

## **CURRICULUM VITAE**

YEKATERINA EPSHTEYN

Summer 2022

### **PERSONAL INFORMATION:**

- Citizenship: United States

### **POSITION:**

- Professor, Department of Mathematics, The University of Utah  
(07/2022 - present)
- Associate Professor, Department of Mathematics, The University of Utah  
(07/2015 - 06/2022)
- Assistant Professor, Department of Mathematics, The University of Utah  
(07/2010 - 06/2015)
- NSF RTG Postdoctoral Fellow, Department of Mathematical Sciences  
and Center for Nonlinear Analysis, Carnegie Mellon University  
Postdoctoral Mentor: Prof. David Kinderlehrer, (08/2007-07/2010).

### **SCIENTIFIC VISITS:**

- Nihon University, Tokyo, Japan, October 2019
- Uppsala University, Sweden, August 2013, August-September 2016
- Imperial College London, UK, October 2015, May 2016
- Carnegie Mellon University, Pittsburgh, October 2010, December 2010

### **RESEARCH INTERESTS:**

- Mathematical and Computational Modeling of Materials: modeling of polycrystalline materials; grain growth

- Numerical Methods for PDEs, Numerical Analysis, Scientific Computing, Applied Mathematics
- Difference Potentials Method, Finite Difference Methods, Central-Upwind Finite-Volume Schemes, Finite Element Methods
- Shallow Water Models
- Biomedical Applications: cells signaling, chemotaxis models, blood flow models, reaction-diffusion systems in developmental biology
- Computational Fluid Dynamics
- Flow in Porous Media, Multiphase Flow

#### **EDUCATION:**

- University of Pittsburgh, Pittsburgh, (Mathematics), Ph.D., 2002-2007.  
Advisor: Prof. Beatrice Rivière.
- Moscow Institute of Physics and Technology (MIPT), Moscow, Russia, (Applied Mathematics and Physics), B.S., 2000.  
Advisor: Prof. Viktor S. Ryaben'kii.

#### **AWARDED GRANTS:**

- NSF Research Grant, University of Utah (**PI:** Y. Epshteyn, co-PI: A. Narayan), DMS-2207207, “*Structure-Preserving Algorithms for Hyperbolic Balance Laws with Uncertainty*”, \$450,000, July 1 2022 - June 30 2025
- DMREF (“Designing Materials to Revolutionize and Engineer our Future”) Collaborative Research, NSF, University of Utah (**PI:** Y. Epshteyn) /Columbia University (Lead PI: K. Barmak)/Illinois Institute of Technology (PI: C. Liu)/Lehigh University (PI: J. Rickman), DMS-2118172/2118206/2118181/2118197, “*Collaborative Research: DMREF: Microstructure by Design: Integrating Grain Growth Experiments, Data Analytics, Simulation and Theory*”. Total budget for the project is

\$1,798,856.00, September 1 2021 -August 31 2025 (University of Utah, PI, Share: \$384,494). Supplemental Award, \$100,000, August 2022. Total budget for the project with the supplemental award is \$1,898,856.00, (University of Utah, PI, Share: \$409,494).

- NSF Research Grant, University of Utah (**Lead PI**: Y. Epshteyn, Senior Personnel: L. Horvath)/Columbia University (PI: K. Barmak), DMS-1905463/DMS-1905492, “*Collaborative Research: Towards a Predictive Theory of Microstructure Evolution in Polycrystalline Materials*”, \$700,002, September 1 2019 - August 31 2022 (Lead PI, Share: \$250,002)
- Award from Japan to visit Masashi Mizuno, Nihon University, Tokyo, Japan (Lead Institution: Nihon University, Tokyo, Japan), **Collaborators**: Yekaterina Epshteyn (University of Utah) and Masashi Mizuno (PI, Nihon University, Tokyo, Japan), 2019
- Simons Foundation: Collaboration Grants for Mathematicians, No. 415673, **Sole PI**, “*Coarsening and Texture Development in Polycrystalline Materials*”, \$35,000, September 1 2016 - August 31 2019 (remaining amount was returned in 2019 to Simons Foundation due to the award of the NSF grant)
- STINT Grant from the Swedish Foundation for International Cooperation in Research and Higher Education (Lead Institution: Uppsala University, Sweden), **Collaborators**: Yekaterina Epshteyn (University of Utah) and Gunilla Kreiss (PI, Uppsala University, Sweden); Participants (Graduate Students): Kyle Steffen and Qing Xia (University of Utah), Simon Sticks and Gustav Ludvigsson (Uppsala University, Sweden), Spring 2016 - Spring 2017
- NSF Research Grant, **Sole PI**, DMS-1112984: *Chemotaxis Models in Biology and Texture Development in Materials: Numerical Methods, Analysis, and Modeling*, \$149,581, September 2011 - August 31 2015
- NSF Conference Grant, **Co-PI**, (PI: Kenneth Golden; Co-PIs: Andrej Cherkaev, Yekaterina Epshteyn and Graeme Milton), DMS-1434212:

*Thirteenth International Conference on Continuum Models and Discrete Systems, July 21-25, 2014, \$35,000, July 2014 - June 30 2015*

- NSF Conference Grant (Lead Institution: Carnegie Mellon University), **Senior Personnel**, DMS-1601475: *Topics in Applied Nonlinear Analysis: Recent Advances and New Trends* (PI: Irene Fonseca (Carnegie Mellon University); Co-PI: Dejan Slepcev (Carnegie Mellon University); Senior Personnel: Maria Emelianenko, Yekaterina Epshteyn and Adrian Tudorascu), \$31,600, April 2016 - March 31 2017
- NSF RTG Grant, **Senior Personnel**, DMS-1148230: *Research Training in Mathematical and Computational Biology* (PI: James Keener; Co-PI: Aaron Fogelson (Former Co-PI), Fred Adler, Paul Bressloff, Alla Borisjuk and Sean Lawley (Co-PI since 2016); Senior Personnel: Yekaterina Epshteyn and Christel Hohenegger), \$2,496,299, August 2012 - July 31 2020

TOTAL FUNDING $\approx$  5.81 M

#### **SELECTED HONORS, AWARDS and TRAVEL GRANTS:**

1. Multiple travel awards/grants from AWM, SIAM, Berlin Mathematical School, Henri Poincaré Institute, Ki-Net (University of Maryland College Park), MSRI, US National Congress on Computational Mechanics, University of Pittsburgh Medical School, 2006 - 2020.
2. US Junior Oberwolfach Fellow, 2012.
3. Paper "Critical events, entropy, and the grain boundary character distribution" is selected by the editors of Physical Review B to be highlighted as an Editors' Suggestion, 2011.  
This work is also featured in "SIAM News" in 2010, featured in Physics in 2011 and in Carnegie Mellon University News in 2012.
4. 8th IMACS most successful papers award, 2009.
5. 4th IMACS most successful papers award, 2007.

6. NSF RTG Postdoctoral Fellowship, August 2007 - July 2010: NSF RTG Training Grant DMS-0635983: “Center for Nonlinear Analysis: Research and Training in Applied Mathematics”.
7. Summer 2003, Fall 2006, Summer 2007, Research Fellowship, Department of Mathematics, University of Pittsburgh.
8. Andrew Mellon Predoctoral Fellowship, 2004-2005.
9. NSF Graduate Fellowship, Honorable Mention, 2004.
10. Summa Cum Laude (Red Diploma), Moscow Institute of Physics and Technology (MIPT), Moscow, Russia, 2000.
11. Research Assistantship, Keldysh Institute for Applied Mathematics, Moscow, 1999-2001.
12. Russian Government Scholarship for high GPA, 1996-2000.
13. Silver Medal for outstanding achievements in study, 1996.
14. Diplomas, Russian Math and Physics Olympiads, 1994-1996.

## STUDENTS AND POSTDOCS:

- **Undergraduate Students:**
- **Supervision of 10 REU students:** Nathan Briggs, Annie Cherkaev, Stephen Durtschi, Kyle Hiroyasu, Erika Loertscher, Sean O’Connor, Troy Raen, Justin Talbot, Hitesh Tolani and Ericson Weah, as a part of REU course Math 4800 “*Selected Numerical Algorithms and Their Analysis*”, Spring 2014.
- **REU Undergraduate Students (individual REU study):**  
James Eckstein, (January 2020 - Summer 2021), project “*Numerical Algorithms for Automated Dynamic Grain Boundary Network Identification*”.  
*James is an undergraduate student in Physics at the University of Illinois at Urbana-Champaign since Fall 2021.*

Liam Hayes, (January 2020 - March 2021, Columbia University, Co-advisor. Advisor: K. Barmak), project “*Numerical Algorithms for Automatically Processing Data with Application to Grain Growth*”.

