

Tsvetanka Sendova
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Education

TEXAS A&M UNIVERSITY, College Station, TX

Ph.D. Mathematics, 2008

Thesis Topic: A New Approach to the Modeling and Analysis of Fracture Through an Extension of Continuum Mechanics to the Nanoscale

SOFIA UNIVERSITY “St. Kliment Ohridski”, Sofia, Bulgaria

B.S. Mathematics, 2002

Employment History

MICHIGAN STATE UNIVERSITY, East Lansing, MI

Academic Specialist, Department of Mathematics, August 2016 - present

Director of the Math Learning Center, January 2016 – present

Co-coordinator of the Center for Instructional Mentoring, August 2015 – present

Instructor of Mathematics, 2013 – present

Advisor for the Advanced Track Program, 2013 - present

BENNETT COLLEGE, Greensboro, NC

Assistant Professor of Mathematics, 2010 –2013

INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS, Minneapolis, MN

Postdoctoral Associate, 2008 –2010

Teaching

Over the course of 10 years, I have taught a wide variety of courses, including remedial classes (developing the class and coordinating several sections at Bennett College), all levels of Calculus classes, Linear Algebra, Axiomatic Geometry, Differential Equations, Abstract Algebra, Real Analysis, Transitions to proofs (introduction to formal mathematical proof), Numerical Methods, Quantitative Literacy, and a Special Topics interdisciplinary class on *Health Disparities Among African American Women: Applications of the Principles of Mathematics and the Sciences to Understanding the Disparities*.

Courses Taught at MSU

- MTH 101, Quantitative Literacy I – Fall 2018
- MTH 132, Calculus I – Fall 2013
- MTH 235, Ordinary Differential Equations – Fall 2017/Spring 2018/Spring 2019
- MTH 299, Transitions – Fall 2013, Spring 2014, Fall 2014, Fall 2015
- MTH 310, Abstract Algebra I and Number Theory – Fall 2014
- MTH 320, Real Analysis I – Spring 2016, Fall 2016, Spring 2017
- MTH 421, Real Analysis II – Spring 2015, Spring 2020

Teaching Awards and Fellowships

- Adams Academy Fellow for 2017-2018.
- MSU Department of Mathematics J. S. Frame Teaching Excellence Award, May 2016.
- MSU Senior Class Council Outstanding Faculty Award, May 2015.

Publications

- Camenga, Kristin; Deaett, Louis; Rault, Patrick X; Sendova, Tsvetanka; Spitkovsky, Ilya; Johnson Yates, Rebekah. Singularities of base polynomials and Gau-Wu numbers. *Linear Algebra and its Applications*, 581(2019)112-127
- Barton, Ke'Yona*; Smith, Corbin*; Rychtar, Jan; Sendova, Tsvetanka. Modeling of breast cancer through evolutionary game theory. *Involve*. Issue 11-4, 2018
- Diaz-Rodriguez, Osvaldo*; Nguyen, Tai*; Kim, Hyejin; Sendova, Tsvetanka. Competing Dynamics: Analyzing market share in a duopoly. *Journal of Statistics and Management Systems*, vol. 20, 2017 - issue 5.
- Camenga, Kristin; Rault, Patrick X; Sendova, Tsvetanka; Spitkovsky, Ilya. On the Gau–Wu number for some classes of matrices. *Linear Algebra and its Applications*. 444 (2014), 254-262. DOI: 10.1016/j.laa.2013.11.045.
- Camenga, Kristin; Rault, Patrick X; Rossi, Dan*; Sendova, Tsvetanka; Spitkovsky, Ilya. Numerical range of some doubly stochastic matrices. *Applied Mathematics and Computation*. 221, September 2013, 40 – 47.
- Rault, Patrick X; Sendova, Tsvetanka; Spitkovsky, Ilya M. 3-by-3 matrices with elliptical numerical range revisited. *Electron. J. Linear Algebra*. 26, 2013, 158-167.
- J.C. Chrispell, S.E. Howington, K.R. Fowler, E.W. Jenkins, M. Minik, T. Sendova. Mathematical Modeling, Simulation, and Optimal Design for Agricultural Water Management, 2012 S.C. Water Resource Conference, October 10-11, 2012.
- T. Sendova, J.R. Walton. The Effect of Surface Tension in Modeling Interfacial Fracture, *AIP Conf. Proc.*, Vol. 1301, pp. 291 - 300, 2010.
- T. Sendova, J. R. Walton. A New Approach to the Modeling and Analysis of Fracture through Extension of Continuum Mechanics to the Nanoscale, *Math. Mech. Solids*, Vol.15, Issue 3, May 2010.
- T. Sendova, J. R. Walton. Constitutive Restrictions for a Hyperelastic Lamellar Material with One Fiber Family, Based Upon Strain Invariants Yielding Orthogonal Stress Response Terms, *Proceedings of the 3rd Canadian Conference on Nonlinear Solid Mechanics*, Toronto, Canada, June 25 - June 29, 2008.
- T. Sendova, J. R. Walton. On Strong Ellipticity for Isotropic Hyperelastic Materials Based upon Logarithmic Strain, *Int. J. Non-Linear Mech.* 40:195–212, 2005.

