Maria Emelianenko

CONTACT INFORMATION

Exploratory Hall, Room 4454
Department of Mathematical Sciences
George Mason University
Fairfax, VA 22030 USA

Voice: (703) 993-9688
Fax: (703) 993-1491
E-mail: memelian@gmu.edu
WWW: math.gmu.edu/~memelian

RESEARCH INTERESTS

Numerical methods and applied PDE, modeling of nonlinear systems, multigrid methods, optimization, stochastic processes, applications to materials science, physics and biology

FULL-TIME POSITIONS

George Mason University, Fairfax, VA
Associate Professor, Department of Mathematical Sciences 08/2012 – present
Assistant Professor, Department of Mathematical Sciences 08/2007 – 08/2012
Affiliate Faculty, Computational Materials Science Center

Carnegie Mellon University, Pittsburgh, PA
CNA Postdoctoral Research Associate, Center for Nonlinear Analysis 08/2005 – 08/2007

Pennsylvania State University, University Park, PA
Research Assistant, Mathematics Department 2003 – 2005
Teaching Assistant/Associate, Mathematics Department 1999 – 2005

VISITING POSITIONS

University of California Los Angeles, IPAM, Los Angeles, CA
Senior Fellow, Core Faculty Participant, Program on Materials Defects 09/2012 – 12/2012

Park City Mathematics Institute, Park City, UT
Institute for Advanced Study, Princeton, NJ
Lecturer, Undergraduate Faculty Program July 2014

EDUCATION

Pennsylvania State University, University Park, PA
Department of Mathematics

Ph.D. Mathematics, Minor in High Performance Computing 08/2005

Thesis: "Multilevel and Adaptive Methods for Some Nonlinear Optimization Problems"
Advisor: Prof. Qiang Du

M.A. Mathematics 08/2002

Thesis: "Analysis of Constrained Multidimensional Birth-Death Processes"
Advisor: Prof. N. Gautam

Moscow State University, Moscow, Russia
Department of Computational Mathematics and Cybernetics

M.S. Applied Mathematics, *summa cum laude* 06/2001

Thesis: "Numerical approach to solving Andronov-Hopf and Bogdanov-Takkens systems of differential equations"
Advisor: Prof. A. Bratus

B.S. Computer Science/Math, *summa cum laude* 06/1999

GRANTS

PI, NSF QED-EXTREEMS grant, $600,000 2014-2017
Title: EXTREEMS-QED: Undergraduate Research in Computational and Data-Enabled Mathematics

PI, NSF CAREER grant, Computational and Applied Mathematics, $452,000 2011 – 2016
Title: CAREER: Developing Mathematical Tools for Modeling Complex Materials Systems

co-PI, NSF-MAA RUMC grant, $2,600 2012 – 2013
Title: Undergraduate Mathematics Conference in Washington

Senior Personnel, DTRA Phase II grant 2012 – 2017
Title: Translational Peptide Research for Personnel Protection

co-PI, NSF REU grant, $334,000 2012 – 2013
Title: REU: Research, Education and Training in Computational Mathematics and Nonlinear Dynamics of Biological, Bio-inspired and Engineering Systems

co-PI, AWM Sonia Kovalevsky Day awards, $1795, $1950 2011, 2012

PI, NSF grant, Computational Mathematics, $267,000 2009 – 2012
Title: Mesoscale Computational Modeling and Analysis of Materials Microstructure

PI, ORAU's Ralph E. Powe Junior Faculty Enhancement Award, $10,000 2009 – 2010
Title: Mesoscale Computational Modeling and Analysis of Materials Microstructure

co-PI, NSF grant for establishing an REU SITE at GMU, $180,000 2009 – 2010
Title: REU: Multidisciplinary REU in Computational Mathematics and Nonlinear Dynamics of Biological, Bio-inspired and Engineering Systems

PI, Summer Research Award, GMU (university-wide competitive grant), $5,200 2008
Title: Mathematics of Materials

