Curriculum Vitae: Yekaterina (Katya) Epshteyn. Fall 2025

Homepage, **http://www.math.utah.edu/~epshteyn/**

Additional Links: Mathscinet and Google Scholar

Education:

- NSF-RTG Postdoctoral Fellow, Mathematics, Carnegie Mellon University, 2007-2010. Postdoctoral Mentor: Prof. David Kinderlehrer
- Ph.D, Mathematics, University of Pittsburgh, 2002-2007. Advisor: Prof. Béatrice Rivière
- My parents and I were granted refugee status to immigrate to the United States. Immigrated in 2001 and worked temporary jobs as a family to make ends meet before I started graduate school in 2002, 2001-2002.
- BS, Applied Mathematics & Physics, Moscow Institute of Physics and Technology, 1996-2000. Undergraduate/Post-Undergraduate Research Assistant/Fellow, Keldysh Institute for Applied Mathematics of Russian Academy of Sciences, Moscow, Russia, 1999-2001. Advisor: Prof. Viktor S. Ryaben'kii

Professional Experience:

Assistant (07/2010-06/2015)/Associate (07/2015-06/2022)/Full Professor (07/2022-present), Department of Mathematics, The University of Utah. Email: epshteyn@math.utah.edu

Current Research Interests

- Mathematical Aspects of Materials, Fluid Flow Problems, Biomedical Applications, Development and Analysis of Structure-Preserving Models and Algorithms, Numerical Analysis, Numerical Methods for PDEs, Uncertainty Quantification Methods, Scientific Computing, Applied Analysis, Applied Mathematics, Interdisciplinary Research and Collaboration

Selected Awards and Grants:

- *2025 Simons Fellow in Mathematics* and Simons Foundation Fellowship, **PI**, *"Polycrystalline Microstructures and Hyperbolic Balance Laws with Uncertainty: Modeling, Simulation and Analysis"*, U of Utah, $143,068, 07/2025-06/2026
- NSF Conference Grant, (**PI:** Y. Epshteyn, Co-PIs: A. Alekseenko, CSUN, J. Adler, Tufts U. and L. Ruthotto, Emory U.), *"Conference: NSF Computational Mathematics Meeting 2025"*, U of Utah, $99,999, 01/2025-12/2025
- NSF Research Grant (**PI:** Y. Epshteyn, co-PI: A. Narayan), *"Structure-Preserving Algorithms for Hyperbolic Balance Laws with Uncertainty"*, U of Utah $450,000, 07/2022-06/2026.
- NSF DMREF ("Designing Materials to Revolutionize and Engineer our Future") Collaborative Research, U of Utah (**PI:** Y. Epshteyn)/Columbia U (Lead PI: K. Barmak)/IIT(PI: C. Liu)/Lehigh U (PI: J. Rickman), *"Collaborative Research: DMREF: Microstructure by Design: Integrating Grain Growth Experiments, Data Analytics, Simulation and Theory"*. Total budget for the project with the supplemental award is $1,898,856.00, (U of Utah Share: $409,494), 09/2021-08/2026.
- NSF Research Grant, U of Utah (**Lead PI:** Y. Epshteyn, Senior Personnel: L. Horvath) /Columbia U (PI: K. Barmak), *"Collaborative Research: Towards a Predictive Theory of Microstructure Evolution in Polycrystalline Materials"*, $700,002, 09/2019-08/2024 (U of Utah Share: $250,002)
- Simons Foundation: Collaboration Grants for Mathematicians, **PI**, *"Coarsening and Texture Development in Polycrystalline Materials"*, U of Utah $35,000, 09/2016-08/2019
- NSF Conference Grant, **Co-PI** (PI: K. Golden; Co-PIs: A. Cherkaev, Y. Epshteyn and G. Milton), *"Thirteenth International Conference on Continuum Models and Discrete Systems, July 21-25, 2014"*, U of Utah $35,000, 07/2014-06/2015

