Leonid Koralov

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College of Computer, Mathematical, and Natural Sciences
Mathematics

PERSONAL INFORMATION

Educational Background

- 1998 - PhD - SUNY at Stony Brook
- 1991 - BSc - Moscow State University

Academic Appointments at UMD

- 2012 – present - professor
- 2008 – 2012 - associate professor
- 2005 – 2008 - assistant professor

Other Employment

- 2000 – 2006 - assistant professor, Princeton University
- 1998 – 2000 - member, Institute for Advanced Study
- 1997 – 1998 - visiting graduate student, Los Alamos National Laboratory

RESEARCH, SCHOLARLY AND CREATIVE ACTIVITIES

Books

- L. Koralov, Y. Sinai. Theory of Probability and Random Processes, Springer-Verlag, Universitext (2007), 353 pp + xi. ISBN 978-3-540-25484-3

Articles

- M. Hairer, G. Iyer, L. Koralov, A. Novikov, Z. Pajor-Gyulai. A fractional kinetic process describing the intermediate time behavior of cellular flows, preprint.
- M. Freidlin, L. Koralov. Metastable distributions of Markov chains with rare transitions, preprint.
- M. Freidlin, L. Koralov, On perturbations of slowly changing dynamical systems, to appear in Nonlinearily.
- M. Freidlin, L. Koralov, A. Wentzell. On the behavior of diffusion processes with traps, to appear in Annals of Probability.

- L. Koralov, L. Tcheuko. Quasi-linear equations with a small diffusion term and the evolution of the hierarchies of cycles, Journal of Theoretical Probability (2016), Vol 29, pp. 867--895.
- M. Hairer, L. Koralov, Z. Pajor-Gyulai. From averaging to homogenization in cellular flows – an exact description of the transition, Annales de l'Institut Henri Poincare - Probabilites et Statistiques, (2016), Vol 52, No 4, pp 1592—1612.
- L. Koralov, Z. Pajor-Gyulai. On the critical behavior of a polymer model, Stochastics and Dynamics (2014), Vol 14, No 1, 12 pp.
- L. Koralov, S. Molchanov, B. Vainberg. On mathematical foundation of the Brownian motor theory. Journal of Functional Analysis 267 (2014), no. 6, 1725-1750.
- L. Koralov. Branching diffusion in inhomogeneous media, Asymptotic Analysis, (2013), Vol 81, no 3–4, pp 357–377.
- D. Dolgopyat, L. Koralov. Averaging of incompressible flows on two-dimensional surfaces, Journal of American Mathematical Society (2013), Vol 26, no 2, pp 427–449.
- L. Koralov, S. Molchanov. Structure of population inside propagating front, Journal of Mathematical Sciences (Problems in Mathematical Analysis) (2013), Vol 189, no 4, pp 637–658.
- D. Dolgopyat, M. Freidlin, L. Koralov. Deterministic and Stochastic Perturbations of Hamiltonian Systems on a 2-dimensional torus, Ergodic Theory and Dynamical Systems, (2012) Vol 32, issue 3, 899–918
- M. Freidlin, L. Koralov. Averaging Principle for quasi-linear parabolic PDE's and related diffusion processes, Stochastics and Dynamics, (2012) Vol 12, no 1, 12 pp
- M. Freidlin, L. Koralov. Nonlinear Stochastic Perturbations of Dynamical Systems, Probability Theory and Related Fields (2010), 147, pp 273–301
- M. Cranston, L. Koralov, S. Molchanov, B. Vainberg. A solvable model for homopolymers and self-similarity near the critical point, Random Operators and Stochastic Equations 18 (2010), no. 1, 7395.
- M. Freidlin, L. Koralov. Metastability for Nonlinear Random Perturbations of Dynamical Systems, Stochastic Processes and Applications 120 (2010), no. 7, 1194-1214
- Dolgopyat, L. Koralov. Motion in a Random Force Field, Nonlinearity, 22 (2009), pp 187–211.
- M. Cranston, L. Koralov, S. Molchanov, B. Vainberg. Continuous Model for Homopolymers, Jounal of Functional Analysis 256 (2009), no 8, pp 2656–2696.
- D. Dolgopyat, L. Koralov. Averaging of Hamiltonian Flows with an Ergodic Component, Annals of Probability, Vol. 36, No. 6, 1999–2049 (2008)
- (conference proceedings) L. Koralov. An Inverse Problem for Gibbs Fields, Probability and Mathematical Physics, CRM Proceedings and Lecture Notes, 42, pp 299–307 (2007)
- L. Koralov. An Inverse Problem for Gibbs Fields with Hard CorePotential, Journal of Mathematical Physics , 48 No 5 (2007)
- (conference proceedings) D. Dolgopyat, V. Kaloshin, L. Koralov. Long time behavior of periodicsto chastic flows, International Congress on Mathematical Physics, 290–295, World Sci Publ. (2005).
- L. Koralov. The Existence of Pair Potential Corresponding to Specified Density and Pair Correlation, Letters in Mathematical Physics (2005), 71, pp 135–148.
- D. Dolgopyat, V. Kaloshin, L. Koralov. A Limit Shape Theorem for Peridic Stochastic Dispersion, Communications in Pure and Applied Mathematics, 57 (2004), no 9, pp 1127–1158.