Honors and Awards

PSU Graduate School Alumni Society Early Career Award 2014
Mason Emerging Researcher/Scholar/Creator Award 2013
Project NExT Fellow (nation-wide competition) 2008 – 2009
First Place in Poster Competition, Gordon Research conference on Physical Metallurgy 07/2006
Travel Award, Gordon Research conference on Physical Metallurgy 07/2006
Dean's Recognition for Outstanding Teaching, CMU 2005
SIAM Student Travel Award, SIAM Meeting, New Orleans 07/2005
Honorable Mention in Student Paper Competition, Copper Mountain Conference 04/2005
Graduate Assistant Outstanding Teaching Award Nomination, PSU 2004
Graduate School Teaching Certificate, PSU 2004
Teaching with Technology Certificate, PSU 2004
Teaching Associate Certificate, Department of Mathematics, PSU 2003
Davey Fellowship, Department of Mathematics, PSU 2003
Applied Management Principles Certificate, Purdue University 2002
Eberly College of Science Fellowship, PSU 1999
Moscow City Mayor's stipend for Distinguished Students, Moscow State University 1998
Dean's List, Moscow State University 1996 – 1999
Dubna Foundation of Science and Education Scholarship 1995 – 1996
Highest Distinction ("'Gold Medal"') on graduation from high school 1996

Publications

Refereed papers and proceedings

25. Claudio Torres, Maria Emelianenko, Dmitry Golovaty, David Kinderlehrer, Shlomo Ta'asan, *"Numerical analysis of the vertex models for simulating grain boundary networks"*, SIAM J. on Applied Mathematics, accepted, 2015

24. J. Snider, I. Griva, X. Sun, M. Emelianenko *"Set-based framework for Gibbs energy minimization"*, CALPHAD, **48** (2015), p. 18–26

23. M. Emelianenko, D. Torrejon, M. DeNardo, A. Socolofsky, A. Ryabov, T. Collins, *"Estimation of Rate Constants in Nonlinear Reactions Involving Chemical Inactivation of Oxidation Catalysts"*, J. Math. Chem., **52**, Issue 5 (2014), p. 1460–1476

22. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R.Sharp, and S.Ta'asan, *"Materials microstructures: entropy and curvature driven coarsening"*, RIMS Proceedings, U. Kyoto, **1881**, p. 71-91 (2014)

21. J. Zhang, M. Emelianenko, Q. Du, *"Periodic centroidal Voronoi tessellations"*, Intern. J. Num. Anal. Modeling, **9**, p.950-969 (2012)

20. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R.Sharp, and S.Ta'asan ,*" Predictive theory for the grain boundary character distribution"*, Materials Science Forum, **715-716**, 2012, p.279–285 (Special Issue on ReX and GG IV)

19. Z. Di, M. Emelianenko, S. Nash, *"Truncated Newton-based multigrid algorithm for centroidal Voronoi calculation"*, Numer. Math. Theor. Meth. Appl., **5**, No. 1, (2012) pp. 242–259

18. A. Baranova, J. Bode, G. Manyam, M. Emelianenko, *"An efficient algorithm for systematic analysis of nucleotide strings suitable for siRNA design"*, BMC Res. Notes, 4(1):168 (2011)

17. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp, S. Ta'asan *"Critical events, entropy, and the grain boundary character distribution"*,Physical Review B, **83**, 134117 (2011)
Editor's suggestion, with accompanying Viewpoint

16. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp, S. Ta'asan, *"An entropy based theory of the grain boundary character distribution"*, DCDS-A, **30**, no. 2 (2011), p.427–454

15. M. Atkins (mentors: D. Anderson, M. Emelianenko, Y.Mishin), *"A Method of Calculating the Thickness of a Solid-Liquid Interface"*, SIAM Undergraduate Research Online, **3**, 2010

14. M. Emelianenko, *"Fast Multilevel CVT-based Adaptive Data Visualization Algorithm"*, Numer. Math. Theor. Meth. Appl., **3**, No. 2 (2010), p.195-211

13. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, S. Ta'asan, *"Geometric growth and character development in large metastable systems"*, Rendiconti di Matematica, Serie VII, **29**, Roma (2009), 1-13

12. K. Barmak, M. Emelianenko, D. Golovaty, D. Kinderlehrer, and S. Ta'asan., *"A new perspective on texture evolution"*, Intl. J. of Num. Anal. and Modeling, **5**, Supp (Special Issue on Modeling, Analysis and Simulations of Multiscale Nonlinear Systems), 2008, p.93–108

11. K. Barmak, M. Emelianenko, D. Golovaty, D. Kinderlehrer, S. Ta'asan, *"Towards a statistical theory of texture evolution in polycrystals"*, SIAM J. Sci. Comput., **30** No. 6 (2008), p. 3150–3169

10. M. Emelianenko, L. Ju, A. Rand, *"Nondegeneracy and weak global convergence of the Lloyd algorithm in* $\mathbb{R}^d$*"*, SIAM J. Numer. Anal., **46** Issue 3 (2008), p.1423–1441

