

Robert S. Manning

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Education

Ph. D. Cornell University, Applied Mathematics, August 1994 (M. S. January 1993).
Held National Science Foundation Graduate Fellowship 1989–1992.
B. S. Yale University, Applied Mathematics, May 1989.

Experience

Jul. 1998—present Haverford College, Math Department; Assoc. Prof. 05–, Asst. Prof. 98–05
Nov. 1997—Jun. 1998 Ecole Polytechnique Fédérale de Lausanne, Département de Mathématiques;
Assistant
Jun. 1995—May 1998 University of Maryland at College Park, Institute for Physical Science and
Technology; NSF Postdoctoral Research Fellow
Aug. 1994—Jun. 1995 Williams College, Mathematics Department; Visiting Assistant Professor

Grants

- “RUI: Continuum Models of DNA and Protein Coils”, National Science Foundation, 8/03–1/08.
- “RUI: Continuum Modeling of DNA Cyclization”, National Science Foundation, 8/99–8/03.
- “Protein-Based Biomaterials for Nanotechnology”, David and Lucile Packard Foundation, 7/00–7/05 (with K. Akerfeldt, S.A. Kane, J. de Paula, R. Fairman, K. Johnson, W. Smith).

Awards

- William H. and Johanna A. Harris Chair of Computational Science, 2006–present
- Christian R. and Mary F. Lindback Foundation award for teaching, Haverford College, 2005.

Publications (* denotes Haverford undergraduate)

- I.N. Okeke, R.S. Manning, and T. Pfeiffer, “Diagnostic schemes for reducing epidemic size of African viral hemorrhagic fever outbreaks”, *Journal of Infection in Developing Countries* **8** (2014) 1148–1159.
- R. S. Manning, “A catalogue of stable equilibria of planar extensible or inextensible elastic rods for all possible Dirichlet boundary conditions”, *J. Elast.* **115** (2014) 105–130.
- B. P. Tsang*, H. S. Bretscher*, B. Kokona, R. S. Manning, and R. Fairman, “Thermodynamic Analysis of Self-Assembly in Coiled-Coil Biomaterials”, *Biochemistry* **50** (2011) 8548–8558.
- K. M. Peterson* and R. S. Manning, “Ineffective perturbations in a planar elastica”, *Involve* **2** (2009) 557–578.
- K. A. Hoffman and R. S. Manning, “An extended conjugate point theory with application to the planar buckling of an elastic rod subject to a repulsive self-potential”, *SIAM Journal on Mathematical Analysis* **41** (2009) 465–494.
- R. S. Manning, “Conjugate Points Revisited and Neumann-Neumann Problems”, *SIAM Review* **51** (2009) 193–212.
- D. J. Rigotti*, B. Kokona, T. Horne*, E. K. Acton*, C. D. Lederman*, R. S. Manning, S. A. Kane, W. F. Smith, and R. Fairman, “AFM Images Reveal Unusual Filaments formed by the *Acanthamoeba Castellani* Myosin II Rod Domain”, *Anal. Biochem.* **346** (2005) 189–200.

