Preface

This festschrift volume is dedicated to Boris Rozovskii on his 60th birthday.

The first paper in the volume, *Stochastic Evolution Equations* by N. V. Krylov and B. L. Rozovskii, was originally published in Russian in 1979 (*Itogi Nauki i Tekhniki, Seriya Sovremennye Problemy Matematiki*, Vol, 14, pp. 71–146). The English translation was first published in the Journal of Soviet Mathematics, Vol. 14, pp. 1233–1277, 1981, ©Plenum Publishing Co. We are very grateful to the current copyright holder, Springer, for the permission to include the paper in the volume. After more than a quarter-century, this paper remains a standard reference in the field of stochastic partial differential equations (SPDEs) and continues to attract attention of mathematicians of all generations, because, together with a short but thorough introduction to SPDEs, it presents a number of optimal and essentially non-improvable results about solvability for a large class of both linear and non-linear equations.

The other papers in this volume were specially written for the occasion. The 14 contributions deal with a wide range of topics in the theory and applications of stochastic differential equations, both ordinary and with partial derivatives.

Eight of the contributions are related to stochastic partial differential equations. *D. Blömker and J. Duan* investigate behavior of the mean energy and correlation function for the Burgers equation with various types of random perturbation. *L. Borcea, G. Papanicolaou, and C. Tsogka* study asymptotics of the space-time Wigner transform for the stochastic Schrödinger equation and apply the results to broadband array imaging in random media. *A. de Bouard and A. Debussche* establish existence and uniqueness of a global square-integrable solution of the stochastic Korteweg-de Vries equation with multiplicative noise. *Z. Brzeźniak and L. Debbi* establish global existence and uniqueness of a mild solution for a fractional Burgers equation with multiplicative space-time white noise. *F. Flandoli and M. Romito* study regularity properties of a transition semigroup associated with the Navier-Stokes equation driven by a non-degenerate additive space-time noise. *I. Gyöngy and A. Millet* establish the rate of convergence of the implicit Euler scheme for a class of nonlinear SPDEs. *N.V. Krylov* proves the maximum principle for a large class of linear stochastic parabolic equations and uses the result to study spatial regularity of the solution for equations on the half-line. *G. Da Prato* investigates the Kolmogorov equation associated with a class of non-linear stochastic parabolic equations.

Six of the contributions are related to stochastic ordinary differential equations. *A. Cadenillas, J. Cvitanic, and F. Zapatero* study a stochastic control problem that models the use of stock options for executive compensation. *P. Chigansky and R. Liptser* establish the large deviations principle for a class of stochastic equations with rapidly growing coefficients and a possibly degenerate diffusion. *D. Crisan and S. Ghazali* study numerical approximation of the probability distribution of the solution at a fixed time for a class of stochastic equations in the Stratonovich form and apply the results to the nonlinear filtering problem. *L. Decreusefond and D. Nualart* show that the solutions of stochastic equation driven by a fractional Brownian motion with Hurst parameter bigger than 1/2 generate a flow of homeomorphisms. *Yu. A. Kutoyants* reviews recent results on statistical inference for a stochastic equation with delay when the delay parameter is unknown. *R. Mikulevicius and H. Pragarauskas* investigate a linear integro-differential equation connected with jump-diffusion processes.

Preparation of this volume was a joint effort by a number of people. We are very grateful to J. Duan, who initiated the project; to Rok Ting Tan and Yubing Zhai, who managed the project at *World Scientific*; to Inge Weijman and Berendina van Straalen, who processed our copyright clearance at *Springer*; to Abhinav Guru, who helped to prepare the TEX file of the paper by Krylov and Rozovskii. Our special gratitude goes to all the contributors to this volume and all the referees who carefully reviewed the submitted papers and assured the highest quality of all contributions.

P. Baxendale
S. Lototsky

Boris Rozovskii

In the life of every mathematician there are usually several key events that facilitate a successful career. For Boris Rozovkii, one such event happened in 1962, when, shortly after entering the Odessa State University, he got a special invitation to transfer to the Faculty of Mechanics and Mathematics (the famous MechMat) at the Moscow State University, and immediately found himself at the center of the Soviet and, to some extent, the world mathematics. The undergraduate program of study at MechMat leads to an analog of Master of Science degree and requires the students to engage in serious research. Boris started to work with I. Girsanov, of the Girsanov Theorem fame. After the tragic death of I. Girsanov in an avalanche, Boris became a student of A. N. Shiryev, and thus an "academic grandson" of A. N. Kolmogorov. While Kolmogorov did not participate directly in the upbringing of his "grandson," his influence through lectures and seminars was strong and beneficial.

