Tanya L. Leise

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Education

Ph.D. Texas A&M University, in Mathematics, December 1998.
M.S. Texas A&M University, in Mathematics, May 1995.
B.S. Stanford University, in Mathematics with Honors, June 1993.

Current Position: Assistant Professor of Mathematics, Amherst College.

Research Interests: Mathematical modeling, partial differential equations, integral transforms, dynamic fracture mechanics, mathematical biology, and coupled nonlinear oscillators.

Refereed Publications

T. Leise, J. R. Walton, and Y. Gorb, *A boundary integral method for a dynamic, transient mode I crack problem with viscoelastic cohesive zone*, accepted by Int. J. Fracture.

Michael T. Catalano, T. Leise, and Thomas J. Pfaff, *Measuring Energy Inequity: Integration and the Gini Coefficient*, Numeracy, 2:2 (2009), Article 4.

A.J. Davidson, O. Castanon-Cervantes, T. Leise, P. Molyneux, and M. Harrington, *Visualizing jet lag in the mouse suprachiasmatic nucleus and peripheral circadian timing system*, European Journal of Neuroscience, 29:1 (2009), 171-180.

T. Leise, J. R. Walton, and Y. Gorb, *Reconsidering the boundary conditions for a dynamic, transient mode I crack problem*, Journal of Mechanics of Materials and Structures, 3:9 (2008), 1797-1807.

Eric Bittman and T. Leise, *Multi-oscillatory circadian systems.* In: Binder, M.D., Hirokawa, N., Windhorst, U. (eds), Encyclopedia of Neuroscience. Springer, Berlin (2008).

T. Leise and E. Moin, *A mathematical model of the Drosophila circadian clock with emphasis on post-translational mechanisms*, Journal of Theoretical Biology 28 (2007), 48-63.

T. Leise and Andrew L. Cohen, *Nonlinear oscillators at our fingertips*, American Mathematical Monthly, 114:1 (2007), 14-28.

T. Leise, *As the planimeter's wheel rolls*, The College Mathematics Journal, 38:1 (2007), 24-31.

Kurt Bryan and T. Leise, *The $20,000,000 eigenvector: the linear algebra behind Google*, SIAM Review, 48:3 (2006), 569-581.

T. Leise and Hava Siegelmann, *Dynamics of a multistage circadian system*, Journal of Biological Rhythms, 21:4 (2006), 314-323.

T. Leise, *A general solution method for an anti-plane shear crack dynamically accelerating along a bimaterial interface*, J. Mech. Phys. Solids, 53:3 (2005), 639-653.

T. Leise and Jay R. Walton, *An analytical and numerical study of a dynamically accelerating semi-infinite crack in a viscoelastic material*, Int. J. Fracture, 127:2 (2004), 101-117.

T. Leise and J. R. Walton, *A method for solving dynamically accelerating crack problems in linear viscoelasticity*, SIAM J. Applied Math **64**:1 (2003), 94-107.

T. Leise and J. R. Walton, *Dynamically accelerating cracks part 2: A finite length mode III crack in elastic material*, Quart. Appl. Math., **59**:4 (December 2001), 601-614.

T. Leise and J. R. Walton, *A general method for solving dynamically accelerating multiple co-linear cracks*, Int. J. Fracture, **111**:1 (Sept 2001), 1-16.

Robert Finn and T. Leise, *On the canonical proboscis*, Zeit. Anal. Anwend, **13**:3 (1994), 443-462.

Manuscripts Submitted for Review

K. Bryan and T. Leise, *Impedance imaging, inverse problems, and Harry Potter's cloak*.

Other Publications

T. Leise and David Finn, *Rose-Hulman hosts 18th annual undergraduate mathematics research conference*, SIAM News, **34**:5 (June 2001), 9.

David Finn and T. Leise, *Organizing an undergraduate math conference*, MAA Focus, **21**:1 (January 2001), 12-13.

Research With Undergraduates

Stephen Oloo: Vehicle routing problem with pickups and deliveries, summer 2008.

Elisabeth Baseman: Aftereffects in the circadian period of cockroaches, Interterm 2008.

Simon Townsend: Modeling the molecular clock mechanism of *Drosophila*, summer 2007.

Emily Moin: Modeling the molecular clock mechanism of *Drosophila*, summer 2006.

Qingsi Zhu: Coupled nonlinear oscillators and mammalian circadian rhythms, summer 2006.

Thesis Students

Liana Medina-Rios (Modeling of hepatitis C treatment, Mount Holyoke College, 2009).

Appointments

7/07-present Department of Mathematics, **Amherst College**.
Assistant Professor: Teach 4 courses per year, including calculus, vector calculus, linear algebra, Fourier and wavelet analysis, differential equations (emphasis on nonlinear dynamics), and mathematical modeling.

7/04-6/07 Department of Mathematics and Computer Science, **Amherst College**.
Visiting Assistant Professor: Taught 4 courses per year.