Camille Humphries, (January 2019 - December 2019, co-advised jointly with Qing Xia), project “*Fast Numerical Algorithms for Models with Nonlinear Diffusion*”

Charlotte Blake, (August 2018 - May 2019), project “*Numerical Algorithms with Application to Data Processing in Materials Science*”.  
*Charlotte started Ph.D in Mathematics at the University of Illinois at Urbana-Champaign in Fall 2019.*

Gabrielle Legaspi, (January 2019 - May 2019), project “Coarsening Models”

Gabrielle Legaspi, (May 2017 - September 2017, co-advised jointly with Kyle Steffen and Qing Xia), project “*Fast Numerical Algorithms Based on Difference Potentials Method.*” *Recipient of Keith Reed Memorial Scholarship, April 2018.*

*Gabrielle started MSTAT program at the Mathematics Department at the University of Utah Fall 2019.*

Alex Henabray, (May 2014 - September 2014, co-advised jointly with Jason Albright), project “*Numerical Solution of 1D Stefan Problem*”.

Camille Humphries (May 2013 - May 2014, co-advised jointly with Jason Albright in Fall 2013 - Spring 2014), project “*Central-Upwind Schemes for Shallow Water Models*”.

Spencer Phippen (May 2013 - January 2014), project “*Difference Potentials Method for Interface Problems*”. *Recipient of Susan C. Christiansen Memorial Scholarship for our REU project, April 2014.*

Software Engineer at Google.

- **Ph.D Students:**

Kaitlin O’Dell (Fall 2021 - current), Ph.D advisor, thesis area “*Energetic Variational Particle Based Methods for Fokker-Planck Equations and Grain Growth Modeling.*”

*Kaitlin was supported during Spring 2022 via research assistantship on the NSF-DMS Grant 1905463.*

*Kaitlin is the recipient of the NSF Graduate Research Fellowship 2022.*

Dihan Dai (Fall 2016 - Spring 2022, Ph.D advisor. Ph.D co-advisor: Akil Narayan), thesis “*Structure-Preserving Numerical Methods for Shallow Water Equations with Uncertainty.*”

*Recipient of the Department Summer Research Fellowship 2021.*

First Job after Ph.D: Applied Scientist I (L4) at Amazon, July 2022 - Current.

Thuong Nguyen (Fall 2016 - Summer 2022, Ph.D advisor), thesis “*Adaptive Central-Upwind Methods for Shallow Water Models.*” Additional research project in the Fall 2021: “Computational Models of Grain Growth in Polycrystalline Materials.”

*Thuong was supported during Fall 2021 via research assistantship on the NSF-DMS Grant 1905463.*

*Recipient of the Vietnamese Government Fellowship for the Graduate Study, 2016-2018.*

First Job after Ph.D: Postdoctoral Fellow, UT Southwestern Medical Center, August 2022 - Current.

Qing Xia (Fall 2014 - Spring 2019, Ph.D advisor), Ph.D. thesis “*Robust Numerical Algorithms with Applications to Interface Problems and Chemotaxis Models in Biology.*”

*Recipient of the Outstanding Graduate Student Award, April 2016 and the Department Summer Research Fellowship 2017.*

First Job after Ph.D: Postdoctoral Fellow at the Department of Mathematical Sciences at Rensselaer Polytechnic Institute (RPI), July 2019 - June 2021.

*Dahlquist Research Fellow* at KTH Royal Institute of Technology, Stockholm, Sweden, Fall 2021 - Current.

Kyle Steffen, (2013 - 2018, Ph.D advisor. Ph.D co-advisor: Kenneth Golden), Ph.D. thesis “*The Difference Potentials Method for Problems with Evolving Geometry and Modeling Fluid Flow in Sea Ice*”

First Job after Ph.D: Peter O’Donnell Postdoctoral Fellow at the Oden Institute for Computational Engineering & Sciences at the University of Texas at Austin, Fall 2018 - Current.

Jason Albright (2012 - 2016, Ph.D advisor), Ph.D. thesis “*Numerical Methods based on Difference Potentials for Models with Material Interfaces*”.

*Recipient of the Outstanding Graduate Student Award, April 2014.*

*Recipient of the University of Utah Graduate Research Fellowship, 2015-2016.*

*Jason was also supported during January 2015 - May 2015 via research assistantship on the NSF-DMS Grant 1112984.*

First Job after Ph.D: Postdoctoral fellow at the Theoretical Division at Los Alamos National Laboratory (LANL).

R&D Staff Scientist 2 at the Theoretical Division at Los Alamos National Lab (LANL).

Patrick Bardsley (2012 - 2016, Ph.D advisor. Ph.D co-mentor: Fernando Guevara Vasquez), Ph.D. thesis “*Intensity-only imaging with waves, restarted inverse Born series, and the analysis of coarsening in polycrystalline materials*”.

*Recipient of Rushing Research Fellowship, April 2015. Recipient of Best MSTAT student of the year award, April 2016.*

First Job after Ph.D: Peter O’Donnell Postdoctoral Fellow at the Depart-



ment of Mathematics and Oden Institute for Computational Engineering & Sciences at the University of Texas Austin.

Currently: Machine Learning Engineer at Cirrus Logic.

- **Graduate student research project supervision:**

Elias Clark (Fall 2018 - Spring 2021, Advisor on the research project. Co-advisor: Lajos Horvath), research project “*Data-Driven Numerical Simulation and Modeling of Grain Growth in Polycrystalline Materials*”. *Elias was supported during August 2019 - May 2020 via research assistantship on the NSF-DMS Grant 1905463.*

- **Visiting Ph.D. Students:**

Gustav Ludvigsson and Simon Sticko, Spring 2017 (visiting from Uppsala University, Sweden)

- **Reading Course on Difference Potentials Method to Ph.D students:**

Qing Xia and Vera Babenko, Spring 2014

- **Postdoctoral Mentees:**

Chang (Kamala) Liu (Fall 2021 - present) “*Stochastic Models of Grain Growth and Structure-Preserving Numerical Algorithms.*”

Michael Medvinsky (Fall 2013 - Spring 2015), “*Difference Potentials Methods for the Elliptic Interface Problems in 2D.*”

Currently: Research Assistant Professor at the Department of Mathematics, North Carolina State University.

**Ph.D Committee Member:**

- Matthew Patrick, Ph.D student, Department of Applied Physics and Applied Mathematics with Materials Science and Engineering, Columbia University, 2021-present
- Curtis Miller, Ph.D student, Mathematics, Graduated 2020
- Hanlei Zhu, Ph.D student, Mathematics. Graduated 2019

- Erin Linebarger, Ph.D. student, Mathematics. Graduated 2019
- Tyler Johnson, Ph.D. student, Mathematics, 2017-2018
- Jing Ma, Ph.D. student, Physics, Graduated 2017
- Cheryl Zapata-Allegro, Ph.D. student, Mathematics, Graduated 2016
- Brent Kerby, Ph.D student, Mathematics, Graduated 2016
- Yeonjong Shin, Ph.D student, Mathematics, 2015-2016 (moved to Ohio State University)
- Joe Eason, Ph.D student, Mathematics, Graduated 2017
- Victor Camacho, Ph.D student, Mathematics, since 2014
- Predrag Krtolica, Ph.D student, Mathematics, Graduated 2015
- Mingfeng Qiu, Ph.D. student, Mechanical Engineering, May 2013 - May 2015 (moved to the University of British Columbia, Canada, graduated 2020)
- Michal Kordy, Ph.D student, Mathematics, Graduated 2014
- Brittany Bannish, Ph.D student, Mathematics, Graduated 2012
- **Visiting Professor (for more than a month):** Masashi Mizuno, Spring 2018 (visiting from Nihon University, Tokyo, Japan)

