PA  
Associate Professor, July 2024–current
- **Temple University**, Philadelphia, PA  
Assistant Professor, July 2018–2024
- **Princeton University**, Princeton, NJ  
Instructor, September 2014–2018
- **Stanford University**, Stanford, CA  
Postdoctoral Fellow, September 2012–2014
- **University of California, Riverside**, Riverside, CA  
Visiting Assistant Professor, September 2011–2012

## Research Interests

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- Partial Differential Equations, Mathematical Fluid Dynamics, Harmonic Analysis

## Graduate Students

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- Elie Abdo, PhD 2023

## Postdocs

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- Jingyang Shu, 2020–22
- Patrick Phelps, 2023–

## Publications

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### *Recent Publications Since Joining Temple University in 2018*

37. P. Constantin, M. Ignatova, Q.-H. Nguyen, *Global regularity for critical SQG in bounded domains*, accepted at CPAM (2024). arXiv:2312.12265 [math.AP].
36. M. Ignatova, *2D Voigt Boussinesq Equations*, J. Math. Fluid Mech., **26**, 15 (2024)
35. E. Abdo, M. Ignatova, *Long time dynamics of electroconvection in bounded domains*, submitted (2024). arXiv:2309.17423 [math.AP].
34. E. Abdo, M. Ignatova, *Long Time Dynamics of Nernst-Planck-Navier-Stokes Systems*, Journal of Differential Equations, **379** 3, 794–828 (2024).
33. E. Abdo, N. Glatt-Holtz, M. Ignatova, *Unique Ergodicity in Stochastic Electroconvection*, Nonlinear Differential Equations and Applications NoDEA **31** (4) pp 67. (2024). arXiv:2210.10600 [math.AP].
32. E. Abdo, M. Ignatova, *Long Time Behavior of Solutions of an Electroconvection Model in  $R^2$* , J. Evol. Equ. **24**, 13 (2024). arXiv:2207.06510 [math.AP].
31. P. Constantin, M. Ignatova, F.-N. Lee, *Existence and Stability of Nonequilibrium Steady States of Nernst-Planck-Navier-Stokes Systems*, Physica D: Nonlinear Phenomena, **422** (2022). arXiv:2205.11553 [math.AP].
30. M. Ignatova, J. Shu, *Global Smooth Solutions of the Nernst-Planck-Darcy System*, J. Math. Fluid Mech., **24** 1, (2022) pp 21. arXiv:2107.13655 [math.AP].
29. E. Abdo, M. Ignatova, *On Electroconvection in Porous Media*, Indiana Univ. Math. J., **72**, 6 (2023), 2593–2630.
28. E. Abdo, M. Ignatova, *On the Space Analyticity of the Nernst-Planck-Navier-Stokes system*, J. Math. Fluid Mech., **24**, 2 (2022).
27. M. Ignatova, J. Shu, *Global Solutions of the Nernst-Planck-Euler Equations*, SIAM J. Math. Anal., 53(5), (2021) 5507–5547. arXiv:2101.03199 [math.AP].
26. P. Constantin, M. Ignatova, F.-N. Lee, *Interior Electroneutrality in Nernst-Planck-Navier-Stokes Systems*, Arch Rational Mech Anal **242** (2021), 1091–1118 (2021). <https://doi.org/10.1007/s00205-021-01700-0>. arXiv:2011.15057 [math.AP].
25. E. Abdo, M. Ignatova, *Long Time Finite Dimensionality in Charged Fluids*, Nonlinearity **34** (2021) no. 9, 6173–6209.
24. P. Constantin, M. Ignatova, F.-N. Lee, *Nernst-Planck-Navier-Stokes systems far from equilibrium*, Arch Rational Mech Anal **240**, 1147–1168 (2021). arXiv:2008.10462 [math.AP].
23. P. Constantin, M. Ignatova, F.-N. Lee, *Nernst-Planck-Navier-Stokes systems near equilibrium*, Pure and Applied Functional Analysis, **7**,1, 175–196 (2022). arXiv:2008.10440 [math.AP].
22. E. Abdo, M. Ignatova, *Long time dynamics of a model of electroconvection*, Trans. Amer. Math. Soc. **374** (2021), 5849–5875.
21. P. Constantin, M. Ignatova, *Estimates near the boundary for critical SQG*, Ann. PDE, **6** (1) (2020). <https://doi.org/10.1007/s40818-020-00079-7>.

