William M. Feldman

CONTACT
INFORMATION

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Salt Lake City, UT 84112

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RESEARCH
INTERESTS

Nonlinear PDE, free boundary problems, homogenization, calculus of variations.

ACADEMIC
POSITIONS

University of Utah, Salt Lake City, Utah, USA

Assistant Professor, 2020-present
John E. and Marva M. Warnock Chair for Faculty Development in Mathematics, 2020-present

Institute for Advanced Study, Princeton, New Jersey, USA

Friends of the IAS Member, 2019-2020

The University of Chicago, Chicago, Illinois, USA

L. E. Dickson Instructor, 2015-2019

University of California Los Angeles, Los Angeles, California, USA

Dissertation Year Fellowship, 2014-2015
Teaching and Research Assistant, 2010-2014

EDUCATION

University of California Los Angeles, Los Angeles, California, USA

Ph.D., Mathematics, June 2015

Advisor: Professor Inwon C. Kim

Advanced to Candidacy, Feb 2013
M.A., Mathematics, June 2011

Claremont McKenna College, Claremont, California USA

B.A., Mathematics, Physics, May 2010

HONORS AND
AWARDS

Warnock Chair for Faculty Development in Mathematics (University of Utah, 2020-present)

UCLA: Pacific Journal of Mathematics Dissertation Prize (2015), Dissertation Year Fellowship (2014-2015).

Claremont McKenna College: graduated Magna Cum Laude, Honors in Mathematics and Physics, Phi Beta Kappa, Phi Beta Kappa Graduate Study Award, Best Overall in Mathematics (2010).

PROFESSIONAL
SERVICE

- Co-organized special session, "Nonlinear PDE and Free Boundary Problems", AMS Fall Central Sectional Meeting, Omaha, NE, October 2023.
- NSF-DMS grant reviewer and panelist, February 2021.
- Co-organized IPAM Workshop "Stochastic Analysis Related to Hamilton-Jacobi PDEs", Los Angeles, CA, May 2020.
- Peer-reviewer: *Communications in Partial Differential Equations* (CPDE), *Journal of Differential Equations* (JDE), *SIAM Journal on Mathematical Analysis* (SIMA), *Archive for Rational Mechanics and Analysis* (ARMA), *Stochastics and Partial Differential Equations: Analysis and Computations* (SPDE), *Discrete and Continuous Dynamical Systems* (DCDS), *Annales de l'Institut Henri Poincaré, Analyse Non Linéaire* (AIHPC), *Interfaces and Free Boundaries* (IFB), *Indiana University Mathematics Journal* (IUMJ), *Annales Henri Lebesgue* (AHL), *Annals of Probability* (AOP), *Communications of the AMS* (Comm AMS), *Journal of Statistical Physics* (JSP).

○ Instructed short courses at University of Chicago Math REU, "Introductory topics in PDE" in 2017, "Mixing problems in Fluid Mechanics" in 2018, "Understanding PDEs" in 2019.
○ Co-organized UCLA Math Department outreach booth at UCLA's Exploring Your Universe 2013-2014.

DEPARTMENT
SERVICE

○ Engineering Math Committee, July 2020 - present
○ Mathematics Development Committee, July 2020 - June 2023
○ Colloquium Committee, July 2020 - June 2023 (Co-Chair Jan 2022-June 2022)
○ PhD committee member: Yibo Zhai, Sean Groathouse (PhD 2023), Claire Plunkett (PhD 2023).
○ Masters' committee member: Guang Yang, Caleb Albers (MS 2023), Taos Transue (MS 2022).
○ Applied Math Seminar co-Organizer, Jan 2022-present.
○ Organized informal learning seminar on Optimal Transport and Large Deviations Theory (w/ Farhan Abedin), Spring 2022.

