

Nawaf Bou-Rabee

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Faculty Positions

- Associate Professor of Mathematics, Rutgers University, 2017–present
- Assistant Professor of Mathematics, Rutgers University, 2011–2017.
- Courant Instructor, New York University, 2009–2011.

Education

- Ph.D. Applied & Computational Mathematics, California Institute of Technology 2007.
- B.A. Computational & Applied Mathematics, Rice University 2001.
- B.S. Mechanical Engineering, Rice University 2001.

Research Support

2017 - 2018 Rutgers Camden Provost's Catalyst Grant # 205536

Randomized Hamiltonian Monte-Carlo,
Principal Investigator: Nawaf Bou-Rabee

2012 - 2015 US National Science Foundation Grant # DMS-1212058

Towards Fast & Stable Schemes for Brownian Dynamics with Hydrodynamic Interactions,
Principal Investigator: Nawaf Bou-Rabee

2008 - 2011 US National Science Foundation Grant # DMS-0803095

Mathematical Sciences Postdoctoral Research Fellowship,
Principal Investigator: Nawaf Bou-Rabee

Editorial Work

2013 - present Editor, *Journal of Computational Dynamics,*

<http://aimsciences.org/journals/homejcd.jsp?journalID=24>
a publication of the American Institute of Mathematical Sciences.

In the last five years, I have reviewed papers/books for CRC Press, Annals of Applied Probability, Stochastic Partial Differential Equations, Foundations of Computational Mathematics, Archive of Rational Mechanics and Analysis, Discrete and Continuous Dynamical Systems-A, Journal of Nonlinear Science, Communications for Mathematical Sciences, SIAM Journal of Numerical Analysis, BIT, Journal of Computational Physics, Multiscale Modeling and Simulation, and IMA Journal of Numerical Analysis.

Papers

19. **Cayley Splitting for Second-Order Langevin Stochastic Partial Differential Equations.** arXiv:1707.05603 [math.PR].
18. **Geometric Integrators and the Hamiltonian Monte Carlo Method.** (with J. M. Sanz-Serna), To appear in *Acta Numerica 2018*.
17. **Randomized Hamiltonian Monte Carlo.** (with J. M. Sanz-Serna), 2017, *Annals of Applied Probability*, 27, 2159–2194.
16. **Spectrwm: Spectral Random Walk Method for the Numerical Solution of SPDEs.** To appear in *SIAM Review: Research Spotlights*.
15. **Continuous-Time Random Walks for the Numerical Solution of SDEs.** (with E. Vanden-Eijnden), To appear in *Memoirs of the American Mathematical Society*.
14. **Metropolized Integration Schemes for Self-Adjoint Diffusions.** (with A. Donev & E. Vanden-Eijnden), 2014, *Multiscale Modeling and Simulation*, 12, 781–831.
13. **Time Integrators for Molecular Dynamics.** 2014, *Entropy*, 16, 138–162.
12. **Non-asymptotic mixing of the MALA algorithm.** (with M. Hairer), 2013, *IMA Journal of Numerical Analysis*, 33, 80–110.
11. **A patch that imparts unconditional stability to explicit integrators for Langevin-like equations.** (with E. Vanden-Eijnden), 2012, *Journal of Computational Physics*, 231, 2565–2580.
10. **Pathwise Accuracy & Ergodicity of Metropolized Integrators for SDEs.** (with E. Vanden-Eijnden), 2010, *Communications of Pure and Applied Mathematics*, 63, 655–696.
9. **Long-Run Accuracy of Variational Integrators in the Stochastic Context.** (with H. Owhadi), 2010, *SIAM Journal of Numerical Analysis*, 48, 278–297.
8. **Stochastic Variational Integrators.** (with H. Owhadi), 2009, *IMA Journal of Numerical Analysis*, 29, 421–443.
7. **A Comparison of GHMC with & without Momentum Flips.** (with E. Akhmatskaya & S. Reich), 2009, *Journal of Computational Physics*, 228, 2256–2265.
6. **Hamilton-Pontryagin Integrators on Lie Groups.** (with J. E. Marsden), 2008, *Foundations of Computational Mathematics*, 9, 197–219.
5. **Dissipation-Induced Heteroclinic Orbits in Tippe Tops.** (with J. E. Marsden & L. A. Romero), 2008, *SIAM Review*, 50, 325–344.
4. **The Motion of the Spherical Pendulum Subjected to a D_n Symmetric Perturbation.** (with P. Chossat), 2005, *SIAM Journal of Applied Dynamical Systems*, 4, 1140–1158.
3. **A Geometric Treatment of Jellett’s Egg.** (with J. E. Marsden & L. A. Romero), 2005, *ZAMM - Journal of Applied Mathematics and Mechanics*, 85, 618–642.

2. **Tippe Top Inversion as a Dissipation-Induced Instability** (with J. E. Marsden & L. A. Romero), 2004, *SIAM Journal of Applied Dynamical Systems*, 3, 352–377.
1. **A Multi-Parameter, Numerical Stability Analysis of a Tubular Cantilever Conveying Fluid** (with L. A. Romero & A. G. Salinger), 2002, *SIAM Journal of Applied Dynamical Systems*, 1, 190–214.