20. M. Ignatova, *Construction of solutions of the critical SQG equation in bounded domains*, Advances in Mathematics, **351** (2019), 1000–1023.
19. P. Constantin, M. Ignatova, *On the Nernst-Planck-Navier-Stokes system*, Archive for Rational Mechanics and Analysis, **232** (2019) no. 3, 1379–1428.
18. P. Constantin, M. Ignatova, H.Q. Nguyen, *Inviscid limit for SQG in bounded domains*, SIAM J. Math. Anal. **50** (2018), no. 6, 6196–6207.

*Previous Publications*

17. P. Constantin, T. Elgindi, M. Ignatova, V. Vicol, *On some electroconvection models*, Journal of Nonlinear Science **27** (2017), no. 1, 197–211.
16. P. Constantin, T. Elgindi, M. Ignatova, V. Vicol, *Remarks on the inviscid limit for the Navier-Stokes equations for uniformly bounded velocity fields*, SIAM J. Math. Anal. **49** (2017) no. 3, 1932–1946.
15. P. Constantin and M. Ignatova, *Critical SQG in bounded domains*, Ann. PDE, **2** (2016), no. 8.
14. M. Ignatova and I. Kukavica, *On the local existence of the free-surface Euler equation with surface tension*, Asymptotic Analysis, **100** (2016), no. 1-2, pp. 63–86.
13. P. Constantin and M. Ignatova, *Remarks on the fractional Laplacian with Dirichlet boundary conditions and applications*, Int Math Res Notices **2017** (2017), no. 6, 1653–1673.
12. M. Ignatova, I. Kukavica, I. Lasiecka, and A. Tuffaha, *Small data global existence for a fluid-structure model*, Nonlinearity **30** (2017), no. 2, 848–898.
11. M. Ignatova and V. Vicol, *Almost global existence for the Prandtl boundary layer equations*, Archive for Rational Mechanics and Analysis **220** (2016), no. 2, 809–848.
10. M. Ignatova, G. Iyer, J. Kelliher, R. Pego, and A. Zarnescu, *Global well-posedness results for two extended Navier-Stokes systems*, Commun. Math. Sci. **13** (2015), no. 1, 249–267.
9. M. Ignatova, *On the continuity of solutions to advection-diffusion equations with slightly supercritical divergence-free drifts*, Advances in Nonlinear Analysis **3** (2014), no. 2, 81–86.
8. M. Ignatova, I. Kukavica, I. Lasiecka, and A. Tuffaha, *On well-posedness and small data global existence for an interface damped free boundary fluid-structure model*, Nonlinearity **27** (2014), no. 3, 467–499.
7. M. Ignatova, I. Kukavica, and L. Ryzhik, *The Harnack inequality for second-order parabolic equations with divergence-free drifts of low regularity*, Comm. PDEs **41** (2016), no. 2, 208–226.
6. M. Ignatova, I. Kukavica, and L. Ryzhik, *The Harnack inequality for second-order elliptic equations with divergence-free drifts*, Commun. Math. Sci. (2014) **12**, no. 4, 681–694.
5. M. Ignatova, I. Kukavica, I. Lasiecka, and A. Tuffaha, *On the well-posedness for a free boundary fluid-structure model*, J. Math. Phys. **53** (2012), no. 11, 115624, 13pp.
4. M. Ignatova, I. Kukavica, and M. Ziane, *Local existence of solutions to the free boundary value problem for the primitive equations of the ocean*, J. Math. Phys. **53** (2012), no. 10, 103101, 17pp.
3. M. Ignatova and I. Kukavica, *Strong unique continuation for the Navier-Stokes equation with non-analytic forcing*, J. Dynam. and Differential Equations **25** (2013), no. 1, 1–15.
2. M. Ignatova and I. Kukavica, *Strong unique continuation for higher order elliptic equations with Gevrey coefficients*, J. Differential Equations **252**, (2012), no. 4, 2983–3000.
1. M. Ignatova and I. Kukavica, *Unique continuation and complexity of solutions to parabolic partial differential equations with Gevrey coefficients*, Adv. Differential Equations **15** (2010), no. 9, 953–975.