POSTDOCTORAL
MENTORING

○ Farhan Abedin (AY 2021-22, currently Assistant Professor at Lafayette College)

DOCTORAL
MENTORING

○ Zhonggan Huang (University of Utah, 3rd year PhD student, current)

UNDERGRADUATE
AND MASTERS
MENTORING

○ Guang Yang (Undergraduate Honors Thesis, AY 2022-2023, MS committee member)
○ Caleb Albers (Master's Advisor, now PhD student at Utah)
○ Aidan Copinga (Undergraduate Honors Thesis, AY 2021-2022, now Math PhD student at CMU)
○ Zhecheng Huang (Masters Thesis, University of Chicago, 2019, PhD Student at Univ. Illinois Chicago)
○ Mentor for California Teach S-STEM fellowship recipients Kathlynn Ly and Benjamin Kim (UCLA, 2014-2015)

RESEARCH GRANTS

○ National Science Foundation, Division of Mathematical Sciences Continuing Grant DMS-2009286 "Interfaces and Free Boundaries in Heterogeneous Media" (July 2020-June 2023, extended to June 2024 $163,688)

PREPRINTS AND
PUBLICATIONS

○ William M Feldman, Inwon C Kim, and Norbert Požar. Rate independent models of droplet evolution. Preprint.
○ William M Feldman, Inwon C Kim, and Aaron Zeff Palmer. The sharp interface limit of an Ising Game. Preprint.
○ William M Feldman. Quantitative homogenization of principal Dirichlet eigenvalue shape optimizers. To appear in *Communications in Pure and Applied Mathematics*.
○ William M Feldman. Large scale regularity of almost minimizers of the one-phase problem in periodic media. *Ars Inveniendi Analytica*, Paper No. 2, 41 pp, 2023.
○ Farhan Abedin and William M Feldman. Quantitative convergence of the "bulk" free boundary in an oscillatory obstacle problem. To appear in *Interfaces and Free Boundaries*.
○ William M Feldman and Peter Morfe. The occurrence of surface tension gradient discontinuities and zero mobility for Allen-Cahn and curvature flows in periodic media. To appear in *Interfaces and Free Boundaries*.
○ William M Feldman. Recovering coercivity for the G-equation in general random media. Preprint.
○ William M Feldman. Mean curvature flow with positive random forcing in 2-d. Preprint.
○ William M Feldman, Jean-Baptiste Fermanian and Bruno Ziliotto. An example of failure of stochastic homogenization for viscous Hamilton-Jacobi equations without convexity. *Journal of Differential Equations*, 280: 464-476, 2021.
○ William M Feldman. Shapes of local minimizers for the Alt-Caffarelli energy functional in inhomogeneous media. *Archive for Rational Mechanics and Analysis*, 2021.
○ William M Feldman and Yuming Zhang. Continuity properties for divergence form boundary data homogenization problems. *Analysis & PDE*, 12(8): 1963-2002, 2019.

○ William M Feldman and Charles K Smart. A Free Boundary Problem with Facets. *Archive for Rational Mechanics and Analysis*, 232(1): 389-435, 2018.

○ William M Feldman. Stability of Serrin's Problem and Dynamic Stability of a Model for Contact Angle Motion. *SIAM Journal on Mathematical Analysis*, 50(3): 3303-3326, 2018.

○ William M Feldman and Inwon C Kim. Liquid Drops on a Rough Surface. *Communications on Pure and Applied Mathematics* 71(12): 2429-2499, 2018.

○ William M Feldman and Inwon C Kim. Continuity and Discontinuity of the Boundary Layer Tail. *Annales scientifiques de l'École normale supérieure* 50(4): 1017-1064, 2017.

○ William M Feldman and Panagiotis E Souganidis. Homogenization and non-homogenization of certain non-convex Hamilton-Jacobi equations. *Journal de Mathématiques Pures et Appliquées*, 108(5): 751-782, 2017.

○ Giang Tran, Hayden Schaeffer, William Feldman and Stanley Osher. An L1 Penalty Method for General Obstacle Problems. *SIAM Journal on Applied Mathematics*, 75(4):1424-1444, 2015.

○ William M Feldman, Inwon C Kim and Panagiotis E Souganidis. Quantitative Homogenization of Elliptic Partial Differential Equations with Random Oscillatory Boundary Data. *Journal de Mathématiques Pures et Appliquées*, 103(4):958-1002, 2015.

○ William M Feldman. Homogenization of the Oscillating Dirichlet Boundary Condition in General Domains. *Journal de Mathématiques Pures et Appliquées*, 101(5):599-622, 2014.

○ William M Feldman and Inwon C Kim. Dynamic Stability of Equilibrium Capillary Drops. *Archive for Rational Mechanics and Analysis*, 211(3):819-878, 2014.