- R. S. Manning and G. B. Bulman*, “Stability of an elastic rod buckling into a soft wall”, Proc. R. Soc. Lon. Ser. A, **461** (2005) 2423–2450.
- K. A. Hoffman, R. S. Manning, and J. H. Maddocks, “Link, Twist, Energy, and the Stability of DNA Minicircles”, Biopolymers, **70** (2003) 145–157.
- K. A. Hoffman, R. S. Manning, and Randy C. Paffenroth, “Calculation of the stability index in parameter-dependent calculus of variations problems: Buckling of a twisted elastic strut”, SIAM Journal on Applied Dynamical Systems, **1** (2002) 115–145.
- R. S. Manning and K. A. Hoffman, “Stability of n -covered circles for elastic rods with constant planar intrinsic curvature”, Journal of Elasticity, **62** (2001) 1–23.
- P. B. Furrer, R. S. Manning, and J. H. Maddocks, “DNA Rings with Multiple Energy Minima”, Biophysical Journal, **79** (2000) 116–136.
- R. S. Manning and J. H. Maddocks, “Symmetry Breaking and the Twisted Elastic Ring”, Comput. Methods Appl. Mech. Engrg., **170** (1999) 313–330.
- R. S. Manning, K. A. Rogers, and J. H. Maddocks, “Isoperimetric conjugate points with application to the stability of DNA minicircles”, Proc. R. Soc. Lon. Ser. A., **454** (1998) 3047.
- J. H. Maddocks, R. S. Manning, R. C. Paffenroth, K. A. Rogers, and J. A. Warner, “Interactive computation, parameter continuation, and visualization”, Int. J. of Bif. and Chaos., **7** (1997) 1699.
- R. S. Manning, J. H. Maddocks, and J. D. Kahn, “A Continuum Rod Model of Sequence-Dependent DNA Structure”, J. Chem. Phys., **105** (1996) 5626.
- R. S. Manning and G. S. Ezra, “A uniform regularized semiclassical propagator for the x^{-2} potential”, Phys. Rev. A., **53** (1996) 661.
- R. S. Manning and G. S. Ezra, “Regularized semiclassical radial propagator for the Coulomb potential”, Phys. Rev. A, **50** (1994) 954.
- R. S. Manning and N. De Leon, “Theory of Projected Probabilities on Non-Orthogonal States: Application to Electronic Populations in Molecules”, J. Math. Chem., **5** (1990) 323–357.
- Emily Ann Schmalzer, Robert Scott Manning, and Shu Chien, “Filtration of sickle cells: recruitment into a rigid fraction as a function of density and oxygen tension”, J. Lab. Clin. Med., **113** (1989) 727–734.

Recent Presentations

- “Monte Carlo simulations of DNA cyclization using a rigid-base model and mechanical properties derived from molecular dynamics”, 8th European Nonlinear Dynamics Conference (ENOC 2014), Vienna, July 2014.
- “Monte Carlo simulations within a rigid-base model of DNA with comparison to experimental measurements of persistence length”, AMS Spring Eastern sectional meeting, University of Maryland Baltimore County, March 2014.
- “Monte Carlo simulations of DNA cyclization using a rigid-base model and mechanical properties derived from molecular dynamics”, AMS Fall Eastern sectional meeting, Temple University, October 2013.

- “A generalization of conjugate points for a broader range of elastic rod problems”, Applied Math seminar, Temple University, March 2013.
- “Mathematical models for DNA looping or cyclization: Monte Carlo simulations and semiclassical approximations”, Differential Equations seminar, University of Maryland Baltimore County, October 2011.
- “Mathematical models for DNA looping or cyclization: Monte Carlo simulations and semiclassical approximations”, BiCo Math Colloquium, Bryn Mawr College, March 2011.
- “Mathematical models for DNA looping or cyclization: Monte Carlo simulations and semiclassical approximations”, Applied Math seminar, University of Delaware, February 2011.
- “Conjugate Point test for stability of elastic rod configurations subject to a repulsive self-contact potential”, SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2009.
- “Elastic rods and conjugate points”, Mathematics colloquium, St. Joseph’s University, February 2009.
- “Computational Implementations of Entropic Correction to DNA Cyclization”, SIAM Conference on Mathematical Aspects of Material Science, Philadelphia, May 2008.
- “Elastic rod contact problems and conjugate points”, Mathematics colloquium, Drexel University, April 2007.
- “A continuum rod model for DNA cyclization and a contact problem”, Applied Math seminar, University of Maryland Baltimore County, March 2006.

Professional Activities

- Editorial Board member, Scientific Reports
- Reviewer for NSF, Mathematical Reviews, Journal of Elasticity, Journal of Chemical Physics, Proceedings of the Royal Society of London Series A, SIAM Review, International Journal of Nonlinear Mechanics, Computer Methods in Applied Mechanics and Engineering, Discrete and Continuous Dynamical Systems, Journal of Fluids and Structures, Taylor & Francis Publishers, American Mathematical Society, Cambridge University Press, Applied Mathematics Letters, ZAMM
- Special session co-organizer (“Mathematical Biology”), AMS Fall Eastern Sectional Meeting, Temple University, Philadelphia, PA, October 2013.
- Minisymposium co-organizer (“Modeling DNA as an elastic object” and “Elastic Rods and Applications, Parts I and II”), SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2009.
- Minisymposium co-chair (“Mechanical models of DNA”), SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2003.
- Minisymposium co-chair (“Continuum mechanics of DNA”), IMACS 2000 World Congress, Lausanne Switzerland, Aug. 2000.