## LIST OF PUBLICATIONS:

### *Papers and Book Chapters:*

1. M. Patrick, G. Rohrer, O. Chirayutthanasak, S. Ratanaphan, E. Homer, G. Hart, Y. Epshteyn and K. Barnak, Relative Grain Boundary Energies from Triple Junction Geometry: Limitations to Assuming the Herring Condition in Nanocrystalline Thin Films, submitted, 2022
2. Y. Epshteyn, C. Liu, C. Liu and M. Mizuno, Local Well-Posedness of a Nonlinear Fokker-Planck Model, submitted, 2022

3. Y. Epshteyn, C. Liu, C. Liu and M. Mizuno, Nonlinear Inhomogeneous Fokker-Planck Models: Energetic-Variational Structures and Long Time Behavior, to appear, *Analysis and Applications*, 2022
4. Y. Epshteyn and T. Nguyen, Adaptive Central-Upwind Scheme on Triangular Grids for the Saint-Venant System, to appear, *Communications in Mathematical Sciences*, 2022
5. D. Dai, Y. Epshteyn and A. Narayan, Non-Dissipative and Structure-Preserving Emulators via Spherical Optimization, to appear, *Information and Inference: A Journal of the IMA*, 2022
6. Y. Epshteyn, C. Liu, and M. Mizuno, A Stochastic Model of Grain Boundary Dynamics: A Fokker-Planck Perspective, to appear, *Mathematical Models and Methods in Applied Sciences (M3AS)*, 2022
7. K. Barmak, A. Dunca, Y. Epshteyn, C. Liu, and M. Mizuno. Grain growth and the effect of different time scales, to appear, Springer AWM series volume "Research in the Mathematics of Materials Science", 2022
8. 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*, Volume 452, 1 March 2022
9. 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 (CMS)*, Vol. 19, No. 5, 1403-1428, 2021
10. 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 (SIMA)*, 53(3), 3072-3097, 2021
11. D. Dai, Y. Epshteyn and A. Narayan, Hyperbolicity-Preserving and Well-Balanced Stochastic Galerkin Method for Shallow Water Equations, *SIAM Journal on Scientific Computing (SISC)*, 43(2), A929-A952, 2021

12. Y. Epshteyn and Q. Xia, Difference Potentials Method for Models with Dynamic Boundary Conditions and Bulk-Surface Problems, *Advances in Computational Mathematics* 46, 67 2020, DOI: 10.1007/s10444-020-09798-8
13. Y. Epshteyn and Q. Xia, Efficient numerical algorithms based on difference potentials method for chemotaxis systems in 3D, *Journal of Scientific Computing*, July 2019, Volume 80, Issue 1, 26-59, DOI:10.1007/s10915-019-00928-z
14. 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 (2018) 213-236, DOI: 10.1016/j.jcp.2018.07.038
15. G. Ludvigsson, K. Steffen, S. Sticker, S. Wang, Q. Xia, Y. Epshteyn, and G. Kreiss, High-order numerical methods for 2D parabolic problems in single and composite domains, *Journal of Scientific Computing*, 2018, Volume 76, Issue 2, 812-847, DOI: 10.1007/s10915-017-0637-y
16. K. Steffen, Y. Epshteyn, J. Zhu, M. J. Bowler, J. W. Deming, and K. M. Golden, Network modeling of fluid transport through sea ice with entrained exopolymeric substances, *SIAM Journal on Multiscale Modeling and Simulation*, 16-1 (2018), 106-124, DOI: 10.1137/17M1117513  
*June 2019 Featured Article in SIAM Journal on Multiscale Modeling and Simulation*
17. A. Chertock, Y. Epshteyn, H. Hu and A. Kurganov, High-Order Positivity-Preserving Hybrid Finite-Volume-Finite-Difference Methods for Chemotaxis Systems, *Advances in Computational Mathematics*, February 2018, Volume 44, Issue 1, pp 327-350, DOI: 10.1007/s10444-017-9545-9
18. 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 Publish-

- ing), 28 (2017), 777-805, DOI 10.4171/RLM/785, 2017, (*Invited paper, Dedicated to the Memory of Prof. Ennio De Giorgi.*)
19. J. Albright, Y. Epshteyn, Q. Xia, High-Order Accurate Methods Based on Difference Potentials for 2D Parabolic Interface Models, *Communications in Mathematical Sciences*, Volume 15 (2017), Number 4, pages 985-1019, DOI: 10.4310/CMS.2017.v15.n4.a4
  20. J. Albright, Y. Epshteyn, M. Medvinsky and Q. Xia, High-order numerical schemes based on difference potentials for 2D elliptic problems with material interfaces, *Applied Numerical Mathematics*, Volume 111, January 2017, pages 64-91, DOI: 10.1016/j.apnum.2016.08.017
  21. S.K. Godunov, V.T. Zhukov, M.I. Lazarev, I.L. Sofronov, V.I. Turchaninov, A.S. Kholodov, S.V. Tsynkov, B.N. Chetverushkin and Y. Epshteyn, Viktor Solomonovich Ryaben'kii and his school (on his 90th birthday), *Uspekhi Mat. Nauk (Russian Math. Surveys)*, 70:6(426) (2015), 213-236
  22. *Refereed book chapter*: Y. Epshteyn and M. Medvinsky, On the Solution of the Elliptic Interface Problems by Difference Potentials Method, Springer Volume of Lecture Notes in Computational Science and Engineering (LNCSE) Series, Volume 106, pages 197-205, 2015
  23. Y. Epshteyn, I. Sofronov and S. Tsynkov, Professor V. S. Ryaben'kii. On the occasion of the 90th birthday, *Applied Numerical Mathematics (Editorial)*, Volume 93, July 2015, pages 1 - 2, DOI: 10.1016/j.apnum.2015.02.001
  24. J. Albright, Y. Epshteyn and K. Steffen, High-Order Accurate Difference Potentials Methods for Parabolic Problems, *Applied Numerical Mathematics, (Special Issue in Honor of Prof. Viktor Ryaben'kii 90th Birthday)*, Volume 93, July 2015, Pages 87-106, DOI: 10.1016/j.apnum.2014.08.002
  25. Y. Epshteyn and S. Phippen, High-Order Difference Potentials Methods for 1D Elliptic Type Models, *Applied Numerical Mathematics, (Special*

- Issue in Honor of Prof. Viktor Ryaben'kii 90th Birthday*), Volume 93, July 2015, Pages 69-86, DOI: 10.1016/j.apnum.2014.02.005
26. Y. Epshteyn, Algorithms Composition Approach based on Difference Potentials Method for Parabolic Problems, Communications in Mathematical Sciences, Volume 12 (2014), Number 4, pages 723 - 755
  27. *Refereed book chapter*: K.Barmak, E.Eggeling, M.Emelianenko, Y.Epshteyn, D.Kinderlehrer, R.Sharp and S. Ta'asan, A Theory and Challenges for Coarsening in Microstructure, Springer INdAM Series, "In Analysis and Numerics of Partial Differential Equations" in Memory of Enrico Magenes, 2013
  28. Y. Epshteyn, Upwind-Difference Potentials Method for Patlak-Keller-Segel Chemotaxis Model, Journal of Scientific Computing, Volume 53, Issue 3 (2012), Pages 689-713
  29. *The paper is selected by the editors of Physical Review B to be highlighted as an Editors' Suggestion and our work featured in Physics and SIAM News*:  
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
  30. 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 - Series A (DCDS-A), Volume 30, Issue 2, June 2011, 427-454, (*Invited Paper, Special Issue in Honor of Prof. Louis Nirenberg 85th Birthday.*)
  31. S. Bryson, Y. Epshteyn, A. Kurganov and G. Petrova, Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System, M2AN Math. Model. Numer. Anal., Volume 45, Issue 3, May 2011, 423-446
  32. *Refereed book chapter*: Scheme of Algorithms Composition for Problems in Composite Domains Based on Difference Potentials Method (with V.S.