## Temple University Service

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- Graduate Committee, Temple University, 2018–current
- Dean’s Advisory Committee, Temple University, 2020–2024
- Executive Committee, Temple University, 2021–current
- DEI Committee, Temple University, 2022–current
- Co-organizing the Grosswald Lectures, Temple University, 2021–current
- Hiring Committees, 2018–current
- Mentoring
  - Graduate Defense Committees
    - \* Dissertation Examining Committees: Elie Abdo (2023), Jeongsu Kyeong (2024)
    - \* Preliminary Examination Committees: Elie Abdo (2021), Apo Demirelli (2022), Irem Altiner (2022), Artur Andrade (2023)
  - Undergraduate students: Anna Minasyan, Sara Annos, Samantha Wert, Alison Tintera
  - Faculty Oversight Committees: Irem Altiner (2021–2024), Artur Andrade (2021–2024), Nizar Bou-Ezz (2022–2023), Henry Brown (2022–2023), Apo Demirelli (2020–2021), Jeongsu Kyeong (2021–2024), Nour Ahmed Khoudari (2019–2020), Lancelot Leung (2021–2022), Holly Miller (2024), Blessing Nwonu (2024), Anthony Pasles (2024),

## Mathematical Community Service

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- Organizing the Princeton Mathematics Department Colloquium, Princeton University, 2015–16
- Organizing the Analysis of Fluids and Related Topics Seminar, Princeton University, 2015–18
- Organizer of workshop: Applications of Geometric Methods of Functional Analysis, UT Dallas, May 2022
- Organizer of summer school and conference: Recent Advances in Mathematical Fluid Dynamics, Duke University, May 2023
- Organizer of Oberwolfach Seminars: Long-Time Behavior in Fluids, Germany, May 2024

## Awards

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- NSF DMS-2204614 \$184,670, 2022–25
- Collaboration Grants for Mathematicians, Simons Foundation Award ID: 964687, 2022–25 (withdrawn due to NSF grant award)
- Selma Lee Bloch Brown Professorship, 2020–24
- AWM Sadosky Research Prize in Analysis, 2020
- Grayson and Judith Manning Fellowship, Graduate School/Provost’s Office, USC, Los Angeles, 2011–2012
- Theodore Edward Harris Graduate Research Prize, USC, Los Angeles, Spring 2011

- Women in Science and Engineering (WiSE) Merit Award, College of Letters, Arts, and Sciences Merit Fellowship, USC, Los Angeles, 2010–2011
- College of Letters, Arts, and Sciences Merit Fellowship, USC, Los Angeles, Spring 2010
- Merit-based Full Scholarship, University of Nantes, France, 2003–2004

## Recent Presentations

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- Oberwolfach Seminars: Long-Time Behavior in Fluids, Germany, May 2024
- AMS SS on Mathematical Fluid Dynamics, San Francisco, CA, May 2024
- CNA Seminar, CMU, PA, April 2024
- PDE and Analysis Seminar, University of Pittsburgh, PA, April 2024
- Geometric Analysis Seminars, Notre Dame, IN, March 2024
- SLMath/ MSRI Workshop *Recent Progress in Deterministic and Stochastic Fluid-Structure Interaction*, Berkeley, CA, December 2023
- BIRS Workshop *Fluid Equations, A Paradigm for Complexity: Regularity vs Blow-up, Deterministic vs Stochastic*, Canada, October 2023
- IMSI Workshop "Laplacian Growth Models Theory and Applications," Chicago, June 2023
- Analysis seminar, UT Austin, April 2023
- BIRS Workshop *Women in Nonlinear Dispersive PDEs*, Alberta, Canada, February 2023
- Workshop on Geometry and Analysis of Fluids in honor of David Ebin, Stony Brook, January 2023
- Simons Center for Geometry and Physics Workshop, *Small scale dynamics in fluid motion*, Stony Brook, June 2022
- International Workshop on Applications of Geometric Methods of Functional Analysis, UT Dallas, May 2022
- JMM AMS, SS Recent Advances in Fluids and Related Models, May 2022
- CAMS Colloquium, USC, March 2022
- Vanderbilt Shanks Workshop on *Mathematical Aspects of Fluid Dynamics*, February 2022
- Applied Math Seminar, Drexel University, November 2021
- Applied Analysis Seminar, Louisiana State University, October 2021
- BIRS CMO Workshop *New Trends in Nonlinear Diffusion: a Bridge between PDEs, Analysis and Geometry*, September 2021
- BIRS Workshop *New Mechanisms for Regularity, Singularity, and Long Time Dynamics in Fluid Equations*, July 2021
- MCA, SS New Developments in Mathematical Fluid Dynamics, July 2021
- AMS SS *Regularity Theory for Linear and Nonlinear PDEs*, May 2021
- MSRI Workshop on *Recent Developments in Fluid Dynamics*, April 2021
- AIM Workshop *Criticality and stochasticity in quasilinear fluid systems*, April 2021
- Nonlinear PDEs seminar, Texas A&M, October 2020