9. Q. Du, M. Emelianenko *"Uniform convergence of a nonlinear energy-based multilevel quantization*

scheme via centroidal Voronoi tessellations", SIAM J. Numer. Anal., **46**, Issue 3 (2008), p. 1483–1502

8. K. Barmak, M. Emelianenko, D. Golovaty, D. Kinderlehrer, and S. Ta'asan., *"On a statistical theory of critical events in microstructural evolution"*, Proc. of the 11th International Symposium on Continuum Models and Discrete Systems (CMDS11), Paris, France, 2007

7. Q. Du, M. Emelianenko and L. Ju *"Convergence properties of the Lloyd algorithm for computing the centroidal Voronoi tessellations"*, SIAM J. Numer. Anal., **44**, Issue 1 (2006), p. 102–119

6. M. Emelianenko, Z.-K. Liu, Q. Du *"A New Algorithm for the Automation of Phase Diagram Calculation"*, Comp. Mater. Sci., **35**, Issue 1 (2006), 61-74
[In ScienceDirect Top 25 Hottest Articles]

5. Q. Du, M. Emelianenko *"Acceleration schemes for computing the centroidal Voronoi tessellations"*, Numer. Linear Algebra Appl., **13**, Issue 2-3 (Special Issue on Multigrid Methods) (2006), p. 173–192

4. Q. Du, M. Emelianenko, H.-C. Lee and X. Wang *"Ideal point distributions, best mode selections and optimal spatial partitions via centroidal Voronoi tessellations"*, Proc. 2nd Intl. Symp. on Voronoi Diagrams in Sci. and Engr., Seoul, Korea, Oct 2005 (VD2005), pp. 325-333, 2005

3. Q. Du, M. Emelianenko *"A multilevel energy-based quantization scheme"*, Lecture Notes in Comp. Sci. Eng., **55**, Widlund, Olof B.; Keyes, David E. (Eds.), Springer, Berlin (2007), p.533–541

2. M. Yacoubi, M. Emelianenko and N. Gautam *"Pricing in next generation network queuing model to guarantee QoS"*, Perform. Evaluation, **5**, issue 1 (2003), 59-84
[In Top 10 downloads from Performance Evaluation website in 2003]

1. E.B. Dushanov, M.G. Emelianenko and G.Yu. Konovalova *"On formats of the representation of real numbers and algorithm for automatic declaration of constants of the computer real arithmetic"*, J. Comput. Meth. Sci. Eng., **2**, issue 1-2 (2002), p.57–62

CONFERENCE PROCEEDINGS

1. G.A. Emel'yanenko, V.N. Samoilov and M.G. Emelianenko *"The uncertainty principle in numerical linear algebra"*, in Proc. Intl. Conf. on Comp. Math. Part I-II, (2002), 104–106, ICMMG, Novosibirsk

PUBLICATIONS ON EDUCATION

M. Emelianenko, *"Helping Undergraduates See Mathematics in Material World"*, SIAM News, **43**, Number 6, 2010

BOOKS

M. Emelianenko, "Multilevel and adaptive methods for nonlinear optimization problems", VDM-Verlag, 116 pages (2010) ISBN: 978-3-639-22436-8

PREPRINTS

7. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp, S. Ta'asan, *"An Entropy Based Theory of the Grain Boundary Character Distribution"*, Center for Nonlinear Analysis, No. 11-CNA-001, 2011

6. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp, *"Critical Events, Entropy, and the Grain Boundary Character Distribution"*, Center for Nonlinear Analysis, No. 10-CNA-014, 2010

5. K. Barmak, E. Eggeling, M. Emelianenko, Y. Epshteyn, D. Kinderlehrer, R. Sharp, S. Ta'asan, *"Predictive Theory for the Grain Boundary Character Distribution"*, Center for Nonlinear Analysis, No. 10-CNA-013, 2010

4. K. Barmak, M. Emelianenko, D. Golovaty, D. Kinderlehrer, S. Ta'asan, *"On a statistical theory of critical events in microstructure evolution"*, Center for Nonlinear Analysis, No. 07-CNA-005, 2007

3. M. Emelianenko, D. Golovaty, D. Kinderlehrer, S. Ta'asan, *"Texture evolution via continuous time random walk theory"*, Center for Nonlinear Analysis, No. 06-CNA-011, 2006

2. M. Emelianenko, D. Golovaty, D. Kinderlehrer, S. Ta'asan, *"Grain boundary evolution: new perspectives"*, Center for Nonlinear Analysis, No. 06-CNA-010, 2006

