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I. RESEARCH INTERESTS

Mathematical biology, scientific computation, dynamical systems, stochastic processes and graph theory, with an emphasis in coupled oscillators, complex networks, directed graphs, Markov chains, neurobiology, cellular physiology and ecology.

II. ACADEMIC TRAINING

- Ph.D. (Mathematics), University of Texas at Austin, May 2005. Advisor: Jack Xin
  Human acoustics: From vocal chords to inner ear, Ph.D. dissertation

- B.S. (Mathematics), University of Texas at San Antonio, 1997. Advisor: Mary Lou Zeeman
  Computer Visualization in Competitive Lotka-Volterra Systems, Honors thesis

III. ACADEMIC POSITIONS

- Assistant Professor, 2011-Present (Biology, The College of William and Mary)

- Research Assistant Professor, 2010-2011 (Applied Science, The College of William and Mary)

- Visiting Assistant Professor, 2009-2010 (Mathematics, The College of William and Mary)

- Postdoctoral Associate, 2007-2009 (Applied Science, The College of William and Mary)

- Postdoctoral Associate, 2005-2007 (Cornell University)

- Graduate Research Assistant, 2001, 2004-2005 (UT Austin)

- Assistant Instructor, 2000-2004 (UT Austin)

- Teaching Assistant, 1997-2000 (UT Austin)

- Undergraduate Research Assistant, 1994-1997 (UT San Antonio)

IV. GRANTS

- *NSF RCN-UBE Incubator: An online networking hub for collaboration, discovery, and synthesis in quantitative biology curricula*; PI: M. D. LaMar; co-PIs: C. D. Eaton, DB. Poli, A. Shende, R. Sheehy; Budget: $49,971; Start date: 01/15/2014; Duration: 1 year.

V. PUBLICATIONS

Peer-reviewed articles

- *Threshold digraphs*, B. Cloteaux, M. D. LaMar, E. Moseman, and J. Shook, Journal of Research of NIST 119 (2014), pp. 227–234. [doi:10.6028/jres.119.007]

- *Split digraphs*, M. D. LaMar, Discrete Mathematics 312 (2012), pp. 1314–1325. [doi:10.1016/j.disc.2011.12.023]

- *Reduction of calcium release site models via moment fitting of phase-type distributions*, M. D. LaMar, P. Kemper and G. D. Smith, Phys. Biol. 8 (2011) 026015. [doi:10.1088/1478-3975/8/2/026015]

- *Effect of node-degree correlation on synchronization of identical pulse-coupled oscillators*, M. D. LaMar and G. D. Smith, Phys. Rev. E. 81, 046206 (2010). [doi:10.1103/PhysRevE.81.046206]

- *Markov chain models of coupled calcium channels: Kronecker representations and iterative solution methods*, H. DeRemigio, M. D. LaMar, P. Kemper and G. D. Smith, Phys. Biol. 5 (2008) 036003. [doi:10.1088/1478-3975/5/3/036003]

- *Signal processing of acoustic signals in the time domain with an active nonlinear nonlocal cochlear model*, M. D. LaMar, Y-Y Qi, and J. Xin, Signal Processing, Vol. 86, pp. 360–374, 2006. [doi:10.1016/j.sigpro.2005.05.017]

- *Modeling vocal fold motion with a hydrodynamic semi-continuum model*, M. D. LaMar, Y-Y Qi, and J. Xin, Journal of the Acoustical Society of America, Vol. 114, No. 1, pp 455-464, 2003. [doi:10.1121/1.1577547]

Peer-reviewed conference proceedings

- *Modeling the effects of crab potting and road traffic on a population of diamondback terrapins*, S. Gilliand, R. M. Chambers, and M. D. LaMar, Proceedings of the Sixth International Symposium on Biomathematics and Ecology: Education and Research, 2014. [Abstract]

- *Dimension and mortality in linear stage class models of Acartia tonsa*, C. King, K. Shipman, S. Day, and M. D. LaMar, Proceedings of the Sixth International Symposium on Biomathematics and Ecology: Education and Research, 2014. [Abstract]

- *Directed 3-cycle anchored digraphs and their application in the uniform sampling of realizations from a fixed degree sequence*, M. D. LaMar, Proceedings of the 2011 Winter Simulation Conference, pp. 3353–3364, 2011. [PDF]