RECENT SEMINAR AND COLLOQUIUM TALKS

○ Analysis Seminar, UCLA, October, 2021.
○ Department Colloquium, Florida Institute of Technology, Melbourne, FL, April 2021.
○ Rainwater Seminar, University of Washngtion, Seattle, WA, March 2021.
○ Join Applied / Probability Seminar, Stanford University, Palo Alto, CA, September 2020.

CONFERENCE TALKS

○ Rocky Mountain Mathematics Consortium Summer School, University of Wyoming, June 16-20, 2025 (anticipated)
○ BIRS-CMO Workshop "Optimal Transport and Dynamics", August 2024 (anticipated)
○ BIRS Workshop "Mathematics of Multiscale and Multiphysics Phenomena in Materials Science", June 2024 (anticipated)
○ AMS Sectional Meeting (Special Session), Omaha, NE, Oct 2023
○ AMS Sectional Meeting (Special Session), El Paso, TX, Sept 2022
○ AMS Sectional Meeting (Special Session), Salt Lake City, UT, October 2020 (Virtual).
○ SIAM TXLA Section Annual Meeting (Mini-symposium), Texas A&M University, October 2020 (Virtual)
○ FRG concentration period on geometric measure theory and partial differential equations, Seattle, WA, August/September 2020 (Rescheduled to 2021 due to COVID-19)
○ IPAM Workshop "Stochastic Analysis Related to Hamilton-Jacobi PDE", Los Angeles, CA, May 2020 (Virtual).
○ AMS Sectional Meeting (2 Special Sessions), Ann Arbor, MI, October 2018.
○ LMS Durham Symposium on Homogenisation in Disordered Media, Durham, UK, August 2018.
○ "79/80th Midwest PDE Seminar", University of Illinois, Chicago, USA, September 2017.
○ AMS Sectional Meeting (Special Session), Bloomington, IN, April 2017.
○ "78th Midwest PDE Seminar", Loyola University, Chicago, USA, October 2016.
○ Workshop "New Trends in nonlinear PDEs: from theory to applications", Cardiff, UK, June 2016.
○ Banff International Research Institute Workshop "Developments in the Theory of Homogenization", Banff, Canada, July 2015.
○ Institut Mittag-Leffler Long Program "Homogenization and Random Phenomenon", Stockholm, Sweden, Sept 2014.
○ AMS Sectional Meeting (Special Session), Louisville, KY, Oct 2013.

University of Utah, Salt Lake City, Utah, USA

Assistant Professor **2019-present**

- Math 1210: Calculus I, Fall 2022 (online), Spring 2023 (online), Fall 2023 (in person)
- Math 7875: Graduate Partial Differential Equations II (topics class), Spring 2023.
- Math 6220: Complex Analysis (Graduate Qualifier), Spring 2022
- Math 6420: Partial Differential Equations (Graduate Qualifier), Spring 2022
- Math 6410: Ordinary Differential Equations (Graduate Qualifier), Fall 2021
- Math 5210 (Interactive Video Conferencing): Introduction to Analysis, Spring 2021
- Math 3220 (Interactive Video Conferencing): Foundations of Analysis II, Fall 2020

The University of Chicago, Chicago, Illinois USA

Instructor **2015 - 2019**

- Math 212: Advanced Numerical Analysis, Fall 2018
- Math 203/204/205: Analysis in $\mathbb{R}^n$, Fall 2016 / Winter 2017 / Fall 2017, Spring 2018
- Math 275: Basic Theory of Partial Differential Equations, Spring 2016
- Math 200/201: Mathematical Methods for Physical Sciences, Fall 2015 / Winter 2016

University of California Los Angeles, Los Angeles, California USA

Teaching Assistant **2010 - 2014**

- Math 266B: Graduate Partial Differential Equations, Winter 2013, 2014
- Math 266A: Graduate Applied Differential Equations (ODEs), Fall 2012
- Math 131C: Topics in Analysis (Measure Theory), Spring 2012
- Math 131A: Analysis, Winter 2012
- Math 151A: Applied Numerical Methods, Fall 2011
- Math 33A: Linear Algebra, Spring 2011
- Math 33B: Differential Equations, Fall 2010 and Winter 2011