From the start, Boris worked at the junction of stochastic analysis and statistics, and with considerable success. His undergraduate work on change detection in a Poisson process was praised by A. N. Kolmogorov, which is probably the highest reward a young mathematician could have received at the time. His Ph.D. dissertation, *On stochastic equations arising in filtering of Markov processes*, published in 1972, became one of the three works that formed the foundation of the modern theory of stochastic partial differential equations (SPDEs); the other two, by E. Pardoux and M. Viot, appeared in 1975 and were also Ph.D. dissertations.

In 1972 Boris became a faculty member at the Moscow Institute of Advanced Studies for Engineers and Managers in Chemical Industry (MIASCME). This institution had a strong statistical group, which Boris joined. Working with chemical engineers was a valuable experience, as it taught him how to effectively communicate mathematics to non-mathematicians and provided ample opportunity to learn about various applications of mathematics. This experience came in very handy later, when Boris became the director of the Center for Applied Mathematical Sciences at the University of Southern California (USC).

Meanwhile, Boris continued to work, both independently and with N. V. Krylov, on nonlinear filtering of diffusion processes and the general theory of SPDEs. The result was a complete L_2 theory for linear SPDEs, as well as several key results for nonlinear equations. The linear theory was summarized in the book *Stochastic Evolution Systems* (1983 in Russian, 1990 in English). While the Russian edition looked more like a brochure than a book, the English translation, with extra material on Malliavin Calculus, was in hard cover and had a much more respectable appearance. The inside of the English translation was a different story; because of a technical glitch, the text contained an enormous number of typos, some of them rather serious. In the end, though, this proved to be a blessing in disguise, as reading the book and correcting the typos became a rite of passage for every student interested in SPDEs; correcting all those typos makes the reading much more challenging and rewarding.

In 1984 Boris was granted the second doctoral degree, Doctor of Science in Physics and Mathematics, by the Vilnius State University. This degree was an important benchmark for a scholar in the former Soviet Union.

In 1988 Boris emigrated to the USA. After a short tenure at the University of North Caroline, Charlotte, he moved to Los Angeles, CA, to become director of the Center for Applied Mathematical Sciences (CAMS) at the University of Southern California. Nonlinear filtering and SPDEs are connected with a large number of mathematical problems, both applied and theoretical, and, while at USC, Boris explored these connections to the fullest. As a Director of CAMS, Boris was very successful in attracting extensive external research funds and became involved in numerous projects in computational fluid dynamics, finance, network security, physical oceanography, target recognition and tracking, and many other areas.

Applied problem not only help to write a successful grant proposal, but can also lead to new and unexpected theoretical developments. For example, physical oceanography, the subject of the first big grant from the Office of Naval Research Boris secured as the director of CAMS, lead to a new estimation theory for SPDEs, developed in his joint papers with M. Huebner, R. Khasminskii, S. Lototsky, and L. Piterbarg. Similarly, numerical computation of the optimal nonlinear filter, the key component of many successful proposals, lead to a new way of analyzing linear and nonlinear SPDEs using Wiener chaos decomposition. Yet another direction of his research at USC was a comprehensive theory of absolute continuity and singularity of measures generated by solutions of nonlinear SPDEs, developed jointly with R. Mikulevicius.

B. L. Rozovskii has published in over 25 different journals with over 40 collaborators. His Erdős number is 4, via several connections, such as A. N. Shiryaev→L. A. Shepp→P. Frankl; R. Z. Khasminskii→O. Zeitouni→P. Diaconis; P. Baxendale→D. Stroock→P. Diaconis.

Not long ago Boris became a grandfather (his granddaughter Mia was born in 2005), and shortly after that, an "academic grandfather." Still, he shows no signs of slowing down, publishing more papers in the past year than in the previous five. In fact, his recent move to the East Coast suggests that he is at the peak of his mathematical career.

Main landmarks of B. L. Rozovskii's scientific career

Boris L'vovich Rozovskii was born on June 8, 1945, in Odessa, Ukraine. Currently, he is Professor at the Division of Applied Mathematics, Brown University.