1. G.A. Emel'yanenko, M. Emelianenko, T.T. Rakhmonov, E.B. Dushanov, G.Yu. Konovalova, *"On efficiency of critical-component method for solving singular and ill-posed systems of linear algebraic equations"*, preprint JINR, Dubna, Russia, arXiv:math/0108074, 2001

Invited presentations

- "The road less traveled: an interdisciplinary mathematician's journey", AWM workshop talk, SIAM CSE15, Salt Lake City, UT, March 2015
- "PDE-based modeling of coarsening in polycrystalline materials", minisymposium talk, AWM Research Symposium, U. of Maryland, March 2015
- "Optimization challenges in phase diagram calculation", minisymposium talk, AMS Sectional Meeting, Georgetown University, March 2015
- "Advances in multiscale mathematical modeling of materials: from phase diagrams to interface dynamics", minisymposium talk, AVS-61 Symposium, Baltimore MD, November 2014
- "Modeling materials and beyond", SIAM Faculty Symposium, GMU, October 2014
- "Computational modeling of polycrystals: accuracy and sensitivity analysis", minisymposium talk, JMM, Baltimore MD, January 2014
- "Centroidal Voronoi Tessellations: from Lloyd method to multigrid and beyond", Numerical Analysis seminar, University of Maryland, College Park, September 2013
- "Modeling rare events in microstructure evolution", Mesoscale and Continuum Scale Modeling of Materials Defects workshop, IPAM, UCLA November 2012
- "Mathematical modeling of polycrystals", IMA Special Workshop, Mathematics and the Materials Genome Initiative, Minneapolis, September 2012
- "Mathematical modeling of interfacial dynamics in polycrystals", Materials Defects Tutorial, IPAM, UCLA September 2012
- "Mesoscopic modeling of grain growth", minisymposium talk, SES meeting, Atlanta GA October 2012
- "Computational modeling of coarsening in polycrystalline materials, poster presentation, OCI CAREER Workshop, Arlington, VA June 2012
- "Coarsening in materials: new takes on an old problem", invited talk, PSU, State College, PA April 2012
- "Modeling rare events in microstructure evolution", invited lecture, PIRE lecture series, Carnegie Mellon University, Pittsburgh, PA March 2012
- "Advances in multiscale modeling of coarsening in materials", invited talk, PDE seminar, University of Maryland, College Park, March 2012
- "Constrained optimization approach to multicomponent phase diagram calculation", invited seminar, Beijing International Center for Mathematical Research (BICMR) at Peking University thematic program on "Mathematical Theory and Simulation of Phase Transitions ", November 2011
- "Advances in Multiscale Kinetic Modeling of Grain Growth in Polycrystals", minisymposium talk, AMS Sectional Meeting, Salt Lake City, Utah, October 2011