- NSF RTG Grant, **Senior Personnel** (PI: J. Keener; Co-PI: A. Fogelson (Former Co-PI), F. Adler, P. Bressloff, A. Borisyuk and S. Lawley (Co-PI since 2016); Senior Personnel: Y. Epshteyn and C. Hohenegger) *"Research Training in Mathematical and Computational Biology"*, U of Utah $2,496,299, 08/2012-07/2020
- NSF Research Grant, **PI**, *"Chemotaxis Models in Biology and Texture Development in Materials: Numerical Methods, Analysis, and Modeling"*, U of Utah $149,581, 09/2011-08/2015

Selected Press Releases:

- U of Utah College of Science and Department of Mathematics *News Articles about the Simons Foundation Fellowship*
- U of Utah College of Science *News Articles about the NSF CompMath Meeting 2025*
- Work in the Paper "Point Process Microstructural Model of Metallic Thin Films with Implications for Coarsening", (Nature Journals) npj Computational Materials, *is featured in multiple news releases, including EurekAlert! (AAAS) and ASM International*, Spring 2023
- Work in the Paper "Relative Grain Boundary Energies from Triple Junction Geometry: Limitations to Assuming the Herring Condition in Nanocrystalline Thin Films", Acta Materialia, *is featured in news release "Materials Scientists and Mathematicians Challenge Central Hypothesis in Grain Growth Modelling for Thin Films" by Columbia U.*, Spring 2023
- DMREF Award was featured in Columbia U., U of Utah, IIT and Lehigh U. *news releases*
- Paper "Critical events, entropy, and the grain boundary character distribution" *was selected by the editors of Physical Review B to be highlighted as an Editors' Suggestion*, 2011.
  This work was also featured in SIAM News in 2010, featured in Physics in 2011 and in Carnegie Mellon U. News in 2012.

Selected Publications:

- Y. Epshteyn, A. Narayan and Y. Yu, Energy Stable and Structure-Preserving Algorithms for the Stochastic Galerkin System of 2D Shallow Water Equations, *Computer Methods in Applied Mechanics and Engineering (CMAME)*, Vol 440, 117932, 2025
- D. Dai, Y. Epshteyn and A. Narayan, Energy Stable and Structure-Preserving Schemes for the Stochastic Galerkin Shallow Water Equations, *ESAIM: Mathematical Modelling and Numerical Analysis*, Vol 58, 2, 723-757, 2024
- J. Rickman, K. Barmak, Y. Epshteyn and C. Liu, Point Process Microstructural Model of Metallic Thin Films with Implications for Coarsening, *(Nature Journals) npj Computational Materials 9, 27*, 2023
- Y. Epshteyn, C. Liu, C. Liu and M. Mizuno, Local Well-Posedness of a Nonlinear Fokker-Planck Model, *Nonlinearity, (Institute of Physics and London Mathematical Society)*, 36, 1890-1917, 2023
- M. Patrick, G. Rohrer, O. Chirayutthanasak, S. Ratanaphan, E. Homer, G. Hart, Y. Epshteyn and K. Barmak, Relative Grain Boundary Energies from Triple Junction Geometry: Limitations to Assuming the Herring Condition in Nanocrystalline Thin Films, *Acta Materialia* 242, 118476, 2023
- Y. Epshteyn, C. Liu and M. Mizuno, A stochastic model of grain boundary dynamics: A Fokker-Planck perspective, *Mathematical Models and Methods in Applied Sciences*, Vol. 32, Issue 11, pp. 2189-2236, 2022
- D. Dai, Y. Epshteyn and A. Narayan, Hyperbolicity-Preserving and Well-Balanced Stochastic Galerkin Method for Two-Dimensional Shallow Water Equations, *Journal of Computational Physics*, Vol. 452, 1, 2022
- Y. Epshteyn, C. Liu and M. Mizuno, Large Time Asymptotic Behavior of Grain Boundaries Motion with Dynamic Lattice Misorientations and with Triple Junctions Drag, *Communications in Mathematical Sciences*, Vol. 19, No. 5, 1403-1428, 2021