- Ryaben’kii and V. Turchaninov), in V.S. Ryaben’kii, “Difference Potentials Method and its Applications”, Moscow, Russia, Fizmatlit 2010, Chapter 5, p. 290-311
33. K.Barmak, E.Eggeling, M.Emelianenko, Y.Epshteyn, D.Kinderlehrer and S. Ta’asan, Geometric Growth and Character Development in Large Metastable Networks, *Rendiconti di Matematica, Serie VII, Volume 29*, Roma 2009, 65-81
  34. Y. Epshteyn and A. Izmirliloglu, Fully Discrete Analysis of a Discontinuous Finite Element Method for the Keller-Segel Chemotaxis Model, *Journal of Scientific Computing*, Volume 40, Issue 1-3, 211-256, 2009
  35. B. Riviere, Y.Epshteyn, D.Swigon, Y.Vodovotz, A Simple Mathematical Model of Signaling Resulting from the Binding of Lipopolysaccharide with Toll-like Receptor 4 Demonstrates Inherent Preconditioning Behavior, *Mathematical Biosciences*, 217 (2009), no. 1, 19-26
  36. Y.Epshteyn and A.Kurganov  
New Interior Penalty Discontinuous Galerkin Methods for the Keller-Segel Chemotaxis Model, *SIAM Journal on Numerical Analysis*, 47 (2008/09), no. 1, 386-408
  37. Y. Epshteyn, and B. Rivière  
Analysis of hp Discontinuous Galerkin Methods for Incompressible Two-Phase Flow, *Journal of Computational and Applied Mathematics*, Volume 225, Issue 2, (2009), 487–509
  38. Y.Epshteyn  
Discontinuous Galerkin Methods for the Chemotaxis and Haptotaxis Models, *Journal of Computational and Applied Mathematics*, Volume 224, Issue 1, (2009), 168–181
  39. Y. Epshteyn, T. Khan and B. Rivière  
Inverse Problem in Optical Tomography Using Discontinuous Galerkin Method, *Mathematics and Computers in Simulation*, Volume 79, Issue 7, (2009), 1989–2000

40. Y.Epshteyn and B.Rivière  
Convergence of High Order Methods for Miscible Displacement, International Journal on Numerical Analysis and Modeling, 5 (2008), suppl., 47-63
41. Y. Epshteyn and B. Rivière  
Estimation of Penalty Parameters for Symmetric Interior Penalty Galerkin Methods, Journal of Computational and Applied Mathematics, Volume 206, Issue 2, p. 843-872, 2007
42. 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
43. Y. Epshteyn and B. Rivière  
On the Solution of Incompressible Two-Phase Flow by a p-version Discontinuous Galerkin Method, Communications in Numerical Methods in Engineering, Volume 22, Issue 7, p 741-751, 2006
44. A. Dunca and Y.Epshteyn  
On the Stolz-Adams Deconvolution Model for the Large-Eddy Simulation of Turbulent Flows, SIAM Journal on Mathematical Analysis, Volume 37, Issue 6, p 1890-1902, 2006
45. V.S. Ryaben'kii, V. Turchaninov and Y. Epshteyn  
Algorithm Composition Scheme for Problems in Composite Domains based on the Difference Potential Method, Computational Mathematics and Mathematical Physics, Volume 46, Issue 10, p 1768-1784, 2006  
(*translation from Russian*)
46. V.S. Ryaben'kii, V. Turchaninov and Y. Epshteyn  
The Numerical Example of Algorithms Composition for Solution of the Boundary-Value Problems on Compound Domain Based on Difference Potential Method, No.3, Moscow, Keldysh Institute for Applied Mathematics, Russia Academy of Sciences, 2003,



<http://library.keldysh.ru/preprint.asp?lg=e&id=2003-3>

(translation from Russian)

*Conference Proceedings:*

47. K.Barmak, E.Eggeling, M.Emelianenko, Y.Epshteyn, D.Kinderlehrer, R.Sharp and S. Ta'asan, Recent Developments in Material Microstructure: A theory of Coarsening, Mater. Res. Soc. Symp. Proc. Vol. 1753, 2015 Materials Research Society, DOI: 10.1557/opl.2015.591
48. K.Barmak, E.Eggeling, M.Emelianenko, Y.Epshteyn, D.Kinderlehrer, R.Sharp and S. Ta'asan, Materials Microstructures: Entropy and Curvature-Driven Coarsening, volume 1881, pages 71-91. RIMS, Research Institute for Mathematical Sciences, U. Kyoto, 2014. Also CNA report 13-CNA-003
49. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp and S. Ta'asan, Predictive Theory for the Grain Boundary Character Distribution, in the proceedings of "International Conference on Recrystallization and Grain Growth (REX GG 2010)", Vols 715-716, pp. 279-285, 2012
50. Y.Epshteyn, Upwind-Difference Potentials Method for Chemotaxis Models, proceedings of "European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012)", 2012
51. Y.Epshteyn, Recent Developments in the Numerical Methods for the Chemotaxis Models, Oberwolfach report 10/2012, p.10-12, the proceedings of the workshop "Theory and Applications of Discontinuous Galerkin Methods", Mathematisches Forschungsinstitut Oberwolfach, Germany February 19-25 2012
52. S. Bryson, Y.Epshteyn, A. Kurganov and G. Petrova, Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water Equations, The American Institute of Physics (AIP) Conference Series, Volume 1389, Issue 1, pp. 686-689, 2011

53. Y.Epshteyn, B. Rivière, D. Swigon, Y. Vodovotz  
 A Simple Mathematical Model of Lipopolysaccharide Signaling Through Toll-Like Receptor 4 Results in Complex Insights on Preconditioning, Journal of Critical Care, Volume 22, Issue 4, 2007, in the proceedings of Conference "6th International Conference on Complexity in Acute Illness"
54. Y.Epshteyn and B.Rivière  
 Fully Implicit Discontinuous Galerkin Scheme for Two-Phase Flow, in the proceedings of MSRI Conference "The Legacy of Ladyzhenskaya and Oleinik", p.125-128, 2006

#### **IN PREPARATION:**

- Dihan Dai, Yekaterina Epshteyn, and Akil Narayan, Projection-Based Hyperbolicity-Preserving Numerical Schemes for Stochastic Galerkin System of Shallow Water Equations, in progress, 2022
- Dihan Dai, Yekaterina Epshteyn, and Akil Narayan, Energy Stable Scheme for Stochastic Galerkin System of Shallow Water Equations, in progress, 2022
- Yekaterina Epshteyn, Chang Liu, Chun Liu and Masashi Mizuno, Fokker-Planck Models: Analysis and Numerics, in progress, 2022

#### **INVITED SEMINARS AND COLLOQUIUM TALKS:**

1. "Numerical Methods for Shallow Water Models", Numerical Analysis Seminar, KTH, Sweden, May 2022
2. "Grain Structure, Grain Growth and Evolution of the Grain Boundary Network", University of Minnesota, March 2022
3. "Numerical Methods for Shallow Water Models", Old Dominion University, February 2021.

4. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network in Polycrystalline Materials: Theory, Simulations and Experiments”, University of Nebraska-Lincoln, October 2020.
5. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network in Polycrystalline Materials: Theory, Simulations and Experiments”, Department of Mathematics and Statistics University of Massachusetts Amherst, July 2020.
6. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, Department of Mathematics, Applied Mathematics Seminar, University of Utah, November 2019.
7. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, Department of Mathematics, Nihon University, Tokyo, Japan, October 2019.
8. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, Department of Applied Physics and Applied Mathematics, Columbia University, April 2019.
9. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, Department of Applied Mathematics, Illinois Institute of Technology, March 2019.
10. “Polycrystalline Materials and Evolution of Grain Boundaries Network”, Los Alamos National Laboratory (LANL), December 2018.
11. “Coarsening in Polycrystalline Materials and the Grain Boundary Character Distribution” Penn State, April 2017.
12. “Microstructure, Coarsening, and the Grain Boundary Character Distribution”, Penn State, April 2017.
13. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System”, Uppsala University, Sweden, August 2016.

