

Ian Tobasco

CONTACT INFORMATION

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RESEARCH INTERESTS

Calculus of Variations and Partial Differential Equations,
with specific interests in Elasticity Theory, Fluid Dynamics, and Spin Glasses

EDUCATION

University of Michigan, Ann Arbor, MI
September 2016–May 2019

James Van Loo Postdoctoral Fellow

Courant Institute of Math. Sciences, New York University, New York, NY
September 2011–September 2016

Ph.D. in Mathematics

- Thesis Title: *Variational analysis of compressed thin elastic sheets and the phase diagrams of mean field spin glasses*
- Advisor: Robert V. Kohn

University of Michigan, Ann Arbor, MI
September 2007–April 2011

B.S.E. in Aerospace Engineering

- Graduated *Summa Cum Laude*
- Minor in Mathematics

PUBLICATIONS

In Preparation

1. I. Tobasco, *The Cost of Crushing: Curvature-Driven Wrinkling of Thin Elastic Shells*.
2. I. Tobasco, Y. Timounay, D. Todorova, J. Paulsen, and E. Katifori, *Convex Geometry Drives Pattern Selection in Thin Floating Shells*.
3. A. Souza, I. Tobasco, and C. R. Doering, *Wall-to-Wall Optimal Transport: Theory and 2D Computations*.

Accepted

1. C. R. Doering and I. Tobasco, *On the Optimal Design of Wall-to-Wall Heat Transport*, to appear in *Comm. Pure Appl. Math.*, preprint arXiv:1712.08945.
2. A. Jagannath and I. Tobasco, *Bounds on the Complexity of Replica Symmetry Breaking for Spherical Spin Glasses*, *Proc. Amer. Math. Soc.* **146** (2018) 3127–3142.
3. I. Tobasco, D. Goluskin, and C. R. Doering, *Optimal Bounds and Extremal Trajectories for Time Averages in Nonlinear Dynamical Systems*, *Phys. Lett. A* **382** (2018) 382–386.
4. I. Tobasco, *Axial Compression of a Thin Elastic Cylinder: Bounds on the Minimum Energy Scaling Law*, *Comm. Pure Appl. Math.* **71** (2018) 304–355.

5. I. Tobasco and C. R. Doering, *Optimal Wall-to-Wall Transport by Incompressible Flows*, Phys. Rev. Lett. **118** (2017) 264502.
6. A. Jagannath and I. Tobasco, *Low Temperature Asymptotics in Spherical Mean Field Spin Glasses*, Comm. Math. Phys. **352** (2017) 979–1017.
7. S. Conti, H. Olbermann, and I. Tobasco, *Symmetry Breaking in Indented Elastic Cones*, Math. Models Methods Appl. Sci. **27** (2017) 291–321.
8. A. Jagannath and I. Tobasco, *Some Properties of the Phase Diagram for Mixed p -Spin Glasses*, Probab. Theory Related Fields **167** (2017) 615–672.
9. A. Jagannath and I. Tobasco, *A Dynamic Programming Approach to the Parisi Functional*, Proc. Amer. Math. Soc. **144** (2016), 3135–3150.
10. D. Sanjaya, K. Fidkowski, and I. Tobasco, *Adjoint-Accelerated Statistical and Deterministic Inversion of Atmospheric Contaminant Transport*, Computers and Fluids **100** (2014), 291–307.
11. D. Viswanath and I. Tobasco, *Navier-Stokes Solver Using Green's Functions I: Channel Flow and Plane Couette Flow*, J. Computational Physics **251** (2013), 414–431.