- *Markov chain models of coupled intracellular calcium channels: Kronecker structured representations and benchmark stationary distribution calculations*, with H. DeRemigio, P. Kemper, M. D. LaMar, and G. D. Smith, Pacific Symposium on Biocomputing 13, pp. 354–365, 2008. [1] [PMID:18229699]

Invited book chapter

- *Periodic orbit continuation in multiple time scale systems*, J. Guckenheimer and M. D. LaMar, Numerical continuation methods for dynamical systems: Path following and boundary value problems, Eds. B. Krauskopf, H. M. Osinga, and J. Galán-Vioque, Springer: The Netherlands, pp 253–267, 2007. [doi:10.1007/978-1-4020-6356-5_8]

VI. PREPRINTS

Invited book chapter

- *Network sampling algorithms and applications*, R. K. Kincaid and M. D. LaMar, chapter to appear in *Quantitative Graph Theory*, Springer.

Arxiv

- *Algorithms for realizing degree sequences of directed graphs*, M. D. LaMar, arXiv:0906.0343, June 2010.

- *On uniform sampling simple directed graph realizations of degree sequences*, M. D. LaMar, arXiv:0912.3834, December 2009.

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[1] Preliminary results were presented in *Technical Report WM-CS-2007-06*, Department of Computer Science, The College of William & Mary.

VII. PRESENTATIONS

Invited

- "Split digraphs and their applications", National Institute of Standards and Technology, ACMD Seminar Series, June 19, 2012.

- "Directed 3-cycle anchored digraphs and their application in the uniform sampling of realizations from a fixed degree sequence", 2011 Winter Simulation Conference, December 13, 2011.

- "Split digraphs", MOPTA 2011, Lehigh University, August 18, 2011.

- "Synchronization of pulse-coupled oscillators", Computational Cell Biology Workshop, Cold Spring Harbor Laboratory, July 17, 2011.

- "Networks in Biology", Biomath Faculty Candidate Seminar, The College of William and Mary, January 24, 2011.

- "Global dynamics of pulse-coupled oscillators", AMS southeastern sectional meeting #1065: Special Session on Differential Equations and Applications to Physics and Biology, Richmond, Virginia, November 6 – 7, 2010.

- "Split digraphs and their applications", Discrete Math Seminar, Virginia Commonwealth University, September 15, 2010.

- "Dynamics of oscillators on random networks", Mathematical Biology Seminar, Virginia Commonwealth University, September 15, 2010.

- "Coupled oscillators, phase response curves, and synchronization", Computational Cell Biology Workshop, Cold Spring Harbor Laboratory, July 10, 2010.

- "Dynamics of oscillators on random networks", Dynamics Seminar, Cornell University, April 2, 2010.

- "Synchronization of oscillators on random networks", Applied Science Colloquium, The College of William and Mary, October 1, 2009.

- "Markov chain models of calcium release sites: Kronecker representations with exact and approximate solution methods", AMS southeastern sectional meeting #1037: Special session on Mathematical Modeling in Biology, Baton Rouge, Louisiana, March 28 – March 30, 2008.

- "Periodic orbit continuation in multiple time scale systems", Applied and Computational Math Seminar, George Mason University, February, 2008.

- "Periodic orbit continuation in multiple time scale systems", in minisymposium "Numerical bifurcation analysis and applications" at the SIAM Conference on Applications of Dynamical Systems, Snowbird 2007.

- "Human acoustics: From the vocal chords to the inner ear", Mathematics Colloquium, University of Texas at San Antonio, April, 2003.

Contributed

- "QUBES Hub: A vision of online collaboration in teaching and learning in quantitative biology", Joint Mathematics Meetings, January 17, 2014.

- "Nonlinear Effects in Size-structured Models of Zooplankton Communities", SIAM Conference on Dynamical Systems, May 22, 2013. [link]

- "Split digraphs", Joint Mathematics Meeting, January 5, 2012.

- "Split digraphs and their applications", Mathematics Colloquium, The College of William and Mary, January 29, 2010.

- "Synchronization of pulse coupled oscillators", The College of William and Mary, Mathematical Biology Group, November 17, 2008.