- D. Dolgopyat, V. Kaloshin, L. Koralov. Sample Path Properties of the Stochastic Flows, Annals of Probability, 32 (2004) no 1A, pp 1–27.
- L. Koralov. Random Perturbations of 2-Dimensional Hamiltonian Flows, Probability Theory and Related Fields 129, pp 37–62 (2004).
- D. Dolgopyat, V. Kaloshin, L. Koralov. Hausdorff Dimension in Stochastic Dispersion, Journal of Statistical Physics, Vol 108, Nos 5/6, pp 943–972 (2002).
- R. Carmona, L. Koralov, S. Molchanov. Asymptotics for the Almost Sure Lyapunov Exponent for the Solution of the Parabolic Anderson Problem, Random Operators and Stochastic Equations , Vol 9, No. 1, pp 77–86 (2001).
- L. Koralov. Transport by Vector Fields with Kolmogorov Spectrum, Journal of Statistical Physics, Vol 98, Issue 1/2, pp 405–418 (2000).
- L. Koralov. Transport by Time Dependent Stationary Random Flow, Communications in Mathematical Physics, 199, pp 649–681 (1999).
- L. Koralov. Effective Diffusivity of Stationary Vector Fields with Short Time Correlations, Random Operators and Stochastic Equations, no 4, Vol 5, pp 303–324 (1997).
- L. Koralov, S. Nechaev, Y. Sinai. Limit Behavior of a two-dimensional Random Walk with Topological Constraints, Theory Probab. Appl 38 (1993), no 2, 296–306.
- L. Koralov, S. Nechaev, Y. Sinai. Limiting Probability Distribution for a Random Walk with Topological Constraints, Chaos 1 (1991), no 2, 131–133.

Sponsored Research

- 2016: Seminar on Stochastic Processes - Conference grant - Co-PI, NSF
- 2013 – 2017: Asymptotic Methods in Probability and their Applications to Problems in Natural Sciences, NSF Research Grant, PI
- 2013 – 2014: Simons Fellowship in Mathematics, Simons Foundation, PI
- 2013: Graduate School Research and Scholarship Award
- 2009 – 2013: Stochastics and Dynamics: Asymptotic Problems, NSF Focused Research Group Grant
- 2007 – 2010: NSF Research Grant, PI
- 2004 – 2007: NSF Research Grant, PI
- 1999 - 2002: NSF Postdoctoral Fellowship
- 1998 – 1999: Institute for Advanced Study Fellowship

TEACHING, MENTORING AND ADVISING

Courses Taught

- STAT 601, Probability (graduate, level 2) - Spring 2015, Spring 2013
- STAT 600, Probability (graduate, level 1) - Fall 2015, Fall 2014 , Fall 2012, Fall 2010
- STAT 410, Probability – Spring 2017, Fall 2016, Spring 2016, Spring 2012, Spring 2011
- MATH 410, Advanced Calculus - Spring 2016, Spring 2015, Spring 2013, Spring 2012, Fall 2010
- MATH 411, Advanced Calculus II – Spring 2017
- STAT 400, Probability - Fall 2011

- Sabbatical - Fall 2013 - Spring 2014

Advising

Master's

- Ryan Zavislak - Spring 2013, employment - NSA

Doctoral

- Lucas Tcheuko - defended in Spring 2015, employment - FDA
- Zsolt Pajor-Gyulai - defended in Spring 2015, employment - NYU (Courant Institute).
- Pratima Hebbar - current student

Professional and Extension Education

Workshops

- SSP conference, UMD, co-organizer - 2016
- AMS meeting, Co-organizer of the special session, Georgetown University - 2015
- Conference “Asymptotic Problems in Stochastic Processes and PDEs”, Co-organizer, UMD - 2013
- Workshop “Stochastics and Dynamics, Asymptotic Problems”, Co-organizer, UMD - 2010
- Stochastic Processes and Applications meeting, Berlin, Organizer of invited session - 2009
- Stochastic Processes and Applications meeting, Urbana-Champaign, Organizer of invited session - 2007

SERVICE AND OUTREACH

Reviewing Activities for Journals and Presses

- Reviewer: Acta Applicandae Matematicae, Electronic Journal of Probability, Annals of Probability, Journal of Statistical Physics, De Gruyter, Applications and Applied Mathematics, Stochastic Processes and Applications, Nonlinearity, Journal of Mathematical Analysis and Applications, American Mathematical Monthly, SIAM Journal on Applied Dynamical Systems, Princeton University Press, Journal of Theoretical Probability, Indiana University Mathematical Journal

Reviewing Activities for Agencies and Foundations

- Repeatedly served on NSF probability panel
- Reviewer, NSF PIRE panel - 2010

Committees, Professional & Campus Service

Campus Service - Department

- Probability Seminar, Co-organizer, (currently)
- High School Mathematics Competition Committee, Serving currently
- Hiring Committee, Serving currently
- Merit Committee – 2015, 2013
- Summer REU on branching processes - 2015
- RIT on Stochastic Dynamics, Co-organizer - 2011
- Maryland Mathematics Institute, Lectured – 2010

Other Non-University Committees, Memberships, Panels, etc.

- Regeneron Science Talent Search Committee – 2015, 2016
- 2008 - 2010, Math in Moscow Committee of the AMS