- SIAM Conference on Analysis of PDEs, La Quinta, CA, December 2019
- Workshop *Mathematical Aspects of Hydrodynamics*, Oberwolfach, Germany, August 2019
- CIME, *Progress in Mathematical Fluid Dynamics*, Cetraro, Italy, June 2019
- Fluids and Variational Methods Conference, Budapest, Hungary, June 2019
- PDE seminar, Vanderbilt University, TN, April 2019
- AMS Sectional Meeting, Ann Arbor, MI, October 2018
- Analysis seminar, Temple University, September 2018
- Workshop on *Regularity and Blow-up of Navier-Stokes Type PDEs using Harmonic and Stochastic Analysis*, BIRS, Banff, Canada, August 2018
- Workshop on *Mathematical Analysis of Incompressible Fluids*, IMUS, Sevilla, Spain, June 2018
- SCAPDE Conference, U.C. San Diego, CA, June 2018
- Department colloquium, NJIT, NJ, January, 2018
- SIAM conference on Analysis of PDEs, Baltimore, MD, December 2017
- Department colloquium, Temple University, PA, December 2017
- Department colloquium, Princeton University, NJ, November 2017
- Princeton-Tokyo Fluid Mechanics Workshop, Princeton, NJ, November 2017
- Workshop on *Irregular transport: analysis and applications*, Basel, Switzerland, June 2017
- Workshop on *Essence of  $(u \cdot \nabla)u$* , University of Virginia, May 2017
- AMS Sectional Meeting, Hunter College, New York, NY, April 2017
- KUMUNU Conference, University of Nebraska-Lincoln, April 2017
- Analysis seminar, University of Pennsylvania, April 2017

## Recent Teaching Experience

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- **Course Instructor at Temple University**
  - Math 9041, Functional Analysis, Fall 2024
  - Math 3141, Advanced Calculus I, Fall 2024
  - Math 9400, Topics in Analysis, Spring 2024
  - Math 1041 and 1941, Calculus I, Fall 2023
  - Math 4041, Partial Differential Equations, Spring 2023
  - Math 2043, Calculus III, Fall 2022
  - Math 2941, Honors Differential Equations, Spring 2022
  - Math 8041, Real Analysis I, Fall 2021
  - Math 8142, Partial Differential Equations II, Spring 2021
  - Math 8141, Partial Differential Equations I, Fall 2020
  - Math 8042, Real Analysis II, Spring 2020
  - Math 8041, Real Analysis I, Fall 2019
  - Math 2943, Honors Calculus III, Fall 2018

- **Course Instructor at Princeton University**

- MAT 320, Introduction to Real Analysis, Fall 2017
- MAT 425, Real Analysis, Spring 2016
- MAT 201, Multivariable Calculus, Fall 2015 and Fall 2017
- MAT 103, Calculus I, Fall 2014

- **Course Instructor at Stanford University**

- Math 173, Theory of Partial Differential Equations, Spring 2014
- Math 131P, Partial Differential Equations I, Winter 2014
- Math 51, Linear Algebra and Multivariable Calculus, Summer 2013
- Math 42, Calculus (Accelerated), Winter 2013

## Peer Review Service

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- Journals: Archive for Rational Mechanics and Analysis, SIAM Journal on Mathematical Analysis, Discrete and Continuous Dynamical Systems, Journal of the European Mathematical Society, Journal of Functional Analysis, Journal of Mathematical Fluid Mechanics, Journal of Mathematical Analysis and Applications, Journal of Mathematical Sciences, Indiana University Mathematics Journal, Nonlinearity, Nonlinear Analysis: Real World Applications, Physica D: Nonlinear Phenomena, Revista Matematica Complutense, Communications in Mathematical Physics
- NSF DMS grant award panels, 2023, 2024; Austrian Science Fund (FWF), 2023