Talks

- Jan 2017** *Oberseminar Stochastik*. Institute for Applied Mathematics, Bonn University, Germany
- Nov 2016** *Scientific and Statistical Computing Seminar*, University of Chicago, IL
- May 2016** *Minisymposium on Computational Methods for Materials Science*. SIAM Conference on Mathematical Aspects of Materials Science.
- May 2016** *Mathematics Seminar*. Universidad de Valladolid, Valladolid, Spain
- May 2016** *Mathematics Colloquium*. Charles III University of Madrid, Madrid, Spain
- Dec 2015** *Probability Seminar*. Brown University, RI
- Nov 2015** *Mathematics Seminar*. Universidad de Valladolid, Valladolid, Spain
- Nov 2015** *Applied Probability and Statistics Seminar*. ICMAT, Madrid, Spain
- Sept 2015** *Oberseminar Stochastik*. Institute for Applied Mathematics, Bonn University, Germany
- Mar 2015** *Fluid Mechanics and Waves Seminar*. New Jersey Institute of Technology, NJ
- Dec 2014** *Stochastic Computation Workshop*. Eighth Foundations of Computational Mathematics Conference, Montevideo, Uruguay
- Nov 2014** *PDE and Applied Mathematics Seminar*, Drexel University, PA.
- Feb 2014** *Scientific and Statistical Computing Seminar*, University of Chicago, IL
- June 2013** *Minisymposium on Multiscale Computation of Fluctuating Hydrodynamics and Microscale Mechanics*. SIAM Conference on Mathematical Aspects of Materials Science.
- April 2012** *Stochastic Analysis Seminar*, Princeton University, NJ
- Aug 2011** *Applied Mathematics Seminar*, Waseda University, Tokyo
- May 2011** *Mathematics Seminar*, Rutgers University, NJ
- Nov 2010** *Applied Mathematics and Computation Seminar*, U Mass, Amherst
- Oct 2010** *MFO Seminar on Ergodic Theory of Markov Processes*, Oberwolfach, Germany
- Sept 2010** *IHP Workshop on Simulation of hybrid dynamical systems and applications to molecular dynamics*, Paris, France

June 2010 *INI Workshop on SPDEs Approximation, Asymptotics and Computation*, Cambridge, England

June 2010 *INI Workshop on Simulation and Statistics of Networks*, Cambridge, England

April 2010 *Probability Seminar*, University of Wisconsin, Madison

April 2010 *Sixth Annual Structured Integrators Workshop*, San Diego, CA

Feb 2010 *SAMSI Workshop on Theory and Qualitative Behavior of Stochastic Dynamics*, Durham, NC

Dec 2009 *BIRS Workshop on Numerical Analysis of Multiscale Computations*, Banff, Canada

June 2009 *EPSRC Capstone Conference Minisymposium on Molecular Dynamics in and out of Equilibrium*, Warwick, England

May 2009 *IMA Workshop on Molecular Simulations: Algorithms, Analysis, and Applications*, Minneapolis, MN

May 2009 *Fifth Annual Structured Integrators Workshop*, Pasadena, CA

April 2009 *Mathematical Sciences Colloquium*, RPI, NY

Feb 2009 *IPAM Workshop on Rare Events in High-Dimensional Systems*, Los Angeles, CA

Nov 2008 *ICMS Workshop on Molecular Dynamics, Thermostats and Convergence to Equilibrium*, Edinburgh, Scotland

Nov 2008 *IMA Workshop on Development and Analysis of Multiscale Methods*, Minneapolis, MN

Oct 2008 *Applied Math Seminar*, Courant Institute, NYU, NY

Sept 2008 *TOSCA Seminar*, INRIA Sophia Antipolis, Nice, France

July 2008 *MFO Workshop on Applied Dynamics and Geometric Mechanics*, Oberwolfach, Germany

May 2008 *ICES Seminar*, University of Texas, Austin

April 2008 *Applied Math Seminar*, Waseda University, Tokyo, Japan

March 2008 *INI Workshop on MCMC Methods*, Cambridge, England

Dec 2007 *CRM Workshop on Chaos & Ergodicity of Realistic Hamiltonian Systems*, CRM, Montréal, Canada

Nov 2007 *CAMP/Nonlinear PDEs Seminar*, University of Chicago

Oct 2007 *AIM Workshop on Practice and Theory of Stochastic Simulation*, Palo Alto, CA

Summer Schools

Taught the following mini-courses.

1. **Spectrwm for the Numerical Solution of SPDEs.**
Gene Golub SIAM Summer School 2016
July 25-August 5, 2016 in Philadelphia, PA
2. **MCMC-based Integrators for the Numerical Solution of SDEs.**
New Perspectives in Markov Chain Monte Carlo
June 8-12, 2015 in Valladolid, Spain

Recognition

- IMA J. of Numerical Analysis Top 5 Most Downloaded Article, 2009
- NSF Mathematical Sciences Postdoctoral Research Fellowship, 2008-2011
- SIGEST (best paper award) paper in SIAM Review, 2008
- Associated Students of Caltech (ASCIT) Teaching award, 2007
- Caltech Graduate Student Council (GSC) Teaching and Mentoring Award, 2005
- US DOE Computational Science Graduate Fellowship, 2002-2006
- Outstanding Sandia Labs Student Intern, 2001
- Rice Engineering Alumni Award in Computational and Applied Mathematics, 2001

Last updated: December 2, 2017