Curriculum Vitae
Lenya Ryzhik

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Education

Stanford University, Stanford, CA
Ph.D. in Mathematics - 1997
Moscow Institute of Physics and Technology, Moscow, Russia
1986-1992 - equivalent of B.S. in Mathematical Physics

Experience

2009 – present, Professor, Department of Mathematics, Stanford University
2006 – 2009, Professor, Department of Mathematics, University of Chicago
2003 – 2006, Associate Professor, Department of Mathematics, University of Chicago
2000 – 2003, Assistant Professor, Department of Mathematics, University of Chicago
1997 – 2000, L.E. Dickson Instructor, Department of Mathematics, University of Chicago
Fall 1997, Postdoctoral Fellow, Mathematical Sciences Research Institute

Visiting Positions

Fall 2002 – CNRS, Institut Henri Poincaré, Paris
Spring 2004 – École Normale Supérieure, Paris
Spring 2007 – Université Paul Sabatier, Toulouse
Fall 2007 – École Normale Supérieure, Paris
2008-09 – Stanford University

Dissertation "Waves and Transport, Multiple Scattering of Waves in Random Medium"

Ph.D. Advisors Joseph B. Keller and George C. Papanicolaou

Research Interests Analysis and applied mathematics. More precisely: applications of mathematical methods to physically interesting systems, applied analysis and partial differential equations, stochastic analysis: wave propagation in random medium, reaction-diffusion equations, models of combustion.

Grants and Awards

NSF grant DMS-9971742 "Radiative transport theory for waves", 1999 – 2002.
ONR grant "Time Reversal for Waves in Random Media", 2001 – 2004,
Alfred P. Sloan Research Fellowship 2002 – 2004
NSF grant DMS-0203537 "Propagation of Fronts and Waves in Complex Media", 2002 – 2005.

DARPA-ONR grant N00014-04-1-0224 "Time Reversal for Electromagnetic Waves in Random Media", 2004-2008.
NSF grant DMS-0604687 "The Kinetic Theory of Waves and Reactive-Diffusive Fronts", 2006-2009.
NSF FRG grant DMS-0854952 "Collaborative Research: Stochastics and Dynamics: Asymptotic problems", 2009-2012
NSF grant DMS-0908507 "Collaborative Research: Waves and Fronts in Heterogeneous Media", 2009-2011
NSSEFF Fellowship, 2010-2015.

Editorial boards

Communications in Mathematical Sciences
Proceedings of Symposia in Applied Mathematics, AMS
Nonlinearity
SIAM Journal of Applied Mathematics

Publications and preprints

1. L. Ryzhik, E. Schulman, On the complete algebra of symmetries of integrable systems, Theor. Math. Phys. **95**, 1993, 387-392
2. L. Ryzhik, G. Papanicolaou, J. Keller, Transport equations for elastic and other waves in random media, Wave Motion, **24**, 1996, 327-370.
3. G. Papanicolaou, L. Ryzhik, J. Keller, Stability of the P to S energy ratio in the diffusive regime, Bulletin of the Seismological Society of America, **86**, 1996, 1107-1115
4. L. Ryzhik, G. Papanicolaou, J. Keller, Transport equations for waves in a half space, Communications in Partial Differential equations, **22**, 1997, 1869-1910.
5. G. Papanicolaou, L. Ryzhik Waves and transport, IAS/Park City Mathematics Series, Vol. 5, L. Caffarelli and Weinan E, eds., AMS, 1998, pp. 305-382.
6. A. Fannjiang, L. Ryzhik and G. Papanicolaou, Evolution of trajectory correlations in steady random flows, Recent Advances in Partial Differential Equations (R.Spigler, S.Venakides, eds.), AMS, 1997, 105-131.
7. G. Bal, A. Fannjiang, G. Papanicolaou and L. Ryzhik, Radiative transport in a periodic structure, Journal of Statistical Physics **95** (1/2):479-494, 1999.
8. G. Bal, J.B. Keller, G. Papanicolaou and L. Ryzhik, Transport theory for acoustic waves with reflection and transmission at interfaces, Wave Motion, **30**, 1999, 303-327.
9. G. Bal, G. Papanicolaou and L. Ryzhik, Diffusive energy scattering from weakly random surfaces, Journal of Mathematical Physics, **40**, 1999, 4813-4827.
10. G. Bal, G. Papanicolaou and L. Ryzhik, Probabilistic theory of transport processes with polarization, SIAM Journal of Applied Mathematics, **60**, 2000, 1639 - 1666
11. G. Bal and L. Ryzhik, Diffusion approximation of radiative transfer problems with interfaces, SIAM Journal of Applied Mathematics, **60**, 2000, 1887-1912.
12. P. Constantin, A. Kiselev, A. Oberman and L. Ryzhik, Bulk burning rate in passive - reactive diffusion, Archive for Rational Mechanics, **154**, 2000, 53-91.
13. G. Bal, V. Freilikher, G. Papanicolaou and L. Ryzhik, Wave transport along surfaces with random impedance, Phys. Rev. B, **62**, 2000, 6228-6240.
14. A. Kiselev and L. Ryzhik, Enhancement of the traveling front speeds in reaction-diffusion equa-