- "Markov Chain Models of Coupled Intracellular Calcium Channels: Kronecker Structured Representations and Benchmark Stationary Distribution Calculations", Pacific Symposium on Biocomputing, January, 2008.

- "Mathematical Models: The good, the bad and the ugly", Cornell University, October 2006.

- "Modeling the inner ear", Cornell University, November 2005.

- "Human acoustics: From the vocal chords to the inner ear", University of Utah (February 2005), Humboldt State University (January 2005), New College (January 2005).

- "Geometric visualization in population dynamics", San Antonio Mathematics Group, University of Texas at San Antonio, October, 1996.

- "Visualization in competitive Lotka-Volterra systems", Volterra Centennial Symposium, May, 1996.

Posters

- "Fireflies, Finches and Digraphs", Teaching Discrete and Algebraic Mathematical Biology to Undergraduates, July 30, 2013.

- "Markov chain models of coupled calcium channels: Kronecker representations and iterative solution methods", Biophysical Society 53rd Annual Meeting, Boston, Massachusetts, February 28 – March 4, 2009.

- "A simple hydrodynamic semi-continuum model of vocal-fold motion", 144th Meeting of the Acoustical Society of America, December, 2002.

VIII. PROGRAMS, WORKSHOPS & CONFERENCES

Organized

- Co-organizer with Leah Shaw of SIAM Conference on Dynamical Systems Mini-symposium entitled "Dynamics of Marine Ecosystems", May 22, 2013.

- Charles Center May Seminar: Integrating Mathematics and the Life Sciences, Williamsburg, VA, August 1 – 5, 2011 [Received competitive funding of $3500 through Charles Center]

Assisted

- Workshop on Computational Cell Biology, Cold Spring Harbor, NY, July 2 – July 23, 2010.

- Workshop on Computational Cell Biology, Cold Spring Harbor, NY, June 26 – July 12, 2009.

Attended

- Teaching Discrete and Algebraic Mathematical Biology to Undergraduates, Mathematical Biosciences Institute, July 29–August 2, 2013.

- SUMS4BIO: Quantitative Biology Education Workshop, Radford University, May 17–18, 2013.

- 2012 Undergraduate Mathematics Conference in Washington, April 21–22, 2012.

- 2012 Joint Mathematics Meeting, Boston, Massachusetts, January 4–7, 2012.

- 2011 Winter Simulation Conference, Phoenix, Arizona, December 11–14, 2011.

- MOPTA 2011, Bethlehem, Pennsylvania, August 17 – 19, 2011.

- Workshop on Computational Cell Biology, Cold Spring Harbor, NY, July 12 – July 18, 2011.

- Information Theory Workshop, Williamsburg, Virginia, January 12 – 14, 2011.

- AMS Southeastern Sectional Meeting #1065, Richmond, Virginia, November 6 – 7, 2010.

- NIMBioS Tutorial: Graph Theory and Biological Networks, Knoxville, Tennessee, August 16 – 18, 2010.

- AMS/MAA Joint Mathematics Meetings, San Francisco, California, January 13 – 16, 2010.

- 53rd Annual Meeting of the Biophysical Society, Boston, Massachusetts, February 28 – March 4, 2009.

- AMS/MAA Joint Mathematics Meetings, Washington, D.C., January 5 – January 8, 2009.

- Workshop on "Rhythms in the Hypothalamus and Pituitary", American Institute of Mathematics (AIM), Palo Alto, California, August 4 – August 8, 2008.

- AMS Southeastern Sectional Meeting #1037, Baton Rouge, Louisiana, March 28 – March 30, 2008.

- Pacific Symposium on Biocomputing, The Big Island of Hawaii, January 5 – January 9, 2008.

- SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 28 – June 1, 2007.

- Mathematical Biosciences Institute Workshop on Information Processing in the Visual System, Ohio State University, April 23 – April 27, 2007.

- 51st Annual Meeting of the Biophysical Society, Baltimore, Maryland, March 3 – March 7, 2007.

- Computational Cell Biology, Cold Spring Harbor, NY, March 6 – March 9, 2007.

- Collaborative Research in Computational Neuroscience (CRCNS) Principal Investigators' Meeting, June 2006.

- 145th Meeting of the Acoustical Society of America, Nashville, Tennessee, April 28 – May 2, 2003.