- "Advances in Multiscale Kinetic Modeling of Grain Growth in Polycrystals", minisymposium talk, SES Annual Meeting, Northwestern University, Chicago, IL October 2011
- "Advances in Kinetic Modeling of Grain Growth in Polycrystalline Materials", minisymposium talk, ICIAM, Vancouver, Canada, July 2011
- "Mathematics under the Microscope", GWU Summer Program for Women in Mathematics, June 2011
- "Mathematics under the Microscope", GMU Undergraduate Research in Computational Mathematics program, June 2011
- "Advances in Multiscale Kinetic Modeling of Grain Growth in Polycrystals", Workshop on Macroscopic Modeling of Materials with Fine Structure, Carnegie Mellon University, Pittsburgh PA May 2011
- "A mathematician's journey: what matters and why", PSU SIAM chapter presentation, University Park, PA, May 2011
- "Towards a Unified Statistical Theory of Texture Evolution in Polycrystals", minisymposium talk, SIAM MS10, Philadelphia, PA, May 23-26, 2010
- "Fast Multilevel CVT-based Adaptive Data Visualization Algorithm", invited talk, CS department, GMU, April 13, 2010
- "Kinetic Approaches in Mesoscale Modeling of Polycrystals", minisymposium talk, SIAM PD09, Miami, FL, Dec 8, 2009
- "Mesoscale theory of texture evolution in polycrystals", invited talk, Applied Math colloquium, UMBC, Dec. 4, 2009
- "Mesoscale modeling of materials microstructure", invited talk, Applied Math seminar, University of Delaware, Oct. 27, 2009
- "Kinetic Theories in Multiscale Modeling of Polycrystals", invited talk, Multiscale Modeling and Simulation of Materials minisymposium, SIAM-SEAS Annual Meeting, U. South Carolina, April 4, 2009
- "Kinetic Theories in Multiscale Modeling of Polycrystals", invited talk, FRG workshop on Kinetic Description of Multiscale Phenomena: Modeling, Theory and Computation, U. of Maryland, College Park, March 4, 2009
- "Nonlinear dynamical phenomena in mesoscale modeling of polycrystals", special session presentation, AMS Annual meeting, Washington, DC, Jan 8, 2009
- "Voronoi diagrams, quantization and clustering: theory and applications", invited colloquium talk, George Mason University, Fairfax, VA, Oct 17, 2008
- "Understanding stochastic events in microstructure evolution", invited colloquium talk, Georgetown University, Washington, DC, Oct 3, 2008
- "Understanding stochastic events in microstructure evolution", invited talk, PDE seminar, U. Maryland, College Park, Oct 2, 2008
- "Understanding stochastic events in microstructure evolution", Research Coloquium in Computational Materials Science, GMU, April 14, 2008
- "Mesoscale modeling of polycrystals: understanding stochastic events in microstructure evolution", Applied Mathematics seminar, GWU, April 10, 2008
- Keynote speaker, annual PSU Graduate Open House/Alumni Conference, March 29, 2008
- "Crossing boundaries and shaping the world: interdisciplinary math approach", Women In Scientific DOMains meeting, GMU, Dec. 4, 2007
- "On a statistical theory of critical events in miscrostructure evolution", Math Department Colloquium, Florida State University, Nov. 9, 2007

- "Microstructure Evolution: Recent Progress and Open Questions", Applied Math seminar series, GMU, Sept. 21, 2007
- "On a statistical theory of critical events in miscrostructure evolution", Computational & Data Sciences Colloquium, GMU, Sept. 20, 2007
- "Centroidal Voronoi tessellations: concepts and applications", Undergraduate Colloquium series, CMU, Pittsburgh, PA, April 12, 2007
- "Texture evolution: mathematical aspects", MIMP Seminar, MRSEC, CMU, Pittsburgh, PA, March 27, 2007
- "Centroidal Voronoi tessellations: theory and applications", invited talk, CSUCI, Camarillo, CA, Feb 16, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, US Naval Academy, Anapolis, MD, Feb 9, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, Clarkson Univ., Potsdam, NY, Feb 5, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, American Univ., Washington, DC, Feb 2, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, Purdue Univ., West Lafayette, IN, Jan 31, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, U. Tennessee, Knoxville, TN, Jan 29, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, George Mason Univ., Fairfax, VA, Jan 26, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, Illinois Inst. Tech., Chicago, IL, Jan 22, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, U. Minnesota, Minneapolis, MN, Jan 19, 2007
- "Mathematical modeling and simulation of texture evolution", contributed talk, Joint AMS Meetings, New Orleans, LA, Jan 4-8, 2007
- "Mathematical modeling and simulation of texture evolution", invited talk, U. Akron, Akron, OH, Dec 13, 2006
- "Mathematical modeling and simulation of texture evolution", invited talk, U. Pittsburgh, Pittsburgh, PA, Dec 5, 2006
- "Mathematical Modeling and Simulation of Texture Evolution", invited presentation, A Conference on Applied Analysis on the Occasion of the 65th Birthday of David Kinderlehrer, CNA, CMU, Pittsburgh, PA, Oct 19 - 21, 2006
- "Mathematical modeling and simulation of the grain boundary character distribution", invited poster presentation, Gordon Research Conference on Physical Metallurgy, Plymouth, NH, July 23-28, 2006
- "Uniform convergence of a nonlinear energy-based multilevel quantization scheme via centroidal Voronoi tesselations", minisymposium talk, Joint MAA-SIAM Meeting, Auburn, AL, March 31-April 2, 2006
- "A nonlinear energy-based multilevel quantization scheme", invited talk, Frontiers in Nonlinear Analysis, CNA, CMU, Pittsburgh, Sept 8-10 ,2005
- "Uniform convergence of a multilevel energy-based quantization scheme", invited talk, Minisymposium on centroidal Voronoi tessellations, New Orleans, July 11-15 ,2005
- "A New Algorithm for the Automation of Phase Diagram Calculation", invited talk, MCSD Seminar Series, NIST, Gaithersburg, MD, March 22, 2005

