

ZAHRA AMINZARE

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EMPLOYMENT

- Postdoctoral Research Associate, Applied and Computational Mathematics, Princeton University, May 2015 – present
- Lecturer, Department of Mathematics, Princeton University, Fall 2017
- Lecturer, Department of Mechanical and Aerospace Engineering, Princeton University, 2016

EDUCATION

- Ph.D. Mathematics, Rutgers University, 2009 – 2015
 - Thesis title: On synchronous behavior in complex nonlinear dynamical systems
 - Thesis advisor: Professor **Eduardo D. Sontag**
- B.Sc. Mathematics, Sharif University of Technology, Tehran, Iran, 2002 – 2007

RESEARCH INTERESTS

Applied Dynamical Systems, Applied Analysis and Partial Differential Equations, Stochastic Differential Equations, Mathematical Neuroscience, Systems Biology, Cancer Modeling.

PUBLICATIONS

Articles in Progress

1. E. N. Davison, **Z. Aminzare**, B. Dey, and N. Ehrich Leonard. Mixed mode oscillations and firing onset in coupled systems of FitzHugh-Nagumo type.
2. **Z. Aminzare** and P. Holmes. The effect of noise on gait transitions in a model of insect central pattern generators.

Articles in Journal or Book Chapters

1. **Z. Aminzare**, B. Dey, E. N. Davison, and N. Ehrich Leonard. Cluster synchronization of diffusively coupled nonlinear systems: A contraction based approach. *Under Review. arXiv:1707.00748*.
2. **Z. Aminzare**, V. Srivastava, and P. Holmes. Gait transitions in a phase oscillator model of insect central pattern generators. *To appear in SIAM J. on Applied Dynamical Systems*.
3. F. Menolascina, R. Rusconi, V. I. Fernandez, S. P. Smriga, **Z. Aminzare**, E. D. Sontag, and R. Stocker. Logarithmic sensing in *Bacillus subtilis* aerotaxis. *Nature Systems Biology and Applications*, 3:16036-, 2017.
4. **Z. Aminzare** and E. D. Sontag. Some remarks on spatial uniformity of solutions of reaction-diffusion PDEs. *Nonlinear Analysis: Theory, Methods and Applications*, 147:125–144, 2016.
5. J. L. Gevertz, **Z. Aminzare**, Kerri-Ann Norton, J. Pérez-Velázquez, A. Volkening, K. A. Rejniak. Emergence of Anti-Cancer Drug Resistance: Exploring the Importance of the Microenvironmental Niche via a Spatial Model. In A. Radunskaya and T. Jackson, editors, *Applications of Dynamical Systems in Biology and Medicine*, IMA Volumes in Mathematics and its Applications. 158:1–34. Springer-Verlag, 2015.

6. **Z. Aminzare** and E. D. Sontag. Synchronization of diffusively-connected nonlinear systems: results based on contractions with respect to general norms. *IEEE Transactions on Network Science and Engineering*, 1(2):91–106, 2014.
7. **Z. Aminzare**, Y. Shafi, M. Arcak, and E. D. Sontag. Guaranteeing spatial uniformity in reaction-diffusion systems using weighted L^2 norm contractions. In V. Kulkarni, K. Raman, and G.-B. Stan, editors, *A Systems Theoretic Approach to Systems and Synthetic Biology I: Models and System Characterizations*, pages 73–101. Springer-Verlag, 2014.
8. **Z. Aminzare** and E. D. Sontag. Logarithmic Lipschitz norms and diffusion-induced instability. *Nonlinear Analysis: Theory, Methods and Applications*, 83:31–49, 2013.

Conference Articles

1. **Z. Aminzare** and E.D. Sontag. Contraction methods for nonlinear systems: A brief introduction and some open problems. In *Proc. IEEE Conf. Decision and Control*, Los Angeles, Dec. 2014, pages 3835–3847, 2014.
2. **Z. Aminzare** and E.D. Sontag. Remarks on diffusive-link synchronization using non-Hilbert logarithmic norms. In *Proc. IEEE Conf. Decision and Control*, Los Angeles, Dec. 2014, pages 6086–6091, 2014.
3. Y. Shafi, **Z. Aminzare**, M. Arcak, and E.D. Sontag. Spatial uniformity in diffusively-coupled systems using weighted L^2 norm contractions. In *Proc. American Control Conference*, pages 5639–5644, 2013.