- 144th Meeting of the Acoustical Society of America, First Pan-American/Iberian Meeting on Acoustics, Cancun, Mexico, December 2-6, 2002.

- First SIAM Conference on Life Sciences, Boston, Massachusetts, March 6-8, 2002.

- Undergraduate Summer Institute at the Geometry Center, University of Minnesota, 1996.

- Volterra Centennial Symposium, The University of Texas at Arlington, May 23-25, 1996.

IX. TEACHING EXPERIENCE

Instructor

Course	Eval.	Institution
Introduction to Mathematics	4.3/5	University of Texas at Austin
Pre-Calculus	4.45/5	University of Texas at Austin
Multivariable Calculus	4.3/5	University of Texas at Austin
Introduction to Analysis	3.4/5	Cornell University
Linear Algebra with Applications	4.79/5	Cornell University
Intro. to Biostatistics [2]	4.19/5	College of William and Mary
Matlab for Biologists [2]	4.38/5	College of William and Mary
Calculus I for Life Sciences	4.33/5	College of William and Mary
Calculus II for Life Sciences	4.5/5	College of William and Mary
Networks in Biology [2]	4.5/5	College of William and Mary
Introduction to Quantitative Biology [2]	4.25/5	College of William and Mary

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[2]Curriculum development.

X. UNDERGRADUATE RESEARCH EXPERIENCES

- Co-instructor: Cornell Mathematical Contest in Modeling, Cornell University, 2006-2007

- Current students:

  - Katherine Shipman (Spring 2012–Present)
  - Allyson Mateja (Fall 2012–Present)
  - Scott Nordstrom (Spring 2013–Present)
  - Troy Thomas (Spring 2013–Present)
  - Sivan Yair (Spring 2014–Present)

- Previous students:

  - Sarah Gilliand (Fall 2011–Spring 2014),
    Undergraduate Honors Thesis: *"Population Modeling of Diamondback Terrapins"*
  - Catherine King (Spring 2012–Spring 2014, co-advised with Sarah Day),
    Undergraduate Honors Thesis: *"Nonlinear Models of Zooplankton Communities"*
  - Ryan Gryder (Summer 2012–Spring 2014),
    Undergraduate Honors Thesis: *"Basins of Attraction of Pulsed-Coupled Oscillators"*
  - Sarah Kunkler (Summer 2010–Spring 2012, co-advised with Rex Kincaid),
    Undergraduate Honors Thesis: *"Finding the Minimum Randić Index"*
  - Allison Corish (Summer 2011–Spring 2012, co-advised with Sarah Day),
    Undergraduate Honors Thesis: *"Global Dynamics of Pulse-Coupled Oscillators"*
  - Emily Caggiano (Spring 2014)
  - Anthony Bennici (Spring 2012)
  - James Woods (Summer 2012)

XI. SOFTWARE WRITTEN & PROGRAMMING EXPERIENCE

- *PyDSTool*: An integrated simulation, modeling, and analysis package for dynamical systems, R. Clewley, W. E. Sherwood, M. D. LaMar, and J. Guckenheimer, 2007 (Python, C)
  Available online at: www.sourceforge.net/projects/pydstool.

  Used in at least 6 published research articles, including:

  - *Periodic orbit continuation in multiple time scale systems*, M. D. LaMar and J. Guckenheimer, Numerical continuation methods for dynamical systems: Path following and boundary value problems, Eds. B. Krauskopf, H. M. Osinga, and J. Galán-Vioque, Springer: The Netherlands, pp 253–267, 2007. [doi:10.1007/978-1-4020-6356-5_8]
  - *Modeling the role of covalent enzyme modification in Escherichia coli nitrogen metabolism*, P. B. Kidd and N. S. Wingreen, Phys. Biol. 7, 016006, 2010.
  - *Dominant ionic mechanisms explored in spiking and bursting using local low-dimensional reductions of a biophysically realistic model neuron*, R. Clewley, C. Soto-Treviño, and F. Nadim, J. Comput. Neurosci. 26, pp. 75–90, 2009.

- *CSimplex*: An interactive Geomview module for triangulation and visualization of carrying simplices in n-dimensional competitive Lotka-Volterra systems, M. D. LaMar and M. L. Zeeman (C, XForms, Geomview)

- Other languages: MATLAB, Perl.