Contributed presentations

- "Novel multilevel CVT-based data binning algorithms", minisymposium talk, ICIAM, Vancouver, Canada, July 2011
- "Mesoscale Modeling of Polycrystals", minisymposium talk, SIAM Annual Meeting, Pittsburgh, PA July 2010
- "Texture evolution: new perspectives", poster presentation, 4th Intl. Multiscale Materials Modeling conference, Florida State University, Tallahassee, FL, Oct 27-31, 2008
- "Voronoi-Based Binning Techniques: Acceleration Methods and Applications", minisymposium talk, SIAM Annual Meeting, San Diego, July 2008
- "PDE approach to mesoscale modeling and control of materials microstructure", special session presentation, Pontryagin conference, Moscow State University, Moscow, Russia, June 17, 2008
- "Mesoscale modeling of polycrystals: interplay of theory and simulation", minisymposium talk, SIAM MS08, Minisymposium on Grain Boundary Evolution, May 11, 2008
- "Mathematical modeling and simulation of texture evolution", poster presentation, Barrett Lectures, U. Tennessee, Knoxville, TN, April 29-30, 2007
- "Multidimensional Energy-based Multilevel Quantization Scheme and its Applications", minisymposium talk, SIAM CSE07, Costa Mesa, CA, February 19-23, 2007
- "Toward a Statistical Theory of Texture Evolution", contributed talk, SIAM CSE07, Costa Mesa, CA, February 19-23, 2007
- "A Nonlinear Energy-based Multilevel Quantization Scheme", contributed talk, XII Copper Mountain Conference on Multigrid Methods, Colorado, April 3-8, 2005
- "Uniform convergence of a multigrid energy-based quantization scheme", poster presentation, IMA Workshop: Career Options for Women in Mathematics, Univ. of Minnesota, Minneapolis, MN, February 4-5, 2005
- "Uniform Convergence of a Multigrid Enrgy-based Quantization Scheme", poster presentation, 16th International Conference on DDM, Courant Institute, January 12-15, 2005
- "A New Algorithm for the Automation of Phase Diagram Calculation", poster presentation, NSF Division of Materials Research ITR Computational Workshop, UIUC, Urbana, IL, June 17-19, 2004

Professional activities

- **Conference organization:**

  (1) chair of the Organizing committee, SIAM Development Evening, SIAM CSE15, Salt Lake City, UT March 2015

  (2) co-organizer, "Advances in multigrid methods and their applications", SIAM CSE15, Salt Lake City, UT March 2015

  (3) chair of the Organizing committee, Mason Modeling Days workshop, George Mason University, Fairfax VA June 9-14, 2014

  (4) co-organizer, SIAM Professional Development Evening, SIAM Annual Meetings 2013, 2014

  (5) co-organizer, AWM workshop, SIAM Annual Meeting, San Diego CA July 2013

  (6) chair of the Organizing committee, Undergraduate Mathematics Conference in Washington (UMC), George Mason University, Fairfax VA, April 6, 2013

  (7) co-chair of the Organizing committee, Undergraduate Mathematics Conference in Washington (UMC), George Washington University, Washington, DC April 21-22, 2012

  (8) co-organizer, "Recent Advances in Studies and Applications of Centroidal Voronoi Tessellations" minisymposium for ICIAM, Vancouver, Canada, July 2011

  (9) co-organizer, "AWM Meeting - Workshop: Opportunities Beyond Academia" workshop, ICIAM, Vancouver, Canada, July 2011

(10) member of the Organizing committee, organizer of a minisymposium on Undergraduate Research, co-organizer of a minisymposium on interface kinetics, SIAM Conference on Mathematical Aspects of Materials Science (MS10), Philadelphia, PA, May 23 - 26, 2010

(11) co-organizer, "Kinetic Approaches in Materials Science" minisymposium for 2009 SIAM Conference on Analysis of PDEs, Miami, FL, Dec. 7-10, 2009

(12) co-organizer, "Recent Advances in Algorithms and Applications of Centroidal Voronoi Tessellation and Optimal Quantization" minisymposium for 2008 SIAM Annual Meeting, San Diego, CA,July 7-11, 2008

(13) co-organizer, "Grain Boundary Evolution" minisymposium for SIAM Conference on Mathematical Aspects of Materials Science(MS08), Philadelphia on May 11–14, 2008

(14) co-organizer, "Centroidal Voronoi Tessellations: Theory, Algorithms and Applications" minisymposium for SIAM Workshop on Combinatorial Scientific Computing (CSC07), Costa Mesa, CA, Feb 17–19, 2007

- **Regular referee for:**

  Model. and Simulation in Mater. Sci. and Engr., CALPHAD, Intl. J. Num. Methods in Fluids, Mathematical Reviews, Pattern Recognition, Trans. Visualization and Comp. Graphics, SIAM Multiscale Modeling and Simulation, J. of Computational Physics, J. Engr. Mathematics, SIGGRAPH Proceedings, Computer Aided Design, Applied Mathematical Modeling, SIAM Applied Math, J. Comp. Applied Math.

