

## Veretennikov Alexander — curriculum vitae 2011

**Born:** 09 Feb. 1953

**Place of birth:** Moscow, Russia

**Nationality:** Russian

**Position:** Professor (Chair) in Statistics

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### EDUCATION

- 1970 - 1975 student of Lomonosov Moscow State University, Mechanics and Mathematics Department (1972 - 1975: Probability Department, Research Supervisor A. D. Solov'yev)
- 1975 - 1978 graduate student of Probability Department of Lomonosov Moscow State University, Research Supervisor N. V. Krylov

### DIPLOMAS, TITLES, MEMBERSHIPS

- 1975 BS + MMath: Lomonosov Moscow State University
- 1979 PhD (Physical and Mathematical Sciences: Probability and Statistics); Lomonosov Moscow State University  
Thesis title: Weak and Strong Solutions of Stochastic Differential Equations; Committee: A. N. Kolmogorov (head), A. N. Shiryaev, A. K. Zvonkin (referees), N. I. Portenko (external referee); Members of the Council.
- 1983 Senior Scientific Researcher; by The Presidium of Soviet Academy of Sciences
- 1991 Dr.Sc. (Physical and Mathematical Sciences: Probability and Statistics); Moscow Steklov Mathematical Institute  
Thesis title: Large Deviations, Mixing and Averaging for Systems of Stochastic Differential Equations; Committee: Yu. V. Prokhorov (head), B. Grigelionis, A. N. Shiryaev, A. V. Skorokhod (referees), S. A. Molchanov (external referee), Members of the Council.
- 1997 University Professor of Mathematics; given by Ministry of Education of Russia
- 1992 prize of Russian foundation "Mathematics", for the best research by mathematicians under forty
- 1994-2003 State stipend "For outstanding scientists of Russia"
- 2004 London Mathematical Society, Ordinary Member
- 2004 Clare Hall Cambridge, Life Fellow

## PROFESSIONAL CAREER

I am currently a staff member (Chair in Statistics) of the School of Mathematics, the University of Leeds, UK.

- 2000-2011 Professor (Chair), School of Mathematics, University of Leeds, LS2 9JT, UK; in the autumn semester 2010/2011 I served as an Acting Head of Department of Statistics
- 2002 Associate Professor, Department of Mathematics, 405 Snow Hall, University of Kansas, Lawrence, Kansas 66045-2142, USA (on leave from Leeds)
- 1996-2000 Head of Laboratory, Institute for Information Transmission Problems, Russian Academy of Sciences Address: 19 B.Karetnii, Moscow, 101447, Russia
- 1993-1996 Head of Research Group in the same Institute
- 1990-1993 Senior Scientific Researcher, Leading Scientific Researcher, the same Institute  
Research: Study of Stochastic Systems; Management: Head Manager for several research projects; Administration: Leader, research group working in stochastic dynamic systems; Member, Section of Council of Institute for Information Transmission Problems; Editorial service: Associate Editor in the journal "Stochastic Processes and their Applications" (1997-99); Executive editor for several issues of Proceedings in pure and applied mathematics; Expert for Russian Foundation for Basic Research
- 1993-2000 Professor in Moscow State University; Probability Department  
Activity: MSc and graduate courses in Probability, Mathematical Statistics; project supervision; MSc and graduate tutorial group supervision
- 1993-1998 Professor in Moscow Institute of Radioelectronics, Automatics and Telemechanics (Technical University) Activity: course in Probability and Mathematical Statistics, training seminars, lecture and training problem notes preparing
- 1991-1992 Professor in Moscow State University  
Activity: graduate course in Stochastic Differential Equations
- 1990-1992 Senior Lecturer, Professor in Moscow Institute of Transport Engineering (Technical University)  
Activity: course in Probability and Mathematical Statistics, example classes (seminars) in Probability and in Numerical Methods
- 1988-1990 Senior Lecturer in Moscow Institute of Radioelectronics, Automatics and Telemechanics (Technical University)  
Activity: basic course in Mathematics (Analysis, Ordinary Differential Equations, Analytic Functions, Probability), example classes (seminars)

1978-1990 Junior Researcher, Senior Researcher (since 1981), Institute for Control Sciences, Soviet Academy of Sciences