1968 Graduated from the Department of Mechanics and Mathematics, Moscow State University, with Master of Science degree in Probability and Statistics.
1972 Ph.D. in Physical and Mathematical Sciences, Moscow State University.
1984 Doctor of Science in Physics and Mathematics.

1985 Professor and Head of the Informatics Laboratory, Moscow Institute of Advanced Studies for Engineers and Managers in Chemical Industry.
1991 Professor, Department of Mathematics, USC.
1992 Director, Center for Applied Mathematical Sciences, University of Southern California.
2006 Professor, Division of Applied Mathematics, Brown University.

Graduate students of B. L. Rozovskii

M. Huebner (USC, 1993)
K. Owens (USC, 1994)
A. Fung (USC, 1995)
S. Lototsky (USC, 1996)
C. Rao (USC, 1998)
S. Kligys (USC, 1998)
A. Petrov (USC, 2000)
G. Yaralov (USC, 2000)

B. L. Rozovskii: Honors and Awards

Fellow of the Institute of Mathematical Statistics (1997)
Peter-the-Great Medal (International Academy of Natural and Social Sciences, 1997)
Kolmogorov Medal (Kolmogorov Centennial Conference, 2003)

Publications of B. L. Rozovskii

Books

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2. *Data analysis in chemical research. Statistical foundations* (in Russian). Moscow: *Khimija*, 1984.
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Papers

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2. Wiener chaos expansions and numerical solutions of randomly forced equations of fluid mechanics (with T. How et al.), *J. Comput. Phys.* 216 (2006), no. 2, 687–706.
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11. Global L_2-solutions of stochastic Navier-Stokes equations (with R. Mikulevicius). *Ann. Probab.*, 33 (2005), No. 1, 137–176.
12. Passive Scalar Equation in a Turbulent Incompressible Gaussian Velocity Field (with S. Lototsky), *Russian. Math. Surveys*, 59 (2004), no.2, 297–312.
13. Stochastic Navier-Stokes equations for turbulent flows (with R. Mikulevicius). *SIAM J. Math. Anal.* 35 (2004), no. 5, 1250–1310.
14. A diffusion model of roundtrip time (with S. Bohacek). Computational Statistics and Data Analysis, *Comput. Statist. Data Anal.*, 45 (2004) no. 1, 25–50.
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16. A note on Krylov's L_p-theory for systems of SPDEs (with R. Mikulevicius). *Electron. J. Probab.* 6 (2001), no. 12, 1–35.
17. On equations of stochastic fluid mechanics (with R. Mikulevicius). In *Stochastics in finite and infinite dimensions: in honor of Gopinath Kallianpur*, ed. T. Hida et al., 285–302. Trends Math. Boston: Birkhauser, 2001.
18. Stochastic Navier-Stokes equations: propagation of chaos and statistical moments (with R. Mikulevicius). *In Optimal control and partial differential equations: in honor of Professor Alain Bensoussan*, ed. J. L. Menaldi et al., 258–267. Amsterdam: IOS Press, 2001.
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2. Novel Approach to Detection of "Denial-of-Service" Attacks via Adaptive Sequential and Batch-Sequential Change-Point Detection Methods (with R. Blazek et al.). In *Proceedings of the 2nd Annual IEEE Systems, Man, and Cybernetics Information Assurance Workshop (West Point, NY, 2004).* New York: *Institute of Electrical and Electronics Engineers*, 2004.
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9. State estimation in hidden Markov models with distributed observation (with S. Kligys). In *Theory and Practice of Control Systems: Proceedings of the 6th IEEE Mediterranean Conference (Alghero, Sardinia, 1998)*, ed. A. Tornambe et al. River Edge, NJ: *World Scientific*, 1998.
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12. Separation of observations and parameters in nonlinear filtering (with R. Mikulevicius). In *Proceedings of the 32nd IEEE Conference on Decision and Control, (San Antonio, TX, 1993)*, vol.2. New York: *Institute of Electrical and Electronics Engineers*, 1993.
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21. On the first integral and Liouville equations. In Abstracts of 3rd Working Conference on Stochastic Differential Equations (Visegrad, 1980), Budapest: *SZAMKI*, 1980.
22. On the extrapolation of a signal with a martingale type noise (in Russian). In *5th International Symposium on Inform. Theory. Abstracts (Tbilisi, 1979).*
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