- **Panel participation:**

  Panel on education, invited member, IMA Materials Genome workshop, Sept 2012

  SIAM Forward Looking Session, invited panel member, SIAM Mathematics of Materials Meeting, May 2010

  NSF panels: May 2009, March 2010, March 2011, March 2012, October 2014

  NSF Committee of Visitors: February 2013

- **Undergraduate research activities:**

  PI, GMU QED-EXTREEMS program, 2014 - present

  Associate Editor, SIAM Undergraduate Research Online (SIURO), 2013 - present

  Co-PI, GMU REU: Research, Education and Training in Computational Mathematics and Nonlinear Dynamics of Biological, Bio-inspired and Engineering Systems, 2012 – 2013

  Co-PI, GMU Multidisciplinary REU Program in Computational Mathematics and Nonlinear Dynamics of Biological, Bio-inspired and Engineering Systems, 2009-2010

  Computational Science Training for Undergraduates in the Mathematical Sciences (CSUMS) student mentor, GMU, 2008 – 2013

  Summer Undergraduate Applied Math Institute student mentor, CMU, May 30 – July 17, 2007

- **Diversity-promoting activities**

  Long-term engagements: AWM Meetings Committee, 2015 – 2018

  Sonia Kovalevsky GMU Middle and High School Mathematics Day co-organizer, May 20, 2011 and May 4, 2012

  AWM SIAM Workshop Committee, 2010 – 2013

  Faculty Sponsor, GMU AWM Chapter, 2011 – present

  Faculty member, Women in Scientific DOMains, GMU 2007 – 2012

  Member, Women of Mathematics group, PSU 2000 – 2005

  One-time commitments:

  Speaker, Centreville High School Women in Mathematics club, March 2013, April 2014

Panelist, GWU AWM Networking event, April 2014

Faculty panel participant, GMU Graduate student career workshop, Nov 2011

Speaker, GWU Summer Program for Women in Mathematics, June 2011

Panelist, Women in Science group, CMU 2006

Sponsored participant, "Career Options for Women in Mathematics" workshop, IMA, Minneapolis, Feb 4-5, 2005

- **Scientific community service and outreach activities**

Long-term engagements:

Secretary (elected), SIAM Activity group on Mathematics of Materials, Jan 2014 – present

Member, SIAM Education Committee working group on Professional Development, 2012 – present

Lecturer, Undergraduate Faculty Program, Park City Mathematical Institute/Institute for Advanced Study, Park City, UT June - July 2014

One-time commitments:

co-organizer, SIAM Professional Development Evening, SIAM Annual Meeting July 2013, July 2014, March 2015 (CSE15)

panelist, "Building the Materials Data Infrastructure" workshop, Arlington VA, Jan 21, 2015

"Helping undergraduates see mathematics in the material world", invited paper for SIAM News, Volume 43, Number 6 2010

- **Professional memberships:**

Affiliate faculty, Center for Computational Materials Science (CMaSC)

Associate, Computational Materials Science Network (CMSN)

Societies: SIAM, AMS, MAA, AWM. Member of SIAG on Materials Science.

University, college and departmental service

GMU COS Nominations Committee, 2009 – 2013

GMU Math Policy & Hiring Committee, 2010 – 2012

GMU Math Prelim grading and preparation - ODE and Numerical Analysis

GMU Math and SPACS qualifying exam grading and preparation - ODE, PDE, Numerical Analysis

Participant, Bootstrapping Research at Mason Panel, August 2012

Participant, GMU CAREER panel, April 2012, April 2014

Co-organizer, Applied & Comp. Math seminar, Dept. of Mathematical Sciences, 2007 – 2010

Chair, Committee on Departmental Website Redesign, Fall 2009

Students/postdocs supervised at GMU:

