Leonid Koralov

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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

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 in Refereed Journals

- P. Hebbar, L. Koralov, J. Nolen, The asumptotics of solutions to parabolic PDEs with periodic coefficients, with applications to branching in periodic media, preprint.
- M. Freidlin, L. Koralov, Diffusion in the presence of cells with semi-permeable membranes, submitted to Journal of Statistical Physics.
- M. Freidlin, L. Koralov, A. Wentzell. On diffusion in media with pockets of large diffusivity, to appear in Probability Theory and Related Fields.

- M. Freidlin, L. Koralov, Front propagation for reaction-diffusion equations in composite structures, Journal of Statistical Physics, 172 (2018), no 6, pp 1663—1681.
- D. Dolgopyat, P. Hebbar, L. Koralov, M. Perlman, Multi-type branching processes with time-dependent branching rates, Journal of Applied Probability 55 (2018), no 3, pp 701-727.
- M. Hairer, G. Iyer, L. Koralov, A. Novikov, Z. Pajor-Gyulai. A fractional kinetic process describing the intermediate time behavior of cellular flows, Ann. of Probability, 46 (2018), no. 2, pp 897-955.
- M. Freidlin, L. Koralov. Metastable distributions of Markov chains with rare transitions, Journal of Statistical Physics., 167 (2017), no 6, pp 1355-1375.
- M. Freidlin, L. Koralov, On stochastic perturbations of slowly changing dynamical systems, Nonlinearity 30 (2017), no 1, pp 445-453.
- M. Freidlin, L. Koralov, A. Wentzell. On the behavior of diffusion processes with traps, Annals of Probability. 45 (2017), no 5, pp. 3203-3222.
- 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

- 2017—2020: ARO grant, PI
- 2019: Graduate School Research and Scholarship Award
- 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 AND ADVISING

Courses Taught

- STAT 601, Probability (graduate, level 2) – Spring 2019, Spring 2018, Spring 2015, Spring 2013
- STAT 600, Probability (graduate, level 1) – Fall 2018, Fall 2015, Fall 2014 , Fall 2012, Fall 2010
- STAT 410, Probability – Spring 2018, 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 – Fall 2018, Spring 2017
- STAT 400, Probability - Fall 2011
- Sabbatical - Fall 2013 - Spring 2014

Advising

- Ryan Zavislak – defended MA in the Spring of 2013, employment – NSA
- Lucas Tcheuko – defended PhD in the Spring of 2015, employment – FDA
- Zsolt Pajor-Gyulai - defended PhD in the Spring of 2015, employment – Courant Instructor/Assistant Professor, NYU (Courant Institute)
- Pratima Hebbar -defended PhD in the Summer of 2019, employment – Phillip Griffiths Research Assistant Professor, Duke University
- Shuo Yan – current PhD student

SERVICE AND OUTREACH

Workshops organized

- 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

Committees, Professional & Campus Service

Campus Service - University

- Banneker/Key Committee (2019)
- Flagship Fellowship Committee (2019)

Campus Service - Department

- Probability Seminar, Co-organizer, (currently)
- UMD Mathematics Colloquium, Co-organizer (currently)
- Undergraduate committee (currently)
- PCC committee (currently)
- High School Mathematics Competition Committee (currently)
- Hiring Committee – 2016, 2018-19
- Merit Committee – 2013, 2015, 2018
- Summer REU on branching processes - 2015
- RIT on Stochastic Dynamics, Co-organizer – 2011, 2019
- Maryland Mathematics Institute, Lectured – 2010

Professional Service outside the University

- Regeneron Science Talent Search Committee – 2015--2018
- Math in Moscow Committee of the AMS – 2008-2010