9/99-6/04 Department of Mathematics, **Rose-Hulman Institute of Technology**.
Assistant Professor: Taught eight courses per year, with typically 15-25 students per class, including calculus, vector calculus, ordinary differential equations, linear algebra, statistics, mathematical modeling, and boundary value problems (PDEs). I was also the course coordinator for two freshman and sophomore multi-section courses and the faculty advisor for 3rd year math majors.

9/98-5/99 Department of Mathematics, **Indiana University**.
Visiting Lecturer: Taught three sections of finite mathematics (fall semester) and one section of calculus (spring semester), 85 students per section.

6/97-7/97 Department of Mathematics, **Texas A&M University**.
Lecturer: Taught business calculus, class size 40.

Consultant Activity

Consultant for U.S. Army Research Laboratory/University of Nebraska Lincoln, "An Analysis of the Dynamic Transient Propagation of a Mode I Crack-Tip Cohesive Zone" (2005-2008) and "Analysis of Wave Propagation in Nonlinear Elastic and Viscoelastic With Application to Brain Trauma From Blast Wave Impact" (2008).

Fellowships

8/01-11/01 Sloan Foundation Pre-Tenure Leave Fellowship,
Department of Mathematics, Rose-Hulman Institute of Technology.
9/94-8/98 National Science Foundation Graduate Research Fellowship,
Department of Mathematics, Texas A&M University.
9/93-8/94 Lechner Merit Fellowship,
Department of Mathematics, Texas A&M University.

Honors and Awards

- Lester R. Ford Award (2008), given by the Mathematical Association of America for a noteworthy expository paper in the American Mathematical Monthly, "Nonlinear oscillators at our fingertips."
- Association of Women in Mathematics Travel Grant (2004).
- ExxonMobil Project NExT Fellow (Mathematical Association of America, 2000-01).
- Guseman Prize in Mathematics, for achievement in research and academics (Texas A&M, 1998).
- Firestone Medal for Excellence in Research (Stanford University, 1993).
- Deans' Award for Excellence in Academic Achievement (Stanford University, 1993).
- Member, Phi Beta Kappa, Beta of California at Stanford University.

Professional Service

- Regular contributor to *Media Highlights* column in the College Mathematics Journal since March 2005, covering topics in the history of mathematics and in mathematical biology.
- Serve on review panels for NSF.
- Reviewer for Mathematics Magazine, the College Mathematics Journal, International Journal of Solids and Structures, and the Journal of Biological Rhythms.
- Co-organizer of MAA Contributed Paper Session on Mathematical Modeling in the Classroom, JMM-Baltimore 2003 (with Brian Winkel and Amy Radunskaya).
- Co-organizer of the 2001 Rose-Hulman Undergraduate Mathematics Conference (with David Finn).

Other Affiliations: Associate member of the Neuroscience and Behavior Program at UMass-Amherst, active participant in the Five Colleges Biological Clocks Group Journal Club, and affiliated faculty member of the Environmental Studies program at Amherst College.

Invited Presentations

Dirichlet-to-Neumann Maps and Dynamic Fracture Mechanics, UMass-Amherst Applied Analysis and Computation Seminar, April 21, 2009.

Mathematical Modeling of the Quabbin Reservoir (two hour-long presentations), Climate Change Conference at The Williston Northampton School, March 31, 2009.

Modeling Circadian Rhythms, Schupf Seminar, Amherst College, December 3, 2008.

Pi Mu Epsilon Honor Society induction speaker, Manhattan College, April 17, 2008.

The Linear Algebra Behind Google's PageRank, Mathematics Seminar, Bentley College

(Waltham, MA), October 18, 2006; Holy Cross College (Worcester, MA), March 28, 2007; Middlebury College (Middlebury, VT), October 2, 2007; and St. Mary's University of Minnesota (Winona, MN), October 8, 2007.

Dynamically Accelerating Cracks in Elastic and Viscoelastic Materials, Engineering Mechanics Department, University of Nebraska-Lincoln, August 29, 2006.

An Analysis of the Dynamic Transient Propagation of a Mode I Crack-Tip Cohesive Zone, U.S. Army Research Laboratory/University of Nebraska Semiannual Review Meeting, March 5, 2006 in San Antonio.

Dynamics of a Multistage Circadian System, October 27, 2005, Smith College Math Seminar, and November 1, 2005, UMass-Amherst Applied Analysis and Computation Seminar.

Dynamics of Biological Oscillators, April 6, 2005, to the Mount Holyoke College Math Club.

A Solution Method for Dynamically Accelerating Cracks in Viscoelastic Materials and Elastic Bimaterials, in minisymposium on fracture at the SIAM Conference on Mathematical Aspects of Material Science, May 23-26, 2004 in Los Angeles.

Half-Plane Boundary Value Problems, March 4, 2004, invited talk for the Mount Holyoke College Math Department Seminar.

The Celestial Sphere: Geometry and Astrolabes, March 3, 2004, guest speaker for the Mount Holyoke College Math Club, and on April 14, 2004, for the Rose-Hulman Math Seminar.

A Dynamically Accelerating Crack in a Linearly Viscoelastic Material, October 14, 2002, Special Session at the 2002 Meeting of the Society of Engineering Science, Penn State University.