14. “Coarsening in Polycrystalline Materials and the Grain Boundary Character Distribution”, Imperial College London, UK, October 2015.
15. “High-Order Accurate Numerical Methods for Elliptic and Parabolic Interface Problems”, Towson University, May 2015.
16. “Difference Potentials Method and Applications”, talk to REU students in Computational Mathematics, Brown University, June 2014.
17. “Difference Potentials Method and its Applications to Interface/Composite Domain Problems”, Rice University, April 2014.
18. “Difference Potentials Method and its Applications to Composite Domains Problems and to Chemotaxis Models in Biology”, Uppsala University, Department of Information Technology, Sweden, August 2013.
19. “Numerical Methods for Chemotaxis Models”, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, April 2012.
20. “Polycrystalline Microstructures, Critical Events, Entropy and the Grain Boundary Character Distribution”, Department of Mathematics, University of Pittsburgh, December 2011.
21. “Microstructure, Critical Events, Entropy and the Grain Boundary Character Distribution”, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, November 2011.
22. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, Center for Nonlinear Analysis (CNA) seminar, Carnegie Mellon University, October 2010.
23. “Theory for the Grain Boundary Character Distribution”, Dept. of Mathematics, University of Utah, February 2010.
24. “Chemotaxis and Numerical Methods for Chemotaxis Models”, Dept. of Mathematics, University of Utah, February 2010.

25. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Applied and Computational Mathematics, Southern Methodist University, February 2010.
26. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, University of Arizona, February 2010.
27. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, Temple University, January 2010.
28. "Chemotaxis and Numerical Methods for Chemotaxis Models", Sandia National Laboratory, January 2010.
29. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, Georgia Tech, January 2010.
30. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, Statistics and Computer Science, University of Illinois, Chicago, January 2010.
31. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics and Statistics, McGill University, Canada, January 2010.
32. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Applied Mathematics, University of Colorado Boulder, November 2009.
33. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, University of Maryland College Park, October 2009.
34. "Chemotaxis and Numerical Methods for Chemotaxis Models", Dept. of Mathematics, Iowa State University, October 2009.
35. "Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System", Dept. of Mathematics, University of Pittsburgh, April 2009.
36. "The Method of Difference Potentials and Application to the Domain Decomposition Problem", Dept. of Mathematics, Tulane University, March 2009.

37. “Mathematical modeling and simulations with applications to flow in porous media, biomedical problems and grain growth in complex materials”, Material Science Seminar, Carnegie Mellon University, April 2008.
38. “New Discontinuous Galerkin Methods for the Chemotaxis Model and Related Biomedical Problems”, Department of Mathematics, George Mason University, February 2008.
39. “Discontinuous Galerkin Methods for Chemotaxis and Haptotaxis Models”, CNA seminar, Department of Mathematical Sciences, Carnegie Mellon University, November 2007.
40. “New Discontinuous Galerkin Methods for Chemotaxis and Haptotaxis Models”, Department of Mathematics, University of Pittsburgh, October 2007.
41. “hp Discontinuous Galerkin Finite Element Methods for Two-Phase Flow Models in Porous Media”, Dept. of Applied Mathematics and Physics, Columbia University, January 2007.
42. “hp Discontinuous Galerkin Finite Element Methods for Two-Phase Flow Models in Porous Media”, Dept. of Mathematics, University of Arizona, January 2007.
43. “hp Discontinuous Galerkin Finite Element Methods for Two-Phase Flow Models in Porous Media”, Dept. of Mathematics, University of Tennessee, January 2007.
44. “hp Discontinuous Galerkin Finite Element Methods for Two-Phase Flow Models in Porous Media”, Lawrence Berkeley National Laboratory, January 2007.
45. “hp Discontinuous Galerkin Finite Element Methods for Two-Phase Flow Models in Porous Media”, Dept. of Mathematics, Michigan State University, December 2006.

### **SEMINARS TALKS:**

1. “Shallow Water Models: From Ocean Waves to Bathtub Waves”, Mathematics Undergraduate Colloquium, University of Utah, April 2013.
2. “Numerical Scheme for Saint-Venant System of Shallow Water Equations”, Biofluids and Biogels seminar, Department of Mathematics, University of Utah, April 2012.
3. “Numerical Methods for Chemotaxis Models”, ERD (Early Research Directions) seminar, Department of Mathematics, University of Utah, April 2011.
4. “hp-DG Finite Element Methods for Incompressible Two-Phase Flow Models in Porous Media”, Dept. of Mathematics, University of Pittsburgh, October 2006.
5. “Symmetric Interior Penalty Galerkin methods for elliptic problems” , Dept. of Mathematics, University of Pittsburgh, February 2006.
6. “High Order Discretization of the Multiphase Flow”, Dept. of Mathematics, University of Pittsburgh, April 2005.
7. “Difference Potentials Method for domain decomposition”, Dept. of Mathematics, University of Pittsburgh, November 2002.

### **CONFERENCES TALKS:**

1. “Dynamics of Grain Boundaries in Polycrystals: Modeling, Analysis, Simulation and Experiments”, SIAM Annual Meeting, Pittsburgh, invited talk, July 2022
2. “Recent Advances in Modeling, Analysis and Simulation of Grain Growth in Polycrystalline Materials”, SIAM Annual Meeting, NSF-SIAM mini-symposium, Pittsburgh, invited talk, July 2022

3. “Microstructure by Design: Integrating Grain Growth Experiments, Data Analytics, Simulation and Theory”, MGI PI Meeting, College Park, Maryland, June 2022, invited poster presentation and participation jointly with Katayun Barmak, Chun Liu and Jeffrey Rickman.
4. “Numerical Methods for Shallow Water Models”, BIRS-CMO Workshop, Oaxaca, August 2021, invited talk and participation (online due to COVID-19).
5. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, SIAM Conference on Mathematical Aspects of Materials Science, Bilbao, Spain, May 2021, invited talk (given virtually due to COVID-19).
6. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network in Polycrystalline Materials: Theory, Simulation and Experiments”, 14th World Congress in Computational Mechanics and ECCOMAS Congress, Paris, France, January 2021, invited talk (given virtually due to COVID-19).
7. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network in Polycrystalline Materials: Theory and Simulation”, NSF-SIAM Minisymposium on the NSF Program “Designing Materials to Revolutionize and Engineer our Future” (NSF DMREF), SIAM Annual Meeting, Toronto, July 2020, invited talk (given virtually due to COVID-19).
8. “Grain Growth in Polycrystalline Materials”, AWM Minisymposium, SIAM Annual Meeting, Toronto, July 2020, invited talk (given virtually due to COVID-19).
9. “Grain Structure, Grain Growth and Evolution of the Grain Boundary Network”, JMM 2020, Denver, January 2020, invited talk.
10. “Dynamics of Grain Boundaries with Evolving Lattice Orientations and Triple Junctions”, given by collaborator Masashi Mizuno, SIAM Confer-



- ence on Analysis of Partial Differential Equations (SIAM-APDE 2019), California, December 2019, invited talk.
11. “High-Resolution Central-Upwind Schemes on Unstructured Meshes for Shallow Water Models”, (unfortunately could not attend due to time conflict with my final exams schedule), SIAM Conference on Analysis of Partial Differential Equations (SIAM-APDE 2019), California, December 2019, invited talk.
  12. “Polycrystalline Materials and Evolution of the Grain Boundary Network: Modeling, Analysis and Simulation”, International Congress on Industrial and Applied Mathematics, ICIAM 2019, Valencia, Spain, July 15 - July 19, 2019, invited talk.
  13. “High-Resolution Central-Upwind Scheme on Unstructured Meshes for Shallow Water Models”, International Congress on Industrial and Applied Mathematics, ICIAM 2019, Valencia, Spain, July 15 - July 19, 2019, invited talk.
  14. “Well-Balanced Positivity Preserving Central-Upwind Scheme with a Novel Wet/Dry Reconstruction on Triangular Grids for the Saint-Venant System”, SIAM Central States Section, The University of Oklahoma, October 5 - October 7, 2018, invited talk.
  15. “Well-Balanced Positivity Preserving Central-Upwind Scheme with a Novel Wet/Dry Reconstruction on Triangular Grids for the Saint-Venant System”, BIRS-CMO Workshop, Oaxaca, July/August 2018, invited participation and talk (could not attend due to schedule conflict).
  16. “Polycrystalline Materials and Evolution of Grain Boundaries Network”, SIAM Annual Meeting/SIAM Mathematical Aspects of Materials Science, Portland, OR, July 2018, invited talk.
  17. “Polycrystalline Materials and Evolution of Grain Boundaries Network.”, AMS Spring Western Sectional Meeting, Portland, OR, April 2018, invited talk.