tions with advection, Ann. de l'Inst. Henri Poincaré, C. Analyse non linéaire, **18**, 2001, 309–358.
15. A. Fannjiang and L. Ryzhik, Radiative Transfer of Sound Waves in a Random Flow: Turbulent Scattering and Mode-Coupling, SIAM Journal of Applied Mathematics, **61**, 2001, 1545-1577.
16. P. Constantin, A. Kiselev and L. Ryzhik, Quenching of flames by fluid advection, Communications in Pure and Applied Mathematics, **54**, 2001, 1320–1342.
17. A. Kiselev and L. Ryzhik, An upper bound for the bulk burning rate for systems, Nonlinearity, **14**, 2001, 1297-1310.
18. G. Bal and L. Ryzhik, Wave transport for a scalar model of the Love waves, Wave Motion, **36**, 2002, 49-66.
19. G. Bal and L. Ryzhik, Time reversal for classical waves in random media, Comptes rendus de l'Académie des sciences - Série I - Mathématique, **333**, 2001, 1041-1046.
20. G. Bal, G. Papanicolaou and L. Ryzhik, Radiative transport limit for the random Schrödinger equation, Nonlinearity, **15**, 2002, 513-529.
21. G.Bal and L. Ryzhik, Time reversal and refocusing in random media, SIAM Jour. Appl. Math., **63**, 2003, 1475-1498.
22. G. Papanicolaou, K. Sølna and L. Ryzhik, The parabolic wave approximation and time reversal, Matematica Contemporanea, **23**, 2002, 139-159.
23. G. Bal, G. Papanicolaou and L. Ryzhik, Self-averaging in time reversal for the parabolic wave equation, Stochastics and Dynamics, **2**, 2002, 507-531.
24. S. Mischler, B. Perthame and L. Ryzhik, Stability in a Nonlinear Population Maturation Model, M3AS (Mathematical Models and Methods in Applied Science), **12**, 2002, 1751-1772.
25. G. Papanicolaou, K. Sølna and L. Ryzhik, Statistical stability in time reversal, SIAM Jour. Appl. Math., **64**, 2004, 1133-1155
26. G. Bal, T. Komorowski and L. Ryzhik, Self-averaging of the Wigner transform in random media, Communications in Mathematical Physics, 2003, **242**, 81-135.
27. P. Constantin, A. Kiselev and L.Ryzhik, Fronts in reactive convection: bounds, stability and instability, Communications in Pure and Applied Mathematics, **56**, 2003, 1781-1803.
28. N. Vladimirova, P. Constantin, A. Kiselev, O. Ruchaiskiy and L. Ryzhik, Flame enhancement and quenching in fluid flows, Combustion Theory and Modeling, **7**, 2003, 487-508.
29. G. Bal and L. Ryzhik, Time splitting for wave equations in random media, Mathematical Modelling and Numerical Analysis (M2AN), **38**, 2004, 961-987.
30. B. Perthame and L. Ryzhik, Exponential decay for the fragmentation or cell-division equation, Journal of the Differential Equations, **210**, 2005, 155-177.
31. A. Novikov, G. Papanicolaou and L. Ryzhik, Boundary layers for cellular flows at high Péclet numbers, Communications in Pure and Applied Mathematics, **58**, 2005, 867–922.
32. G. Bal and L. Ryzhik, Time splitting for the Liouville equation in a random medium, Communications in Mathematical Sciences, **3**, 2004, 515–534.
33. G. Bal and L. Ryzhik, Stability of time reversed waves in changing media, Discrete and Continuous Dynamical Systems A, **12**, 2005, 793-815.
34. H. Berestycki, F. Hamel, A. Kiselev and L. Ryzhik, Quenching and propagation in KPP reaction-diffusion equations with a heat loss, Archive for Rational Mechanics and Analysis, **178**, 2005, 57–80.