Undergraduate/High School Student Research Mentoring

- **2016 Summer Undergraduate Research Institute in Experimental Mathematics (SURIEM)** at Michigan State University. Together with Aditya Viswanathan and Mark Iwen mentored a group of four students on a project focusing on the Mathematics of Magnetic Resonance Imaging.
- **Saudi Research Science Institute (SRSI)** at King Abdullah University of Science and Technology (KAUST) – tutor for a group of four students working on research projects in mathematical modeling and mechanical engineering areas. June 7 – July 28, 2014
- **NREUP grant** through MAA’s **Strengthening Underrepresented Minority Mathematics Achievement (SUMMA)** program. Together with Mark Iwen and Hyejin Kim, MSU - mentored a group of five students on projects involving modeling cancer and modeling competing car companies using deterministic and stochastic differential equations; Summer of 2014.
 - Johnson, Jamilia; Peters, Cheyenne; Youngblood, Asia; Crump, Aaron. Faculty advisors: Hyejin Kim and Tsvetanka Sendova. Modeling Interactions Between Various Cell Populations in a Cancerous System. *SIAM Undergraduate Research Online (SIURO)*, Vol. 9, Sept. 2016.
- **NREUP grant** through MAA’s **Strengthening Underrepresented Minority Mathematics Achievement (SUMMA)** program. Together with Hyunju Oh from Bennett College and Jan Rychtar from UNCG mentored a group of five students on projects involving Game Theory and its applications to modeling breast cancer and the invasion of Asian Carp in the Upper Mississippi Basin; Summer of 2013.
- Mentored three senior thesis projects on topics including *mathematical modeling of the transfer rate of HIV in neonates*, *modeling of factors affecting one’s choice of a life partner*, and *game theory models of how basketball players choose a team*; Spring 2013.
- **Interdisciplinary REU** at the Institute of Mathematics and Its Applications – postdoctoral mentor for a team of students working on *Modeling Solar Cells*. Summer of 2009.

Conference participation

Invited Talks

- *Labs in Math Classes: Reports on Four Parallel Course Revisions.* . Co-presenter: Andrew Krause. 2019 MSU Teaching & Learning Spring Conference, May 8, 2019.
- *The Center for Instructional Mentoring: Preparing Future Math Faculty.* Co-presenters: Andrew Krause, Rachael Lund. 2017 MSU Teaching & Learning Spring Conference, May 10, 2017.
- A Few Ideas for Incorporating Inquiry Based Learning Modules in Mathematics Classes. Teach for Bulgaria, June 16, 2015
- Projective Geometry and the Numerical Range of a Matrix. University of Michigan-Dearborn Mathematics Colloquium, April 15, 2015
- Non-Uniqueness in Energy Minimization of Atomistic Problems: A Branch-Following and Bifurcation Investigation. 16th U.S. National Congress of Theoretical and Applied Mechanics. State College, Pennsylvania, July 1, 2010
- Modeling Interfacial Fracture. Second Conference of the Euro-American Consortium for Promoting the Application of Mathematics in Technical and Natural Sciences, Sozopol, Bulgaria. June 21, 2010
- The Effect of Surface Tension in Modeling Fracture. 2010 SIAM Conference on Mathematical Aspects

of Materials Science, Philadelphia, Pennsylvania. May 25, 2010.

- The Effect of Surface Tension in Modeling Fracture. IAMCS Workshop on Computational and Mathematical Challenges in Material Science and Engineering: Multi-Functional Materials: Coupled Field Theories, Composites and Material Failure. October 1, 2009
- Constitutive Restrictions for a Hyperelastic Material Based Upon Strain Invariants Yielding Orthogonal Stress Response Terms. 5th World Congress of Biomechanics, Munich, Germany. August 2, 2006.
- Constitutive Restrictions for Isotropic Hyperelastic Material Modeled Using Invariants of Logarithmic Strain. AMS Sectional Meeting, Lubbock, Texas. April 8, 2005.

