

# 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

**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.

## Grants and Fellowships

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", 2009-2013.

AFOSR NSSEFF Fellowship, 2010-2015.

NSF grant DMS-1100754 "Proposal for a Five-Day Conference: Challenges for Nonlinear PDE and Analysis".

NSF grant "FRG: Collaborative Research: Singularities, mixing and long time behavior in nonlinear evolution", DMS-1158938, 2012-2015.

NSF grant DMS-1311903, "Waves, Particle Transport and Fronts in Heterogeneous Media"

BSF grant "Stochastic front propagation", 2015–2018.

NSF grant DMS-1613603 "Waves and fronts in heterogeneous media", 2016-2019.

ONR grant "Laser propagation in heterogeneous media and applications to off-axis reconstructions", 2017-2020.

### **Editorial boards** (current and past)

Communications in Mathematical Sciences

Proceedings of Symposia in Applied Mathematics, AMS,

Nonlinearity

SIAM Journal of Applied Mathematics,

Asymptotic Analysis

Mathematische Zeitschrift

### **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.
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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.
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  14. A. Kiselev and L. Ryzhik, Enhancement of the traveling front speeds in reaction-diffusion equations 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.
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  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.
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- nications in Mathematical Sciences, **3**, 2004, 515–534.
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91. Y. Gu and L. Ryzhik, The random Schrödinger equation: slowly decorrelating time-dependent potentials, *Comm. Math. Sci.*, **15**, 2017, 359–378.
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93. A. Kiselev, L. Ryzhik, Y. Yao and A. Zlatos, Finite time singularity for the modified SQG patch equation, *Ann. of Math.*, **184**, 2016, 909–948.
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100. T. Do, A. Kiselev, L. Ryzhik and C. Tan, Global regularity for the fractional Euler alignment system, *Arch. Ration. Mech. Anal.* **228**, 2018, 1–37.
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109. C. Mueller, L. Mytnik and L. Ryzhik, The speed of a random front for stochastic reaction-diffusion equations with strong noise, Preprint, 2019.

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