35. P. Gordon, N. Vladimirova and L. Ryzhik, The KPP system in a periodic flow with a heat loss, Nonlinearity, **18**, 2005, 571–589.
36. H. Berestycki, P. Constantin and L. Ryzhik, Non-Planar Fronts in Boussinesq Reactive Flows, Annales de l'Institute Henri Poincaré, C. Analyse non linéaire, **23**, 2006, 407–437.
37. B. Perthame and L. Ryzhik, The quantum scattering limit for a regularized Wigner eq-uation, Methods and Applications of Analysis, **11**, 2004, 447–464.
38. A. Fannjiang, A. Kiselev and L. Ryzhik, Quenching of reaction by cellular flows, Geometric and Functional Analysis, **16**, 2006, 40–69.
39. A. Novikov and L. Ryzhik, Bounds on the speed of propagation of the KPP fronts in a cellular flow, Archive for Rational Mechanics and Analysis, **184**, 2007, 23–48.
40. T. Komorowski and L. Ryzhik, Diffusion in a weakly random Hamiltonian flow, Comm. Math. Phys., **262**, 2006, 277–323.
41. P. Gordon and L. Ryzhik, Traveling fronts in porous media: existence and a singular limit, Proceedings of the Royal Society of London Ser. A, **462**, 2006, 1965–1985.
42. N. Vladimirova, G. Weirs and L. Ryzhik, Flame capturing with an advection-reaction-diffusion model, Combustion Theory and Modeling, **10**, 2006, 727–747.
43. F. Hamel and L. Ryzhik, Non-adiabatic KPP fronts with an arbitrary Lewis number, Nonlinearity, **18**, 2005, 2881–2902.
44. T. Komorowski and L. Ryzhik, The stochastic acceleration problem in two dimensions, Israel Journal of Mathematics, **155**, 2006, 157–204.
45. P. Constantin, K. Domelevo, J.-M. Roquejoffre and L. Ryzhik, Existence of pulsating waves in a model of flames in sprays, Journal of the European Mathematical Society, **8**, 2006, 555–584.
46. G. Bal and L. Ryzhik, Wave field correlations in weakly mismatched random media, Stochastics and Dynamics, **6**, 2006, 301–328.
47. P. Constantin, A. Kiselev, L. Ryzhik and A. Zlatos, Diffusion and mixing in a fluid flow, Annals of Mathematics **68**, 2008, 643–674.
48. P. Constantin, M. Lewicka and L. Ryzhik, Traveling waves in 2D reactive Boussinesq systems with no-slip boundary conditions, Nonlinearity, **19**, 2006, 2605–2615.
49. T. Komorowski and L. Ryzhik, Passive tracer in a slowly decorrelating random flow with a large mean, Nonlinearity, **20**, 2007, 1215–1239.
50. G. Papanicolaou, L. Ryzhik and K. Solna, Self-averaging from lateral diversity in the Itô-Schrödinger equation, SIAM MMS, **6**, 2007, 468–492.
51. B. Perthame and L. Ryzhik, Moderate dispersion in scalar conservation laws, Communications in Mathematical Sciences, **5**, 2007, 473–484.
52. L. Ryzhik and A. Zlatos, KPP pulsating front speed-up by flows, Communications in Mathematical Sciences, **5**, 2007, 575–593.
53. P. Constantin, A. Novikov and L. Ryzhik, Relaxation in reactive flows, Geometric and Functional Analysis, **18**, 2008, 1145–1167.
54. T. Komorowski and L. Ryzhik, On asymptotics of a tracer advected in a locally self-similar, correlated flow, Asymptotic Analysis, **53**, 2007, 159 – 187.
55. B. Perthame, G. Nadin and L. Ryzhik, Traveling waves for the Keller-Segel system with Fisher birth terms, Interfaces and Free Boundaries, **10**, 2008, 517-538.