Research: Studies in stochastic analysis, control problems, stochastic ill-posed problems; Administration: Member, Section of Council of Institute for Control Sciences; Editorial service: Referee for a number of journals in probability theory and its applications, Executive editor for several volumes of Proceedings of the Young Scientists Conferences of the Institute

**SPOKEN LANGUAGES:** Russian, English, French

## MY RESEARCH

My research work started in the first half of the 70s at the Probability and Mathematical Statistics Department of Moscow State University under the supervision of A. D. Solov'yev (Master programme) and N. V. Krylov (postgraduate programme). At that time I attended seminars of A. N. Kolmogorov, N. V. Krylov, A. N. Shiryaev who have had a deep influence on my research.

I investigated problems in the areas of stochastic analysis, PDEs, service networks, statistical inference, ill-posed problems. In my main area, stochastic analysis, I studied solutions of stochastic differential equations (SDEs) with applications to control, Malliavin calculus, ergodic and mixing properties, recurrence, averaging, large deviations, filtering, functional central limit theorems. In PDEs I studied solutions of linear parabolic equations with non-smooth coefficients, running waves for KPP equations, recently Poisson equations in unbounded regions. In service networks I studied Erlang type properties for non-exponential distributions of service times, and convergence to equilibrium. In ill-posed problems my topic was stochastic regularizing procedures under various metrics. My results in statistical inference concern parametric estimations for Markov chains and nonparametric estimation of a stationary density.

I first studied ergodic properties of service network systems. In article [2] (4th year project) the first infinite “non-Markov” service system with Erlang type limiting invariant probabilities was investigated following previous results by R.Fortet and B.A.Sevastyanov for finite systems. This direction was developed in [6] and [50] and quite recently in [84] and [90]; in the latter two papers a new contribution has been established in a classical area of rates of convergence in “Markov” Erlang type systems.

Nearly simultaneously I started studying strong and weak solutions of stochastic differential equations (SDEs) as well as applications to stochastic control theory. One of my main achievements in SDEs is the theorem that any finite-dimensional SDE with a measurable bounded or linear growing drift coefficient and nondegenerate Lipschitz diffusion coefficient has a unique strong solution (see papers [3, 8], cf. also [14] for certain degenerate SDEs). My joint result with N.V.Krylov concerned Wiener chaos expansions for (strong) solutions of a SDE (paper [1] (5th year

project)). The existence of a strong solution for a SDE with a measurable drift provides a straightforward application to stochastic control because for an *optimal* strategy a drift coefficient is usually discontinuous, see papers [5,9]. In paper [87] a new weak solution has been established for highly degenerate SDEs.

Then I studied some problems of Malliavin's calculus – Bismut's approach. I have obtained a simplified version of this approach (article [15]) and several further results among which a localized version of the approach and applications to limit theorems.

Simultaneously I studied qualitative properties of diffusion processes. The paper [12] contains a direct approach to backward Kolmogorov equations based on Krylov's idea. Later in paper [44] I applied this approach to the filtering Zakai SPDE equation. An advantage is that no preliminary 'a priori' bounds in Sobolev spaces are needed, the equation is derived "by hand", using only three derivatives of functions involved.

Then I was studying ergodic properties of solutions of SDEs and more general Markov and stationary processes: the averaging principle under minimal smoothness assumptions on SDE coefficients, the rate of mixing for various mixing coefficients, and the logarithmic asymptotics for large deviations probabilities. In particular, in my papers [23], [34], and in the monograph [3] first exponential and polynomial bounds of beta-mixing (Kolmogorov's) and strong mixing (Rosenblatt's) coefficients have been established; later this direction was continued in [49], [56], [64], [87]. Those results on mixing have various applications to PDEs [63], [70], statistical inference [64]; a new direction about stability of mixing and large deviation rates under approximations of diffusions was initiated in papers [71], [73]-[75] and lecture notes [4].