18. “High-Order Accurate Numerical Methods for Elliptic and Parabolic Interface Models”, Banff International Research Station, Banff, Canada, June 2017, invited participation and talk.
19. “High-Order Accurate Numerical Methods for Elliptic and Parabolic Interface Models”, Institute Mittag-Leffler, Stockholm, Sweden, May 2017, invited participation and talk.
20. “Numerical Methods for the Chemotaxis Models”, SIAM Conference on Computational Science and Engineering, SIAM CSE, February 2017, invited talk.
21. “Numerical Methods for the Chemotaxis Models”, 11th AIMS Conference in Orlando, Florida, July, 2016, invited talk.
22. “Grain Boundary Character Distribution and Mass Transport Paradigm”, SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, May 2016, invited talk.
23. “Grain Boundary Character Distribution and Mass Transport Paradigm”, “Prairie Analysis Seminar 2015”, Kansas State University, September 2015, invited main speaker.
24. “Difference Potentials Method for Interface/Composite Domain Problems”, “International Congress on Industrial and Applied Mathematics” ICIAM 2015, Beijing, China, August 10-14 2015, invited talk.
25. “High-Order Accurate Numerical Methods for Elliptic and Parabolic Interface Problems”, SIAM CSE 2015, Salt Lake City, March 2015, invited talk.
26. Conference “Pacific Northwest Numerical Analysis Seminar (PNWNAS)”, Portland State University, October 18, 2014, invited speaker.
27. “Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water Equations”, at “IMA Hot Topics Workshop: Impact of Waves Along Coastlines”, IMA, Minneapolis, October 14-17 2014, invited speaker.

28. “A Theory and Challenges for Coarsening in Microstructure”, International Conference “Continuum Models Discrete Systems” CMDS-13, Salt Lake City, July 2014, invited talk.
29. “High-Order Accurate Difference Potentials Approach for Variable Coefficient Parabolic Interface Problems”, Conference “International Conference on Spectral and High Order Methods” ICOSAHOM 2014, Salt Lake City, UT, June 2014, invited talk given by Jason Albright about our joint work.
30. “Difference Potentials Methods for Elliptic and Parabolic Problems with Variable Coefficients”, Conference ICOSAHOM 2014, Salt Lake City, UT, June 2014, invited talk given by Kyle R. Steffen about our joint work.
31. “A Theory and Challenges for Coarsening in Microstructure”, Ki-Net Conference in Honor of Prof. Eitan Tadmor’s 60th Birthday “Collective Behavior: Macroscopic versus Kinetic Descriptions”, London, UK, May 2014, contributed talk.
32. Invited Guest Lecturer (gave 3 lectures) “Chemotaxis Models and Numerical Methods for Chemotaxis and Related Models”, at 2013 Summer Graduate Program of the Institute for Mathematics and its Applications (IMA): “Flow, Geometric Motion, Deformation and Mass Transport in Physiological Processes”, July 15 - August 2, 2013.
33. “Algorithms Composition Approach Based on Difference Potentials Method”, SIAM Annual Meeting 2013, San Diego, CA, July 2013, invited talk.
34. “Algorithms Composition Approach Based on Difference Potentials Method”, at International Conference “Difference Schemes and Applications” in Honor of 90th Birthday of Prof. Viktor Ryaben’kii, Moscow, Russia, May 27-31 2013, invited plenary speaker.

35. “Algorithms Composition Approach Based on Difference Potentials Method”, AWM Research Symposium 2013, Santa Clara University, CA, March 2013, invited talk and participation.
36. Ki-Net Workshop “Transport Models for Collective Dynamics in Biological Systems”, January, 2013, North Carolina State University, invited participation.
37. “Numerical Methods for Shallow Water Models”, December, 2012, Frontiers in Computational Physics, Boulder, contributed talk.
38. “Microstructure, Coarsening, Entropy and the Grain Boundary Character Distribution”, at the UCLA Workshop: Mesoscale and Continuum Scale Modeling of Materials Defects, UCLA, November 13 - November 16 2012, invited speaker.
39. “Upwind-Difference Potentials Method for Chemotaxis Models”, “European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012)”, September 2012, Vienna, Austria, invited talk.
40. “Numerical Methods for Shallow Water Models”, July 11, 2012, SIAM Annual Meeting, Minneapolis, invited talk.
41. “Upwind-Difference Potentials Method for Patlak-Keller-Segel Chemotaxis Model”, Midwest Numerical Analysis Days, May 12 - 13, 2012, University of Notre Dame, talk and invited participation (chair of the session).
42. “Recent Developments in Numerical Methods for the Chemotaxis Models”, Meeting at Mathematisches Forschungsinstitut Oberwolfach on Theory and Applications of Discontinuous Galerkin Methods, February 19-25, 2012, Oberwolfach, Germany, invited talk and invited participation.
43. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, AMS West-

- ern Section Meeting, October 2011, University of Utah, Salt Lake City, invited talk.
44. “On the Stolz-Adams Deconvolution Model for the Large-Eddy Simulation of Turbulent Flows”, CNA Conference “Incompressible Fluids, Turbulence and Mixing” In honor of Prof. Peter Constantin’s 60th birthday October 13-16, 2011, Pittsburgh, contributed talk.
  45. “An Entropy Based Theory of the Grain Boundary Character Distribution”, SES 2011, October 2011, Northwestern University, Evanston, invited talk.
  46. “Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water Equation”, ICNAAM 2011, September 2011, Halkidiki, Greece, invited talk.
  47. “Numerical Methods for the Classical Patlak-Keller-Segel Chemotaxis Model”, ICIAM 2011, July 18 - July 22 2011, Vancouver, Canada, invited talk.
  48. “On the Stolz-Adams Deconvolution Model for the Large-Eddy Simulation of Turbulent Flows”, ICIAM 2011, July 18 - July 22 2011, Vancouver, Canada, invited talk.
  49. “An Entropy Based Theory of the Grain Boundary Character Distribution”, CNA Workshop on Macroscopic Modeling of Materials with Fine Structure, May 26 - May 28 2011, Carnegie Mellon University, Pittsburgh, invited participation and contributed talk.
  50. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, Modeling and Computations of Shallow-Water Coastal Flows, CSCAMM Workshop, University of Maryland College Park, October 18-October 22 2010.
  51. “Numerical Methods for Chemotaxis Models”, SIAM Conference on Non-linear Waves and Coherent Structures, Philadelphia, August 16 - August 19, 2010, invited talk.

52. “hp Primal Discontinuous Galerkin Methods For Two-Phase Flow in Porous Media”, SIAM Annual Meeting, July 12-July 16 2010, Pittsburgh, invited talk.
53. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, SIAM Annual Meeting, July 12-July 16 2010, Pittsburgh, invited talk.
54. ”Theory for the Grain Boundary Character Distribution”, SIAM Annual Meeting, July 12-July 16 2010, Pittsburgh, invited talk.
55. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, May 24-May 26 2010, Conference ”Computational and Mathematical Methods in Science and Engineering (CMMSE2010)”, University of Wisconsin-Madison, invited talk.
56. “Predictive Theory for the Grain Boundary Character Distribution”, SIAM Conference on Mathematical Aspects of Materials Science, May 22-May 26 2010, Philadelphia, invited talk.
57. “Well-Balanced Positivity Preserving Central-Upwind Scheme on Triangular Grids for the Saint-Venant System of Shallow Water”, USNCCM 10, July 16-July 19 2009, Columbus, invited talk and poster presentation.
58. “Chemotaxis and Numerical Methods for Chemotaxis Models”, Multi-scale Analysis of Self-Organization in Biology workshop, Banff International Research Station, Canada, July 12-17, 2009, invited participation and poster presentation.
59. “Chemotaxis and Numerical Methods for Chemotaxis Models”, MAFE-LAP, Brunel University, UK, June 8-12, 2009, invited talk.
60. “Discontinuous Galerkin Methods for the Chemotaxis Model and Closely Related Biomedical Problems”, SIAM Annual Meeting, San Diego, July 7-11, 2008, invited talk.