INVITED TALKS

- Fields Institute Workshop on Scientific Computing Across Scales, Toronto, Canada (Apr. 2019)
- 83rd Midwest PDE Seminar, Indiana Univ. (Mar. 2019)
- Applied and Interdisciplinary Math. Seminar, Univ. of Michigan (Dec. 2018)
- Saturday Morning Physics Lecture, Univ. of Michigan (Nov. 2018)
- Applied Math Seminar, Univ. of Utah (Oct. 2018)
- Analysis Seminar, Courant Institute (Oct. 2018)
- Oberwolfach Workshop on Calculus of Variations, Oberwolfach, Germany (Jul. 2018)
- SIAM Math. Aspects of Materials Science & Annual Meetings, Portland, OR (Jul. 2018)
- WHOI Geophysical Fluid Dynamics Program, Woods Hole, MA (Jul. 2018)
- BIRS Workshop on Topics in the Calculus of Variations, Banff, Canada (May 2018)
- APS Division of Fluid Dynamics Annual Meeting, Denver, CO (Nov. 2017)
- Analysis of Fluids Seminar, Princeton Univ. (Oct. 2017)
- Applied and Interdisciplinary Math. Seminar, Univ. of Michigan (Sept. 2017)
- GLSIAM Spring Meeting, Oakland Univ. (Apr. 2017)
- Analysis and Applied Math Seminar, Univ. of Toronto (Apr. 2017)
- Applied Math Seminar, Courant Institute (Mar. 2017)
- PDE and Analysis Seminar, Univ. of Pittsburgh (Jan. 2017)
- Differential Equations Seminar, Univ. of Michigan (Dec. 2016)
- APS Division of Fluid Dynamics Annual Meeting, Portland, OR (Nov. 2016)
- Analysis/Probability Seminar, Univ. of Michigan (Oct. 2016)
- SIAM Math. Aspects of Materials Science, Philadelphia, PA (May 2016)
- Applied Math Colloquium & Level Set Collective Group Meeting, UCLA (Jan. 2016)

- SIAM Conference on Analysis of PDE, Scottsdale, AZ (Dec. 2015)
- Applied and Interdisciplinary Math. Seminar, Univ. of Michigan (Dec. 2015)
- KI-Net Young Researchers Workshop, Univ. of Maryland (Nov. 2015)
- PDE–Applied Math Seminar, Univ. of Maryland (Nov. 2015)
- Oberseminar Analysis, Univ. of Bonn IAM (May 2015)
- Materials Working Group, Courant Institute (Apr. 2015)
- KI-Net Young Researchers Workshop, Univ. of Maryland (Oct. 2014)
- Materials Working Group, Courant Institute (Oct. 2014)

POSTER SESSIONS

- Nonconvexity, Nonlocality and Incompatibility—L. Truskinovky’s 60th Birthday, Univ. of Pittsburgh (May 2017)
- 6th Midwest Workshop on Control and Game Theory, Univ. of Michigan (Apr. 2017)
- NYU–Oxford Workshop on Math. Models of Defects and Patterns, Courant Institute (Jan. 2016)
- IMA Special Workshop on Mathematics and Mechanics, Eugene, OR (Oct. 2015)
- PIRE Workshop on Grain Boundaries and Stochastic Homogenization, Univ. of Leipzig, Germany (Jul. 2015)

AWARDS

Grants and Fellowships

2018–2021	National Science Foundation Research Grant (DMS-1812831, PI)
2016–2019	James Van Loo Postdoctoral Fellowship University of Michigan Department of Mathematics
2013–2016	National Science Foundation Graduate Research Fellowship
2011–2016	Henry M. MacCracken Fellowship New York University Graduate School of Arts and Sciences

Honors and Prizes

2016	Courant Institute Kurt O. Friedrichs Prize “for an outstanding dissertation in mathematics”
2015	Courant Institute Wilhelm T. Magnus Memorial Prize “for significant contributions to the mathematical sciences”
2010	First place at AIAA Regional Student Conference
2008–2010	University of Michigan James B. Angell Scholar

PROFESSIONAL EXPERIENCE

University of Michigan, Ann Arbor, MI

Co-organizer

- AMS 2018 Fall Central Sectional Meeting Special Session on “Analytical and Numerical Aspects of Turbulent Transport”
- SIAM 2018 Annual Meeting Mini-symposium on “Transport, Mixing, and Optimality in Fluids”

Course Instructor

- Honors Multivariable Calculus, Fall 2018
- Minicourse on Calculus of Variations, Summer 2017
- Honors Multivariable Calculus, Fall 2017

- Honors Ordinary Differential Equations, Winter 2017
- Ordinary Differential Equations, Fall 2016

Mentor

- REU mentor to Charles Devlin and Jaeyoon Kim, Summer 2018

Courant Institute of Math. Sciences, New York, NY

Co-organizer

- cSplash Senior Advisor, 2014
- cSplash Academics Coordinator, 2012–2013

Courant Splash (cSplash) is an annual one-day lecture series aimed at mathematically inclined high school students from New York City and surrounding areas (www.csplash.org).

Teaching Assistant

- Intro. to Partial Differential Equations, Spring 2014
- Transformations and Geometry, Fall 2013
- Honors Calculus I, Fall 2013
- Intro. to Mathematical Analysis II, Spring 2013
- Intro. to Mathematical Analysis I, Fall 2012

University of Michigan, Ann Arbor, MI

Tutor

- Michigan Math Lab Tutor, 2009–2011
- Michigan Research Community Math/Physics Study Group Leader, 2008–2009