- Y. Epshteyn, C. Liu and M. Mizuno, Motion of Grain Boundaries with Dynamic Lattice Misorientations and with Triple Junctions Drag, *SIAM Journal on Mathematical Analysis*, 53(3), 3072-3097, 2021
- D. Dai, Y. Epshteyn and A. Narayan, Hyperbolicity-Preserving and Well-Balanced Stochastic Galerkin Method for Shallow Water Equations, *SIAM Journal on Scientific Computing*, 43(2), A929-A952, 2021
- Y. Epshteyn and Q. Xia, Efficient numerical algorithms based on difference potentials method for chemotaxis systems in 3D, *Journal of Scientific Computing*, Vol. 80, No. 1, 26-59, 2019
- X. Liu, J. Albright, Y. Epshteyn and A. Kurganov, Well-Balanced Positivity Preserving Central-Upwind Scheme with a Novel Wet/Dry Reconstruction on Triangular Grids for the Saint-Venant System, *Journal of Computational Physics*, 374, 213-236, 2018
- P. Bardsley, K. Barmak, E. Eggeling, Y. Epshteyn, D. Kinderlehrer, S. Ta'asan, Towards a Gradient Flow for Microstructure, *Rendiconti Lincei - Matematica e Applicazioni (European Mathematical Society Publishing)*, 28, 777-805, 2017
- K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp and S. Ta'asan, Critical Events, Entropy, and the Grain Boundary Character Distribution, *Physical Review B*, B 83 134117, 2011
- K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp and S. Ta'asan, An Entropy Based Theory of the Grain Boundary Character Distribution, *Discrete and Continuous Dynamical Systems*, Volume 30, Issue 2, 427-454, 2011
- S. Bryson, Y. Epshteyn, A. Kurganov and G. Petrova, Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System, *ESAIM: Mathematical Modelling and Numerical Analysis*, Volume 45, Issue 3, 423-446, 2011
- Y.Epshteyn and A.Kurganov, New Interior Penalty Discontinuous Galerkin Methods for the Keller-Segel Chemotaxis Model, *SIAM Journal on Numerical Analysis*, 47, no. 1, 386-408, 2008/09
- Y. Epshteyn and B. Rivière, Fully Implicit Discontinuous Finite Element Methods for Two-Phase Flow, *Applied Numerical Mathematics*, Volume 57, Issue 4, p.383-401, 2007
- Y. Epshteyn and B. Rivière, Estimation of Penalty Parameters for Symmetric Interior Penalty Galerkin Methods, *Journal of Computational and Applied Mathematics*, Vol. 206, Issue 2, p. 843-872, 2007
- A. Dunca and Y.Epshteyn, On the Stolz-Adams Deconvolution Model for the Large-Eddy Simulation of Turbulent Flows, *SIAM Journal on Mathematical Analysis*, Vol. 37, Issue 6, p 1890-1902, 2006

Students and Postdocs:

- **REU Undergraduate Students (individual REU study):** Guang Yang (2022-2023), James Eckstein, (2020-2021, Currently Ph.D. student at Columbia University), Liam Hayes, (2020-2021, Columbia University), Camille Humphries, (2019-2019, 2013-2014), Charlotte Blake, (2018-2019, currently Ph.D. student at the University of Illinois at Urbana-Champaign), Gabrielle Legaspi, (2019-2019, 2017-2017, Currently Biostatistician, Catalyst Clinical Research, New York) Alex Henabray, (2014-2014), Spencer Phippen (2013-2014, Currently Software Engineer, Google)
- **REU Undergraduate Students as a part of the designed REU course Math 4800 "Selected Numerical Algorithms and Their Analysis":** (Spring 2022): Kyle Kazemini, Preston Malen, Ryan Redd, Lia Smith, Sophie Stephens and Zhenzhao Tu; (Spring 2014): Nathan Briggs, Annie Cherkaev, Stephen Durtschi, Kyle Hiroyasu, Erika Loertscher, Sean O'Connor, Troy Raen, Justin Talbot, Hitesh Tolani and Ericson Weah