Workshops, Professional Development, and Other Presentations

- *MTH 235 Reform*. Co-presenter: Gabriel Nagy. Conversations among Colleagues, April 24, 2017.
- Joint Math Meetings, Atlanta, GA, 2017.
- White House “Math Matters” meeting, organized by the Office of Science and Technology Policy, September 8, 2016.
- MAA College Mathematics Instructor Development Source (CoMInDS) Summer Workshop on Improving the Preparation of Graduate Students to Teach Undergraduate Mathematics, June 8th – June 10th, 2016.
- *The Center for Instructional Mentoring*. Co-presenter: Andrew Krause. STEM Alliance Spring Meeting, May 5, 2016.
- *Are These Elections Fair? The Mathematics of Voting*. Academic and Cultural Enrichment Series, Bennett College, Greensboro, NC. October 30, 2012.
- Instructor of a week-long mini-course on Computer Graphics using LOGO, part of the Fueling and Inspiring STEM Stars program for minority high school students, sponsored by the HBCU-UP project at Bennett College. July 18th - July 22nd, 2012.
- *The Mathematics of Voting* - an educational outreach talk to tenth grade students at “Lyuben Karavelov” school in Koprivshtitsa, Bulgaria. May, 2012.
- Mathematical Modeling, Simulation, and Optimal Design for Agricultural Water Management. American Institute of Mathematics, Palo Alto, CA, USA. February 27- March 2, 2012.
- Research Experiences for Undergraduate Faculty. American Institute of Mathematics, Palo Alto, CA, USA. July 18-22, 2011.
- AAC&U Engaging Departments Institute. American Institute of Mathematics, Ellicott City, MD, USA. July 13-17, 2011.
- Sustainability Problems. American Institute of Mathematics, Palo Alto, CA, USA. January 10-14, 2011.
- *A Continuum Theory of Fracture with Corrections for Nanoscale Effects*. Solid and Continuum Mechanics Research Seminar, Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN, USA. April 7, 2009.
- *A Theory of Fracture Based Upon Extension of Continuum Mechanics to the Nanoscale*. Career Options for Women in Mathematical Sciences, IMA Special Workshop, University of Minnesota, April 2-4, 2009.
- *A Theory of Fracture Based Upon Extension of Continuum Mechanics to the Nanoscale*. IMA Postdoc Seminar, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, MN, USA. November 11, 2008.

Service/Outreach/Curriculum Development

MSU Department of Mathematics service

- *Department of Mathematics Strategic planning committee on undergraduate education*, Spring 2019.
- *Continuing stream position search committee*, chair, Fall, 2018.
- *Gateway courses and advising learning community*, Fall 2018.
- *Curriculum development – MTH 101*.
- *Continuing stream position search committee*, chair, 2017-2018.
- Committee member for the development of *Inclusion Workshop focusing on Math Faculty and Academic Advisors*, Fall 2017.
- *Curriculum development – MTH 235*.
- *Frame Teaching Excellence Award Committee*, Spring 2017
- *Conversations among Colleagues – Department of Mathematics seminar on teaching and learning*, co-organizer, 2016-present.
- Met with and provided feedback regarding candidates for the *Academic Specialist position in the Department of Statistics*, Spring 2017.
- *Feedback and evaluation of faculty teaching portfolios*, Fall 2016.
- Member of *MSIM students' Masters portfolio defense committee*
 - *Doru Hutanu*, Spring 2016
 - *Cameron Berry*, Spring 2017
 - *Yueqi Jia*, Spring 2017
- *Hosted a Fireside Chat*, September 17th, 2016. Hosted a dinner for 9 undergraduate honors students and lead an informal conversation about REUs and mathematics programs at MSU. Had a follow-up dinner with the students at Shaw Dining Hall on November 14th, 2016.
- Faculty mentor for *MSIM team working with Herman Miller*, Spring 2016.
- Judge for *MSU Student Math Conference*, 2014, 2015, 2016, 2017.
- Mentor for *Certification in College Teaching for Emily Olson*, 2016-2017.

Outreach and service to the mathematics community

- Presenter at *RCPD's Project Venture Resource Fair*, June 22, 2017.
- Presenter at *Girls Math and Science Day, Michigan State University*. March 4, 2017.
- Judge for *JMM Student Poster Session*, JMM Atlanta, Georgia, January 6, 2017.
- Grader for *the USA (Junior) Mathematics Olympiad*, May 2015 and May 2016.

Professional Development at MSU

- Spring STEM Education Alliance Meeting. Community Conversation: Building Sustainable Approaches to Recruiting, Hiring, Training and Assessing ULAs & Peer Educators at MSU, May 2, 2019.
- SEISMIC project on diversity, equity, and inclusion in foundational STEM courses, April 29, 2019.
- STEM Teaching Essentials: Teaching and Assessing Transferable Skills in STEM Classes, February 12, 2019.
- Cultural Competency for Personal, Organizational and Community Change, January 15, 2019.
- STEM Education Alliance Meeting. ULA Program Management Workshop, December 7, 2018.
- 2018 National Numeracy Network Conference, October 12-14, 2018.
- Addressing Bias in the Math Classroom and University Advising, May 3rd, 2018.

- Michigan Mathematics Pathways Summit, June 28, 2017.
- HHMI Gateway Summit, May 16-17, 2017.
- STEM Teaching Essentials
 - *Putting It All Together: Learning Outcomes and Assessments that Blend Core Ideas with Science and Engineering Practices*, November 14, 2017.
 - *The Hub for Innovation and the AAN: A Working Session on Opportunities and Collaboration*, April 13, 2017.
 - *Learning Narratives from Students of Color in STEM Classrooms*, February 16, 2017.
 - *Impact of Undergraduate Research on Faculty Productivity and Career Advancement*, January 17, 2017.
 - *Promoting the Professional Development of Teaching Assistants (TAs) and Undergraduate Learning Assistants (ULAs) in Help Rooms & Office Hours*, April 13, 2016
- Survive and Thrive for academic Specialists in the Continuing Appointment System, September 14, 2016
- STEM Alliance Meetings, May 2016, December 2015, May 2015.