AWARDS AND FELLOWSHIPS

- 2014 Student Travel Award, Conference on Decision and Control
- 2014 – 2015 Research Assistantship, Rutgers University
- 2013 – 2014 University and Louis Bevier Dissertation Fellowship, Rutgers University
- 2013 Student Travel Award, American Control Conference
- 2011 Weill Fellowship, Rutgers University
- 2009 – 2013 Teaching/Research Assistantship, Rutgers University

TEACHING AND MENTORING EXPERIENCE

- Technical Guidance with Prof. Naomi Ehrich Leonard, Princeton University
 - Elizabeth N. Davison, Ph.D. candidate, Heterogeneity and Synchronization of Coupled Neuronal Oscillator Networks
 - Cathy Chen, Undergraduate student
- Princeton University (Undergraduate Level)
 - Topics in Mathematical Modeling - Mathematical Neuroscience, Instructor, Fall 2017
- Princeton University (Graduate Level)
 - Applied Dynamical Systems, Co-instructor (with C. Rowley), Fall 2016
 - Nonlinear System Theory, Instructor, Spring 2016
- Rutgers University (Undergraduate Level)
 - Calculus I for the Mathematical and Physical Sciences , Fall 2012
 - Calculus II for the Mathematical and Physical Sciences, Fall 2011

- Calculus I, Teaching Assistant, Rutgers, Spring 2011
- Calculus I for the Mathematical and Physical Sciences, Teaching Assistant, Fall 2010
- Dynamical Models in Biology, Teaching Assistant, Fall 2010
- Rutgers University (Workshop)
 - Deterministic Modeling of Chemical Reactions, Interdisciplinary Boot Camp in Quantitative Biology, Guest Lecturer, January 2014

SELECTED PRESENTATIONS

Upcoming Invited Talks

- Department of Mathematical and Statistical Sciences, University of Alberta, January 2018
- Department of Mathematics, Brandeis University, January 2018
- Department of Mathematics and Statistics, Boston University, January 2018
- Department of Mathematics, Iowa State University, January 2018
- Department of Mathematics, University of Iowa, January 2018

Past Talk Presentations

“Virtual” Network Frontier Workshop, December 2017

Sensori-Motor Control of Animal and Robots, MBI, Ohio, November 2017

- Society for Mathematical Biology Annual Meeting, Utah, July 2017
- Applied Math Seminar, Waterloo, January 2017
- Department of Mathematics & Statistics, UMass Amherst, December 2016
- Frontiers in Mathematical Sciences, 4th Conference, Sharif University, Tehran, Iran, July 2016
- SIAM Life Science, Boston, July 2016
- Tarbiat Modarres University, Tehran, Iran, January 2016
- Sharif University, Tehran, Iran, December 2015
- Janelia Neurotheory Workshop, Janelia Research Campus, November 2015
- Conference of Decision and Control, Los Angeles, December 2014
- Dynamical Systems and Nonlinear Science Seminar, Princeton University, December 2014
- AFOSR-BRI: Theory-based engineering of biomolecular circuits in living cells, MIT, August 2014
- SIAM Life Science, North Carolina, August 2014
- Computational/Applied Mathematics, Rutgers University, March 2014
- American Control Conference, Washington, DC, June 2013

Poster Presentations

- Dynamics Days 2018, Denver, Colorado, January 2018
- Workshop on Brain Dynamics and Neurocontrol Engineering, Washington University in St. Louis, St Louis, June 2017
- NSF-CRCNS Conference, Brown University, Providence, June 2017

- 6th annual Winter Workshop on Neuromechanics and Dynamics of Locomotion, Tulane University, New Orleans, January 2017
- NSF-CRCNS Conference, France, October 2016

PROFESSIONAL ACTIVITY

- Member: Society for Mathematical Biology, SIAM
- Reviewer: Automatica, IEEE Transactions on Automatic Control, IEEE Conference on Decision and Control, IEEE Transactions on Control of Network Systems, IEEE Transactions on Networks Science and Engineering

REFERENCES

- Prof. Philip Holmes, Princeton University, *pholmes@math.princeton.edu* (Research)
- Prof. Eduardo Sontag, Rutgers University, *sontag@math.rutgers.edu* (Research)
- Prof. Naomi Ehrich Leonard, Princeton University, *naomi@princeton.edu* (Research)
- Prof. Robert Gunning, Princeton University, *gunning@math.princeton.edu* (Teaching)
- Prof. Clancy Rowley, Princeton University, *cwrowley@princeton.edu* (Teaching)