Mathematical Models of Shape Memory Alloys, April 25, 2001, Mathematics Department, Rose-Hulman Institute of Technology, Terre Haute, IN.

Tessellations, July 6 and 12, 2000, as part of the Fast Forward summer science program for junior high girls, Rose-Hulman Institute of Technology, Terre Haute, IN.

A Two-Part Seminar on Dynamically Accelerating Cracks, November 3 and 10, 1999, Mathematics Department, Rose-Hulman Institute of Technology, Terre Haute, IN.

Dynamically Accelerating Cracks in the Context of Plane Strain, 36th Annual Technical Meeting of the Society of Engineering Science, October 25, 1999, University of Texas at Austin.

An Introduction to Dynamically Accelerating Cracks, Differential Equations Seminar, Mathematics Department, November 16, 1999, Purdue University, West Lafayette, IN.

Dynamic Fracture and the Dirichlet-to-Neumann Map, seminar as part of the Research Experiences for Undergraduates, July 30, 1999, Indiana University, Bloomington, IN.

Contributed Presentations

A Mathematical Model of Circadian Aftereffects (poster), July 21, 2009, Gordon Conference on Chronobiology, Newport, Rhode Island.

A Mathematical Model of the Drosophila Circadian Clock (poster), May 7, 2007, Gordon Conference on Chronobiology, Aussois, France.

Modeling the Dynamics of a Multistage Circadian System (poster), August 3, 2006, SIAM Life Sciences Conferences, Raleigh, NC.

Dynamics of a Multistage Circadian System (poster), May 21, 2006, Society for Research on Biological Rhythms Biennial Meeting, Sandestin, FL.

Modeling the Molecular Mechanisms of Circadian Rhythms and Their Response to Light, January 14, 2006 AMS/MAA Joint Meetings, San Antonio.

Phase Transitions in Coupled Nonlinear Oscillators, January 6, 2005, Projects and Demos That Enhance a DE Course, 2005 AMS/MAA Joint Meetings, Atlanta.

Not Just Twiddling Our Thumbs, January 19, 2003, Mathematical Modeling In and Out of the Classroom Session at 2003 AMS/MAA Joint Meetings, Baltimore.

Mathematical Models from Psychology, March 24, 2001, MAA Indiana Section Meeting, University of Indianapolis.

A Shape Memory Alloy Calculus Project, January 12, 2001, Classroom Demonstrations Session at the 2001 AMS/MAA Joint Meetings, New Orleans.

Dynamically accelerating cracks along a bimaterial interface (poster), AWM Olga Taussky-Todd Celebration of Women in Mathematics, July 17, 1999, MSRI, Berkeley, CA.

Two dynamically accelerating cracks in elastic material (poster), AWM Workshop, SIAM Annual Meeting, July 14, 1998, Toronto, Ontario.

The Neumann-to-Dirichlet map and applications to dynamic fracture, SIAM 45th Anniversary Conference, July 18, 1997, Stanford University, CA.

The Dirichlet-to-Neumann map and applications to dynamic fracture, Second SIAM Conference on Mathematical Aspects of Materials Science, May 12, 1997, Philadelphia, PA.

Workshops and Short Courses Attended:

MAA Minicourse on Game Theory, January 2009, Math Joint Meetings, Washington, DC.

MAA Minicourse on Mathematics of Voting, August 2008, MAA MathFest, Madison, WI.

Mathematics of Social Justice Workshop, Middlebury College, Middlebury, VT, June 20-23, 2007, organized by Priscilla Bremser.

NSF Chautauqua Course "Circadian Biology: From Clock Genes and Cellular Rhythms to Sleep Regulation," May 11-13, 2005, Harvard University, organized by J.W. Hastings, Charles A. Czeisler, and Steven W. Lockley.

AMS Short Course on Computerized Tomography, January 3-4, 2005, AMS/MAA Joint Meetings, Atlanta.

MAA Minicourse on Financial Mathematics, January 5, 2005, AMS/MAA Joint Meetings, Atlanta.

MAA Short Course on the History of Mathematical Technologies, January 5-6, 2004, at the 2004 AMS/MAA Joint Meetings, Phoenix.

MAA Minicourse on Visual Linear Algebra, January 18 and 20, 2003, at the 2003 AMS/MAA Joint Meetings, Baltimore.

Project NExT Workshops (New Experiences in Teaching) and an MAA Minicourse on Teaching Contemporary Statistics with Active Learning, January 11 and 13, 2001, at the 2001 AMS/MAA Joint Meetings, New Orleans.

Project NExT Workshops and a short course on Discrete Dynamical Systems, MAA Mathfest 2000, UCLA, July 31-August 5, 2000.

Pacific Crest Teaching Institute Workshop (on assessment methodologies), February 28-March 1, 2000, Rose-Hulman Institute of Technology, Terre Haute, IN.

Mathematical Modeling for Instructors and Graduate Students, Institute for Mathematics and Its Applications, University of Minnesota at Minneapolis, July 29-August 16, 1996.

Workshop on Women in Mathematical Sciences Connected to Industry, Institute for Mathematics and Its Applications, University of Minnesota at Minneapolis February 23-25, 1996 (invited participant).