61. “Discontinuous Galerkin Methods for the Chemotaxis Model and Closely Related Biomedical Problems”, World Congress on Computational Mechanics (WCCM 8 - ECCOMAS 5), Venice, Italy, June 30 - July 4, 2008, invited talk.
62. “Discontinuous Galerkin Methods for the Chemotaxis Model and Closely Related Biomedical Problems”, conference “Frontiers in Applied and Computational Mathematics”, New Jersey Institute of Technology, May 19-21, 2008, contributed talk.
63. “DG Methods for Chemotaxis and Haptotaxis Models”, Conference “Finite Element Circus”, Cornell University, October 2007.
64. “A Simple Mathematical Model of Lipopolysaccharide Signaling Through Toll-Like Receptor 4 Results in Complex Insights on Preconditioning”, Conference “6th International Conference on Complexity in Acute Illness”, Los Angeles, October 2007, invited poster presentation.
65. ” hp Primal Discontinuous Galerkin Methods For Two-Phase Flow in Porous Media ”, Conference “Modeling, Analysis and Simulation of Multiscale Nonlinear Systems”, Oregon State University, June 2007, invited talk.
66. “hp Primal Discontinuous Galerkin Methods For Two-Phase Flow”, Conference “14th International Conference on Finite Element Methods for Flow Problem”, Santa Fe, March 2007, invited talk.
67. “High Order Fully Coupled Discontinuous Finite Element Methods for Two-Phase Flow”, Conference “AWM Workshop at the Joint Mathematical Meetings (JMM)”, New Orleans, January 2007, invited poster presentation.
68. “hp Discontinuous Galerkin FEM for Incompressible Two-Phase Flow Problems in Porous Media ”, Conference “Finite Element Circus”, Penn State, November 2006.

69. “High Order Fully Implicit Method For Two-Phase Flow”, Conference “Seventh World Congress on Computational Mechanics”, Los Angeles, July 2006, invited talk.
70. “Adaptive and implicit high order methods for two-phase flow”, Conference “SIAM Annual Meeting”, Boston, July 2006, invited talk
71. “Application Of Interior Penalty Galerkin Method to Inverse Problem”, Conference ” SIAM Annual Meeting”, Boston, July 2006, invited talk.
72. “On The Choice Of The Penalty Parameters For Symmetric Interior Penalty Galerkin Method”, Conference MAFELAP, Brunel University, UK, June 2006, invited talk.
73. “Fully Implicit Discontinuous Finite Element Method for Two-Phase Flow” , MSRI Conference “The Legacy of Ladyzhenskaya and Oleinik “, University of California, Berkeley, May 2006, invited poster presentation.
74. “Stable Interior Penalty Galerkin Methods for elliptic problems” , Conference “Finite Element Circus”, UMBC, March 2006.
75. “Adams-Stolz Deconvolution LES Models”, Conference “Frontiers of Applied Analysis”, Carnegie Mellon University, September 2005, contributed talk.
76. “Fully Implicit Scheme for the Two-Phase Flow”, Conference “Finite Element Circus”, University of Delaware, April 2005.

**OTHER CONFERENCES ATTENDED:**

1. 2010 CNA Summer School : New Vistas in Image Processing and PDEs, June 2010, Carnegie Mellon University
2. “Frontiers in Mathematical Biology”, April 2010, University of Maryland College Park
3. “Mathematics of Multiscale Phenomena”, 2008 Summer School, Free University of Berlin, Berlin, September 2008, invited participant



4. Center for Nonlinear Analysis 2008 Summer School - Contemporary Topics in Nonlinear PDEs.
5. Conference “Finite Element Circus”, University of Pittsburgh, May 2004.
6. Conference “Finite Element Circus”, Penn State, October 2002.

### **TEACHING EXPERIENCE:**

#### *University of Utah:*

- Instructor, Undergraduate/Graduate Course, Introduction to Partial Differential Equations, Math 5440-6850, Fall 2022
- Instructor, Undergraduate Course, Calculus III, Math 2210, Fall 2022
- Instructor, Numerical Solutions of Partial Differential Equations: Selected Numerical Methods, Math 6630, Spring 2022 (6 students)
- Instructor, REU-Undergraduate Course, Selected Numerical Algorithms and their Analysis, Math 4800, Spring 2022 (8 students)
- Instructor, Graduate Course, Analysis of Numerical Methods I, Math 6610, Fall 2021 (8 students)
- Instructor, Graduate Course, Analysis of Numerical Methods II, Math 6620, Spring 2021 (7 students)
- Instructor, Undergraduate Course, Calculus III, Math 2210, Fall 2020 (73 students)
- Instructor, Undergraduate/Graduate Course, Introduction to Partial Differential Equations, Math 5440-6850, Fall 2020 (13 students)
- Instructor, Graduate Course, Numerical Solutions of PDE: Finite Element Methods (FEM), Math 6630, Spring 2020 (4 students)
- Instructor, Undergraduate/Graduate Course, Introduction to Partial Differential Equations, Math 5440-6850, Fall 2019 (16 students)

- Instructor, Calculus III, Math 2210-004, Fall 2019 (57 students)
- Instructor, Graduate Course, Analysis of Numerical Methods II, Math 6620, Spring 2019 (9 students)
- Instructor, Graduate Course, Analysis of Numerical Methods I, Math 6610, Fall 2018 (8 students)
- Instructor, Undergraduate/Graduate Course, Introduction to Partial Differential Equations, Math 5440-6850, Fall 2018 (15 students)
- Instructor, Graduate Course, Numerical Methods for PDE: FEM, Math 6630, Spring 2018 (8 students)
- Instructor, Two Undergraduate Courses, Calculus III, Math 2210-002 and Math 2210-004, Fall 2017 (138 students)
- Instructor, Graduate Course: Analysis of Numerical Methods II, Spring 2017, (9 students)
- Instructor, Graduate Course: Analysis of Numerical Methods I, Fall 2016 (11 students)
- Instructor, Undergraduate Course, Accelerated Engineering Calculus I, Math 1311-001, Fall 2016 (20 students)
- Instructor, Two Undergraduate Courses, Engineering Calculus II, Math 1320-006 and Math 1320-009, Spring 2016 (80 students)
- Instructor, Graduate Course: Selected Topics in Numerical Methods for PDE, Math 7875, Fall 2015 (6 students)
- Instructor, Graduate Course: Analysis of Numerical Methods II, Math 6620, Spring 2015 (17 students)
- Instructor, Undergraduate Course, Accelerated Engineering Calculus I, Fall 2014

- Instructor, Graduate Course: Analysis of Numerical Methods I, Math 6610 Fall 2014
- Instructor, REU Course, Math 4800: Undergraduate Research in Mathematics: “Selected Numerical Algorithms and Their Analysis”. The course successfully introduced 10 REU students to the research in modern Computational Mathematics, Spring 2014:  
<http://www.math.utah.edu/newsletter/aftermath/2014-04.pdf>, page 3.
- Instructor, Upper Level Undergraduate Course, Introduction to Numerical Analysis II, Spring 2014
- Instructor, Undergraduate Course, Accelerated Engineering Calculus I, Fall 2013
- Instructor, Graduate Course: Numerical Methods for Partial Differential Equations, Spring 2013
- Instructor (and I designed the modeling course for the Case Studies CES), Graduate Course: “Mathematics and Materials” (March 2012)
- Instructor, Upper Level Undergraduate/Graduate Course: Optimization, Fall 2012
- Instructor, Graduate Course: Analysis of Numerical Methods I - II (Fall 2011- Spring 2012)
- Instructor, Graduate Course: Analysis of Numerical Methods I-II (Fall 2010-Spring 2011)  
*Carnegie Mellon University:*
- Instructor: Calculus for Humanities Students I (Fall 2007)
- Instructor: Integration and Differential Equations (Spring 2008 - Fall 2008)
- Instructor: Numerical Methods (Spring 2009 - Fall 2009)

- Instructor, Graduate Course: Numerical Methods for PDE: Finite Difference and Finite Volume Methods (Spring 2010)

*University of Pittsburgh:*

- Instructor: Calculus 1 (Summer 2005)
- Teaching Assistant: Calculus 1, 2 (Spring 2004, 2005-2006)