56. P. Constantin, J.-M. Roquejoffre, L. Ryzhik and N. Vladimirova, Propagation and quenching in a reactive Burgers-Boussinesq system, Nonlinearity, **21**, 2008, 221–271.
57. J. Nolen and L. Ryzhik, Traveling waves in a one-dimensional random medium, Annales de l'Institute Henri Poincaré, C. Analyse non linéaire, **26**, 2009, 1021–1047.
58. H. Berestycki, A. Kiselev, A. Novikov and L. Ryzhik, The explosion problem in a flow, Journal d'Analyse Mathématique, **110**, 2010, 31–65.
59. A. Mellet, J. Nolen, J.-M. Roquejoffre and L. Ryzhik, Stability of generalized transition fronts, Communications in PDE, **34**, 2009, 521–552.
60. F. Hamel and L. Ryzhik, Travelling fronts for the thermodiffusive system with arbitrary Lewis numbers, Archive for Rational Mechanics and Analysis, **195**, 2010, 923–952.
61. T. Komorowski, Sz. Peszat and L. Ryzhik, Limit of fluctuations of solutions of Wigner Equation, Communications in Mathematical Physics, **292**, 2009, 479–510.
62. H. Berestycki, G. Nadin, B. Perthame and L. Ryzhik, The non-local Fisher-KPP equation: traveling waves and steady states, Nonlinearity **22**, 2009, 2813–2844.
63. G. Bal, T. Komorowski and L. Ryzhik, Asymptotics of the phase of the solutions of the random Schrödinger equation, Arch. Ration. Mech. Anal. **200**, 2011, 613–664.
64. G. Iyer, A. Novikov, L. Ryzhik and A. Zlatos, Exit times of diffusions with incompressible drifts, SIAM J. Math. Anal. **42**, 2010, 2484–2498.
65. A. Kiselev and L. Ryzhik, A simple model for asset price bubble formation and collapse, Preprint, 2010.
66. T. Komorowski and L. Ryzhik, Fluctuations of solutions to Wigner equation with an Ornstein-Uhlenbeck potential, to appear in DCDS-B, 2011.
67. T. Komorowski and L. Ryzhik, A sharp bound on the L^2 norm of the solution of a random elliptic difference equation, Comm. Math. Sci., **9**, 2011, 607–622.
68. G. Bal, T. Komorowski, and L. Ryzhik, Kinetic limits for waves in a random medium. Kinet. Relat. Models **3**, 2010, 529–644.
69. J. Nolen, J.-M. Roquejoffre, L. Ryzhik and A. Zlatos, Existence and non-existence of Fisher-KPP transition fronts, Preprint, 2010.
70. A. Kiselev and L. Ryzhik, Biomixing by chemotaxis and enhancement of biological reactions, to appear in CPDE, 2011.
71. T. Komorowski, A. Novikov and L. Ryzhik, Evolution of particle separation in slowly decorrelating velocity fields, Preprint, 2011.
72. G. Iyer, T. Komorowski, A. Novikov and L. Ryzhik, From homogenization to averaging in cellular flows, Preprint, 2011.

All papers and preprints may be found at my web page http://www.math.uchicago.edu/∼ryzhik.

Selected Past and Planned Talks

Mini-symposium on Wave Propagation in Seismology, Berkeley, April 1996.
Applied Mathematics Seminar, University of Wisconsin, October 1999.
Nonlinear Analysis Seminar, University of Illinois, Urbana-Champaign, October 1999.