An application of the stochastic averaging principle to sliding modes was established in my joint paper with G. N. Milstein [61]; to the best of the authors' knowledge, it is the first paper which concerns a stochastic counterpart of this theory. Sliding modes is an engineering oriented theory which studies the limiting behavior of solutions of ODEs with discontinuities on attractors of lower dimensions; a classical reference is the book by A. F. Filippov. A small white noise approach gives a nice theory and "right" answers in most cases where such answers are known; it also provides a technique to study new cases. Though the idea of an additional small white noise in ODEs and PDEs is very old (70s, if not earlier), it is usually very hard to get explicit formulae ([13] provides a rare simple example). Since it was a first paper in this direction, there are a lot of problems for future investigations.

I have obtained the large deviation principle for general recurrent diffusion processes (article [45]) and large deviations in the Freidlin's type averaging principle for systems of SDE's in noncompact finite-dimensional Euclidean spaces and also for discrete-time processes of stochastic - approximation type. My studies of large deviations were inspired by the problem in stochastic approximation theory: how to apply Freidlin's large deviation principle to stochastic approximation algorithms in non-compact spaces. Earlier algorithms had to be changed in order to use Freidlin's

techniques. The original problem was solved in my monograph [3] and papers [29, 35, 40, 41, 43, 46]. Among applications of the large deviation techniques there is a method of studying running waves in KPP type equations [paper 58]. In large deviations for diffusion with average a solution of a “complete dependence case” – a challenging problem open since 70s – was obtained in my paper [55] and preprint [1] (a corrected version of the paper, to be submitted).

I investigated singularly perturbed SDEs and Poisson equations jointly with E. Pardoux. In this area my previous results on mixing were used essentially. We have obtained a new powerful functional central limit theorem for a large class of two-scaled diffusions (see papers [63,70]) and new bounds for Green’s functions for second order elliptic operators. A discrete time version of the theory is also in work, see paper [59] where general conditions for a Markov chain to have a smooth invariant density with respect to a parameter are given, – a question which is important in many aspects and close to the Poisson equation. Some extended version of this technique may be applied to other problems such as moderate deviations (see paper [66]).

Some time ago I also started investigations in mathematical statistics (papers [57,64]). In 1998-99 I delivered a lecture course on mathematical statistics for random processes in Moscow State University which combined classical settings and simplified versions of certain recent results and ideas in limit theorems and mixing. The course provides a bridge from elementary statistics courses to LAN theory as in the book by Ibragimov and Khasminskii. See lecture notes [3]. The last achievement in this direction is a joint result with M. Kleptsyna concerning stability of filters for ergodic signals in non-compact spaces under wrong initial distributions, a so called misspecified problem in filtering. This problem was wrongly believed to have been solved in a classical paper in 1971; a correct solution for the compact case was obtained only in 1997. A general non-compact case has been solved in [82, 83, 89]. Together with my co-author M.Kleptsyna I was invited to contribute to the Oxford Handbook of Nonlinear filtering (2011 – paper [92]).

My work on stochastic procedures for ill - posed problems concerns probability versions of iterative regularizing algorithms introduced independently by Vainikko and Morozov, see monograph [1] and papers [18, 21, 25, 34, 51].

## **BRIEF RESEARCH STATEMENT**

I managed to find solutions of several important longstanding problems. I. Existence of strong solution for a multidimensional SDE with a measurable (and, e.g., bounded) drift and, e.g., a unit diffusion matrix. II. Large deviation principle for averaged diffusions in non-compact spaces, including ”full dependence” case for ”fast” and ”slow” components. III. Mixing rates – exponential, polynomial, etc. – for general stochastic differential equations and discrete Markov chains; for SDEs suggestion to use Harnack inequalities for this purpose. IV. Poisson problem for non-compact spaces, with smoothness with respect to parameters. V. Stability of

filtering measures for ergodic Markov processes with non-specified initial data.

## **BRIEF RESEARCH PLANS**

I am planning to continue studying Poisson equations, large deviations and mixing, including approximations for SDEs and SPDEs and filtering, applications to networks and queueing systems, nonlinear Markov processes and stochastic control; There are plans for the near future to write monographs on mixing and ergodic control as well as some other monograph plans.

## **LIST OF PUBLICATIONS**

### **Monographs**

1. (with G.M.Vainikko) Iterative procedures for ill-posed problems. Nauka, Moscow, 1986 (in Russian)
2. (with S.V.Anulova, N.V.Krylov, R.Sh.Liptser, A.N.Shiryaev) Stochastic calculus. VINITI, Moscow, Ser. Fundamental Researchs, vol.35, 1989 (in Russian; English version: Springer, Berlin, 1998.)
3. (with O.V.Gulinsky) Large deviations for discrete - time processes with averaging. VSP, Utrecht, The Netherlands, 1993.