### **PROFESSIONAL ACTIVITIES:**

- Member, Nominating Committee for the SIAM Activity Group on Analysis of Partial Differential Equations (SIAG-APDE), 2020
- SIAG Officer, Leadership of SIAM Mathematical Aspects of Materials Science Activity Group (SIAG/MS), 01/2019 - 12/2020, (*Elected by SIAG/MS Members*)
- Member, SIAM Committee on Programs and Conferences, SIAM, 2016-2022 (*Appointed by the SIAM President*)
- Invited Organizer, NSF-SIAM Minisymposium on the NSF Program “Designing Materials to Revolutionize and Engineer our Future” (NSF DMREF), SIAM Annual Meeting, Pittsburgh, July 2022
- Co-organizer of the conference, AMS Fall Western Sectional Meeting, Salt Lake City, UT, October 2022 (postponed to Fall 2022 due to COVID-19)
- Co-organizer, WCCM Mini-Symposium “New Developments in Polycrystalline Microstructures” at 14th World Congress in Computational Mechanics and ECCOMAS Congress, Paris, France, July 2020 (3 sessions) - now January 2021 (online)
- Co-organizer, SIAM Mini-Symposium “Polycrystalline Microstructures: Recent Advances and New Trends” at SIAM Conference on the Mathematical Aspects of Materials Science, Bilbao, Spain, May 2020 (3 sessions) (due to COVID-19 the conference and the mini-symposium took place virtually in May 2021 instead)

- Invited Organizer, SIAM Special Session at JMM 2020 on “Recent Advances and New Trends in Modeling and Simulation of Systems with Multiple Scales, Coupled Phenomena and Interfaces”, Denver, Colorado, January 2020
- Project Leader, Women in Mathematics of Materials (WIMM) Workshop, University of Michigan, Ann Arbor, MI, May 14-May 18 2018
- Co-organizer of Special Session on “Modeling, Analysis, and Simulation of PDEs with Multiple Scales, Interfaces, and Coupled Phenomena”, at AMS Spring Western Sectional Meeting, Portland State University, Portland, OR April 14-15, 2018
- Co-organizer, AWM Research Symposium, UCLA, April 8-9, 2017
- Co-organizer of the International Conference “Topics in Applied Nonlinear Analysis: Recent Advances and New Trends”, Conference in honor of David Kinderlehrer’s 75th birthday, Carnegie Mellon University, July 18-20 2016. *The conference was very successful and stimulated extensive interdisciplinary research discussions and collaborations:*  
<https://www.math.cmu.edu/CNA/kinderlehrer75/>
- Co-organizer of “CMDS Investigators Workshop: At the Frontiers of Computation and Materials”, Snowbird, Utah, USA, May 16, 2015
- Co-organizer of the Mini-symposium “Embedded Boundary and Interface Techniques” at SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, March 2015
- Invited Co-organizer of the Career Panel mini-symposium at AWM Workshop at SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, March 2015
- Invited Co-Mentor, “WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations”, IMA Special Workshop, Minneapolis, August 11-15 2014.

- Co-organizer of the CMDS 2014: International Conference, Continuum Models Discrete Systems, Salt Lake City, July 21 - 25 2014, about 80 participants. *The conference was very successful and stimulated extensive interdisciplinary research discussions and collaborations*
- Co-organizer of the ICOSAHOM 2014: International Conference on Spectral and High Order Methods, Salt Lake City, June 23 - 27 2014, about 300 participants. *The conference was a great success and stimulated extensive interdisciplinary research discussions and collaborations*
- Mini-symposium co-organizer “Recent Developments in Numerical Methods for PDEs”, SIAM Annual Meeting 2013, 4-sessions, July 2013
- Member of the program committee “Flow and Transport: Computational Challenges” - An International Workshop in conjunction with the International Conference on Computational Science, Tsukuba, Japan, June 2011
- Mini-symposium co-organizer “Theoretical and Computational Aspects of Discontinuous Galerkin Methods”, MAFELAP June 8-12, 2009
- CNA working group co-organizer “Recent Advances in Analysis and Approximation of Fluids”, Carnegie Mellon University, Fall 2009
- Reviewer and panelist, American Association of University Women (AAUW) Fellowships and Grants, 2018-2022
- NSF panelist and reviewer since 2015
- Reviewer for Army and the University of Utah Seed Grant
- Reviewer for EPSRC, UK
- Reviewer for Polish National Science Centre/Foundation
- Reviewer for Tenure and Promotion

- Invited External Reviewer for the position of Associate Senior Lecturer in Scientific Computing, Sweden, Uppsala University, Department of Information Technology, Fall 2013 - May 2014
- Guest Editor, Applied Numerical Mathematics, APNUM, 2013-2014
- Refereeing for: Archive for Rational Mechanics and Analysis, Springer US, SIAM Journal on Applied Mathematics, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, Mathematics of Computation, Numerische Mathematik, Journal of Computational and Applied Mathematics, Journal of Computational Mathematics, Journal of Mathematical Analysis and Applications, Journal of Numerical Mathematics, Computer Methods in Applied Mechanics and Engineering, Continuum Mechanics and Thermodynamics, Applied Numerical Mathematics, Journal of Scientific Computing, Journal of Computational Physics, Proceedings of the Royal Society A, Applied Mathematics and Computations, International Journal on Numerical Analysis and Modeling, Computers & Fluids, Scripta Materialia

**SERVICE:**

- Chair of the Faculty Awards Committee, Department of Mathematics, University of Utah, 2020 - present
- Member of the Faculty Undergraduate Teaching Award Committee, Department of Mathematics, University of Utah, 2021 - present
- Member of the RPT Committee, Department of Mathematics, 2022 - present
- Member of the Graduate Recruitment Committee, Department of Mathematics, July 2022 - present
- Member of the Undergraduate Curriculum Committee, Department of Mathematics, University of Utah, 2021 - 2022

- Member of the Graduate Committee, Department of Mathematics, University of Utah, 2020 - 2021
- Member of the Hiring Committee, Department of Mathematics, University of Utah, 2019 - 2020
- Member of the Development Committee, Department of Mathematics, University of Utah, 2018 - 2021
- Member of the Warnock Chair Committee, Department of Mathematics, University of Utah, 2019 - present
- Elected Member of the College of Science Council, University of Utah, 2019 - 2021
- Member of the Library Committee, Department of Mathematics, University of Utah, 2018 - 2019
- Member of the Senate Advisory Committee on Diversity, University of Utah, 2016 - 2020
- Elected Member of the Academic Senate, University of Utah, 2015 - 2018
- Elected Member of the College of Science Council, University of Utah, 2014 - 2016
- Elected Member of the Executive Committee, Department of Mathematics, University of Utah, 2015 - 2017
- Member of the Graduate Committee, Department of Mathematics, University of Utah, Fall 2011 - Fall 2017  
 Graduate Recruitment Committee, July 2017 - July 2018  
 Chair of the Graduate Recruitment Committee, July 2014 - July 2015
- Organizer of the Department Applied Mathematics Seminar, Department of Mathematics, University of Utah, Summer 2013 - present
- Co-Chair of the Department Colloquium, Department of Mathematics, University of Utah, Fall 2010 - Spring 2011



## **EXTRACURRICULAR AND OUTREACH ACTIVITIES:**

- Judge, Semi-Finals of Sterling Scholar Competition for High-School Students in Utah, <http://www.sterlingscholar.org/>, February 2019
- Invited presentations, Access Course, June 2018, June 2019
- Instructor, Access Course, August 1 - August 5, 2016  
<http://www.math.utah.edu/newsletter/aftermath/2016-10.pdf>, p.8
- Participated in Project Youth and gave lectures about Applied Mathematics to 6-th graders from Title I local schools in Salt Lake City, University of Utah
- Together with F. Guevara-Vasquez created and maintain website for MAC group: Multiscale Analysis and Computations Group, Mathematics Department, University of Utah, 2013-current
- Affiliated faculty, AWM chapter, Mathematics Department, University of Utah

## **COMPUTER SKILLS:**

- Languages: Fortran, C, C++.
- Software: L<sup>A</sup>T<sub>E</sub>X, Matlab, Mathematica, Tecplot, Paraview, Word, Excel.
- Operating Systems: UNIX, Linux, Windows

## **PROFESSIONAL AND SOCIETY MEMBERSHIPS:**

- Member of the Society for Industrial and Applied Mathematics , Member of SIAG/APDE, Member of SIAG/MS and Member of SIAG/GS
- Member of Women in Mathematics of Materials (WIMM) and Member of Women in Numerical Analysis and Scientific Computing (WINASc)