- **Ph.D Students:** Caleb Albers (2023-Current), Batuhan Bayir (2023-Current), Dongwan Kim (2023-Current), Yinqian Yu (2023-Current), Kaitlin O'Dell (2021-2023, Ph.D student. Graduated in Spring 2023 with MS due to personal reasons. Currently at Boeing), Thuong Nguyen (2016-2022. Currently Postdoctoral Fellow, UT Southwestern Medical Center), Dihan Dai (2016-2022. Currently at Amazon), Qing Xia (2014-2019. Currently Tenure-Track Assistant Professor at Wenzhou-Kean University, China), Kyle Steffen, (2013-2018. Currently researcher at the UT Austin), Jason Albright (2012-2016. Currently at COSM Advanced Manufacturing Systems), Patrick Bardsley (2012-2016. Currently at Cirrus Logic)
- **Graduate Students Research Project Supervision:** Chong Wang (Fall 2022, MS project advisor. Graduated with MS 2022), Elias Clark (Fall 2018-Spring 2021, advisor on the research project. Graduated with Ph.D 2023, Ph.D. advisor: S. Lawley), Vira Babenko (Spring 2014, advisor on the research project. Graduated with Ph.D 2016, Ph.D. advisor, P. Alfeld)
- **Visiting International Ph.D. Students:** Gustav Ludvigsson and Simon Sticko (Spring 2017, visiting from Uppsala University, Sweden)
- **Member of Multiple Ph.D. Committees**
- **Postdoctoral Mentees:** Bohyun Kim (Fall 2023-Spring 2024), Chang (Kamala) Liu (Fall 2021-Fall 2022. Currently back to China due to family emergency), Michael Medvinsky (Fall 2013-Spring 2015. Currently Research Assistant Professor at NCSU)

Selected Synergistic Activities/Service to the Community:

- Member of AWM Sadosky Research Prize Selection Committee (AWM Sadosky Research Prize in Analysis), (2026-2030), President of SIAM Northern State Section (2023-2025), Member of SIAG/APDE Early Career Prize Selection Committee, SIAM Activity Group on Analysis of Partial Differential Equations (2025), Member of Nominating Committee for the SIAM Activity Group on Mathematical Aspects of Materials (2024), Member of Nominating Committee for the SIAM Activity Group on Analysis of Partial Differential Equations (2020), SIAG Officer-Secretary, Leadership of SIAM Mathematical Aspects of Materials Science Activity Group (01/2019-12/2020), Member of SIAM Committee on Programs and Conferences (2016-2022)
- Co-organizer of several international/national conferences/workshops: NSF CompMath PI meeting (2025), BIRS workshop 24w5159 (2024), SIAM Conference on Mathematical Aspects of Materials Science (2024), AMS Fall Western Sectional Meeting (2020, was in 2022 due to COVID-19, local co-organizer), Conference "Topics in Applied Nonlinear Analysis: Recent Advances and New Trends" (2016), ICOSAHOM (2014) and CMDS-13 (2014)
- Organizer and Co-organizer of multiple mini-symposia, special sessions and workshops: SIAM-UQ mini-symposium (*upcoming* 2026); SIAM-MS mini-symposium (2024, 2020); SIAM Annual mini-symposium (mini-symposium 2025, NSF-SIAM mini-symposium 2022, and mini-symposium 2013); ICIAM mini-symposium (2023); SIAM special session at JMM (2020); SIAM CSE mini-symposium and career development AWM workshop at SIAM CSE (2015); WCCM mini-symposium (2021); AMS Spring Western Sectional Meeting special session (2018); AWM research symposium (2017); CMDS Investigators Workshop: "At the Frontiers of Computation and Materials" (2015); MAFELAP mini-symposium (2009)
- Invited Project Leader, Women in Mathematics of Materials (WIMM) Workshop (2018), Invited Co-Mentor, "WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations", IMA Special Workshop (2014)
- More than 145 invited conference, colloquium, seminar talks and lectures nationally and internationally
- Reviewer for top journals in Applied Mathematics and Applied Analysis, Numerical Analysis and Scientific Computing, Materials Science; Reviewer and panelist, NSF (since 2015) and American Association of University Women (AAUW) Fellowships and Grants (2018-2022)