Mathematical Investigations of Models in Combustion, IMA, November 1999.
AMS meeting at Notre Dame, April 2000.
Midwest PDE workshop, Chicago, November 2000.
Tel Aviv University, June 2000, 2001.
Hebrew University, June 2001.
Analysis, Modeling and Simulation of Multiscale Problems, Bonn, July 2001.
Schrödinger Institute, Vienna, July 2001.
École Normale Supériere, Paris, July 2001.
MSRI, Inverse problems workshop, November 2001.
Brown University, December 2001.
4th DSDE Conference, Wilmington, May 2002.
University of California, Davis, May 2002.
AMS meeting at Madison, October 2002.
The Courant Institute, October 2002.
Institut Henri Poincaré, Paris, October 2002.
University of Wisconsin, November, 2002.
University of Texas, Austin, November, 2002.
University of California, Davis, January 2003.
Caltech, January 2003.
Northwestern University, January 2003.
Random Phenomena in Applied Mathematics, Stanford, January 2003.
University of Minnesota, January 2003.
University of Toronto, February 2003.
University of Illinois, Chicago, February 2003.
Indiana University, March 2003.
BIRS, Banff, Canada, March 2003.
Partial Differential Equations and Applications, Technion, June 2003.
Time Reversal Workshop, Irvine, August 2003.
Geometrically Based Motions, Lake Arrowhead, December 2003.
Université Paris VI, March 2004.
AMS Meeting, Los Angeles, April 2004.
Chicago Area PDE Seminar, May 2004.
International Workshop on Nonlinear Waves, Hong Kong, June 2004.
5th DSDE Conference, Pomona, June 2004.
University of Bonn, January 2005.
Pennsylvania State University, February 2005.
University of Illinois, Chicago, February 2005.
Distinguished Lectures in PDE (two lectures), Tel Aviv University, March 2005.
Technion, Haifa, March 2005.
Notre Dame University, April 2005.
Wayne State University, April 2005.
University of California, Irvine, May 2005.

Stanford University, May 2005.
Université Paul Sabatier, Toulouse (three lectures), June 2005.
Stochastic Analysis and Partial Differential Equations, Northwestern University, June 2005.
Transfert Radiatif et Approximation de la Diffusion, CIRM, Marseille, September 2005.
High Frequency Wave Propagation Workshop, University of Maryland, September 2005.
Brown University, October 2005.
Tel Aviv University, December 2005.
Technion, Haifa, December 2005.
AMS-SIAM Meeting, San Antonio, January 2006.
University of Illinois, Urabana-Champaign, April 2006.
University of Wisconsin, Madison, April 2006.
ENS, Paris, May 2006.
Multiscale Aspects and Transport Phenomena, Theory and Numerics (five lectures), Toulouse, June 2006.
Canadian Mathematical Society Meeting, Toronto, December 2006.
The Schrödinger Institute, Vienna, (four lectures) February 2007.
ICIAM, Zurich (two talks), July 2007.
Imaging Problems Workshop, SAMSI, January 2008.
University of Pennsylvania, April 2008.
Great Lakes SIAM Conference, Ann Arbor, April 2008.
Duke University, April 2008.
Stanford University, April 2008.
Tel Aviv University, May 2008.
Technion, May 2008.
Stanford University, January 2009.

Organizer

Nonlinear Analysis 2000, Courant institute – member of the scientific committee,
CAMP seminar, University of Chicago, organizer, 1999 – 2002.
5th DSDE Conference, Section on Wave propagation, Pomona, June 2004.
AMS Special Session on "Fluids, Diffusion and reaction", October 2004.
"Reaction-diffusion and Free Boundary Problems", Banff, March 2006.
"JBK-85" conference, Stanford, October 2008.
"Deterministic and Stochastic Front Propagation", Banff, March 2010.

Miscellaneous

Served as a reviewer and panelist for National Science Foundations of US, Canada, Israel, France and Austria, and as a referee for the following journals: Advances in Differential Equations, Annales de l'Institut Henri Poincaré, Archive for Rational Mechanics, Communications in Mathematical Physics, Discrete and Continuous Dynamical Systems B, Geometriae Dedicata, Geometric and Functional Analysis, International Journal of Solids and Structures, Inverse Problems, Journal of the AMS, Jornal of Differential Equations, Journal of the Mathematical Biology, Journal of Statistical Physics, Mathematical Modelling and Numerical Analysis (M2AN), Mathematische

Annalen, Methods and Applications of Analysis, Multiscale Modeling and Simulation, Nonlinearity, Physica D, Physics of Fluids, Transactions of the AMS, SIAM Journal of Applied Mathematics, SIAM Journal of Mathematical Analysis, Stochastic Processes and their Applications, Wave Motion, Waves in Random Media.

I have been participating since 1998 in the Accelerated Strategic Computing Initiative (ASCI) Flash Project at the Astrophysics Department of the Univeristy of Chicago, on the subject of theoretical modeling of combustion processes.

Member of the AMS. Citizen of the US.