Recent College Service

- Department Chair (Spring 2007, 08-09, 09-10, Spring 2011)

- Academic Council (07-08, 08-09, 15-16)
- Faculty Representative to the Board of Managers (07-08, 08-09)
- Faculty Committee on Academic Excellence (chair) (09-10)
- Ad Hoc Search Committees in Mathematics (06-07, 11-12)
- Search Committee in Mathematics at Bryn Mawr (10-11)
- Appeals Committee (10-11)
- Steering Committee for Koshland Integrated Science Center (11-12, 12-13)
- Faculty Affairs and Planning Committee (12-13, 13-14)
- Admissions Committee (13-14)
- IACUC (chair) (14-15, 15-16)

Research undergraduate research students:

Laura Kasakoff (2005), Ryan Sajac (2005), Joel Kwabi (2005), Kaitlyn Peterson (2006), Phil Zhang (2007, 2008), Luis Mosquera (2007), Will McKerrow (2009, 2011), Andrew Lipstein (2009), Joshua Weiss (2010), Rachel Grimmelmann (2010), Chang Cao (2010), Rengyi (Emily) Xu (2011), Laurie Merrell (2013), David Marsico (2013), Ting Zhou (2015), Tiancheng Liu (2015)

Recent undergraduate theses advised:

“FitzHugh-Nagumo: Measuring Nerve Impulse Transmissions”, Perri Donenfeld '06
“The Fourier Transform”, Mark Maienschein-Cline '07
“Copula Functions: Theory and an Application to Financial Data”, Rachel Heaton '07 (co-advised with Kobi Abayomi)
“Chaos in Dynamical Systems”, Emma O'Neill '08
“Hidden Markov Models and Bond Default Rates”, Will Stafford '08
“Weiner Measure, Functional Integration, and the Feynman-Kac Representation Theorem”, Phil Zhang '08
“Langevin Equations: Modeling Particle Motion and Pedestrian Trail Formation”, Dena Feldman Bryn Mawr '08
“Simulated Annealing”, Sonia Gilbukh '09
“Pseudorandom Number Generators: What Makes a Good Generator”, Jacob Blanton '09
“Neutron Optics: A Mathematical Approach to Acceptance Diagrams and Ray Tracing”, David Winogradoff '09
“Modeling HIV Therapy: Fighting a Virus With Another Virus”, Andrew Wei '10
“Classifying and Reclassifying Cellular Automata: Paradise Lost and Found in Garden-of-Edens”, Andrew Lipstein '10
“Measure Theory, Probability, and Martingales”, Ryan Fackler '11
“Fractal Image Compression”, Daphne Papis '12
“Repeated Games in Economics”, Theo Feder '12
“Pricing Derivatives: Black-Scholes”, Joshua Weiss '12
“The Adiabatic Theorem of Quantum Mechanics”, Aaron Buikema '13
“Nash Equilibria in a Hotelling-Type Model with Non-Uniform Consumer Density”, Matthew Mazewski '13

“An Application of Artificial Neural Networks to Solving Ordinary Differential Equations”, Jonathan Fosdick '13

“Application of the Black-Scholes Model in Baseball Free Agency”, Brett Cohen '14

“Using Box Models to Study Ocean Dynamics”, Brittney Li '14

“Membrane Harmonics: A Study of Isospectral non-isometric membranes and their properties”, Aspen deVries '14

“Analysis of GRANTISM Ice Sheet Model”, Margaret Duffy '15

“Epidemic Modeling and the 2014 Ebola Outbreak”, Alyssa Lavin '15

“Solving the Ising Problem on the Chimera Graph”, Muyuan Li '15

“The Second Derivative Test in the Calculus of Variations”, David Marsico '15