- Postdocs: Boris Gafurov (2011-2012), Claudio Torres (2012-2013)
- Graduate students: Diego Torrejon (advisor, PhD thesis), Jeff Snider (co-advisor, PhD thesis), Zichao Di (co-advisor, PhD thesis, defended Aug 2013), Hasitha de Silva (advisor, MS thesis 2010-2012), Jonathan Bode (research project co-advisor, 2010-2011), Thomas Stephens (advisor, research project, 2010-2011)
- Undergraduate students: Daniel Sun (co-advisor, summer research project, Summer 2012), Matthew Farkas (advisor, REU research project, Summer 2012), Matthew Villemarette (co-advisor, REU research project, Summer 2012), Alex Price (co-advisor, REU research project, Summer 2012), Diego Torrejon (co-advisor, CSUMS research project 2011-2012), Michael Sharov(co-advisor, CSUMS research project 2011-2012), Russell Mahoney (advisor, CSUMS research project 2010-2011), Robert Hill (co-advisor, CSUMS research project 2010-2011), Tom Stephens (co-advisor, CSUMS research project 2008-2009), Mike Atkins (co-advisor, CSUMS

research project, 2008-2009), Joshua Snyder (advisor, CSUMS research project, 2009-2010), Sandra Varela (co-advisor, REU research project, Summer 2010), Ross Kistler (advisor, REU research project, Summer 2010), Charles Cook, Alma College (advisor, REU research project, Summer 2009), Angela Dapolite, Clarkson University (advisor, REU research project, Summer 2009; advisor, Honors thesis, 2010)

- Member of dissertation committees: Jessica O'Connor (Ph.D. thesis committee, Physics, GMU, current), Jennifer Roames (M.S. thesis committee, Physics GMU, current), Michael Crone (Ph.D. thesis committee, Math GMU, current), Veronica Bloom (Ph.D. thesis committee, CSI GMU, defended Spring 2014), Alexander Koufos (Ph.D. committee, CSI GMU, current), Lei Wang (Ph.D. committee, Systems Biology GMU, current), Hypnos Hu (Ph.D. committee, CSI GMU, current), Jieun Lee (Ph.D. thesis committee, George Washington University, Mathematics, defended May 2010), TJ Flynn (M.S. thesis committee, GMU Mathematics, defended Spring 2009), Mary Ann Graham (M.S. thesis committee, GMU Mathematics, defended Fall 2007), Ganga P. Purja Pun (Ph.D. thesis committee, GMU Physics, defended Fall 2011)

Students supervised at CMU

Tarek Elgindi (University of Wisconsin, REU student, CMU, Summer 2007), Morgan Shaffer (Mount Holoyoke College, REU student, CMU, Summer 2007), Michelle Baker (Shippensburg University, REU student, CMU, Summer 2007), Jian Wang (UT Knoxville, REU student, CMU, Summer 2007), Keith Rogers (Alabama State, REU student, CMU, Summer 2007), Alexander Chun (Northwestern University, REU student, CMU, Summer 2007)

Teaching Experience

At George Mason University:
Math 493/Math 689 (senior/graduate) Math Methods in Materials Science - Spring 2015
Math 290 (sophomore) Intro to Advanced Math - Spring 2013
Math 114 (freshman) Calculus II - Spring 2013
Math 678 (grad) Partial Differential Equations - Fall 2011
Math 113 (freshman) Calculus I - Spring 2011, Fall 2011, Fall 2014
Math 214 (sophomore) Elementary Differential Equations - Spring 2014, Spring 2011, Fall 2010, Fall 2008
Math 413 (senior) Introduction to Applied Mathematics I - Fall 2010. Fall 2014
Math 414 (senior) Introduction to Applied Mathematics II - Spring 2015
Math 685/CSI 700 (grad) Numerical Methods - Spring 2008, Spring 2010
Math 677 (grad) Ordinary Differential Equations - Fall 2009
Math 446/OR 481 (senior) Introduction to Numerical Analysis - Fall 2007

At Carnegie Mellon University:
Fall 2005, Fall 2006: 21-369 (junior) - Numerical Mathematics and Computing

At Penn State University:
Spring 2004: Math250 (sophomore) - Ordinary Differential Equations
Fall 2002, Spring 2002: Math251 (sophomore) - Ordinary and Partial Differential Equations
Fall 2001: Math231 (sophomore) - Calculus of Several Variables
Summer 2001: Math21 (freshman) - College Algebra I
Spring 2001: Math220 (sophomore) - Matrices
Fall 2000, Spring 2000: Math22 (freshman) - College Algebra II and Analytic Geometry
Summer 2000: Math21 (freshman) - College Algebra I