### **Lecture notes**

1. (1994) Beginning of Probability Theory - 1. Lecture course notes, Moscow Radioelectronics, Automatics and Telemechanics Institute (in Russian)
2. (1997) (with E. V. Veretennikova) Beginning of Probability Theory - 2. Lecture course notes, Moscow Radioelectronics, Automatics and Telemechanics Institute (in Russian)
3. (2000) Parametric and non-parametric estimation for Markov chains, Lecture course notes, Moscow State University (in Russian)
4. (2004) Approximations for diffusions with equilibrium, Helsinki University of Technology, Institute of Mathematics Reports C17, (2004) (English); electronic version at <http://math.tkk.fi/visitors0405/AVslides.pdf> or/and <http://math.tkk.fi/reports/c017.pdf>

### **Articles**

1. (1976) (with N.V.Krylov) Explicit formulas for solutions of stochastic equations. Math. USSR Sborn. 29(2), 239-256
2. (1977) Ergodicity of service systems with an infinite numbers of servomechanisms. Math. Notes. 22(3-4), 804-808

3. (1978a) On strong solutions of some stochastic equations. *Russ. Math. Surv.* 33, 215-216
4. (1979) On the strong solutions of stochastic differential equations. *Theory Probab. Appl.* 24(2), 354-366
5. (1980) On the existence of the optimal policy for a multidimensional quasidiffusion controlled process. *Lecture Notes in Control and Information Sci.*, Springer, vol. 25, 80-90
6. (1981a) Ergodicity and invariance principle for multiphase queuing systems. *Aut. Remote Control.* 42(7), 906-909
7. (1981b) On strong and weak solutions of one - dimensional stochastic equations with boundary conditions. *Theory Probab. Appl.* 26(4), 670-686
8. (1981c) On strong solutions and explicit formulas for solutions of stochastic integral equations. *Math. USSR Sborn.* 39(3), 387-403
9. Existence of optimal strategy in univariate diffusion process control, *Autom. Remote Control* 42, 722-727; transl. from *Avtom. Telemekh.* 1981, No.6, 28-34.
10. (1982a) Parabolic equations and Ito stochastic equations with coefficients discontinuous in the time variable. *Math. Notes.* 31(3-4), 278-283
11. (1982b) (with I. V. Emelin and M. A. Krasnosel'skii) On regularization of ill-posed problems by stop-rules of iterative procedures with random errors. *Numer. Funct. Anal. and Optimiz.* 5(2), 199-215
12. (1983a) Inverse diffusion and direct derivation of stochastic Liouville equations. *Math. Notes,* 33(5-6), 397-400
13. (1983b) Approximation of ordinary differential equations by stochastic differential equations. *Math. Notes,* 33(5-6), 476-477
14. (1983c) On stochastic equations with degenerate diffusion with respect to some of the variables. *Math. USSR Izvestia.* 47(1), 173-180
15. (1983d) A probabilistic approach to hypoellipticity. *Russ. Math. Surveys.* 38(3), 127-140
16. (1983e) On the criteria for the existence of a strong solution of a stochastic equation. *Theory Probab. Appl.* 27(3), 441-449
17. (1984a) Probabilistic problems in the theory of hypoellipticity. *Math. USSR Izvestia* 48(6), 455-473
18. (1984b) Iterative methods in ill-posed problems with random errors. *Aut. Remote Control.* 45(12), 1564-1569
19. (1984c) (with M. L. Kleptsina) On strong solutions of stochastic Ito-Volterra equations. *Theory Probab. Appl.* 29(1). 154-158

20. (1985) (with M. L. Kleptsina) On filtering and properties of conditional laws of Ito-Volterra processes. *Statistics and control of stochastic processes. Steklov seminar, 1984.* Ed. by N.V.Krylov et al. Optimiz. Software, Publ. division, N.Y. 179-196
21. (1986) Regularization of ill-posed problems by stochastic iteration procedures in the mean. *Aut. Remote Control.* 47(10), 1367-1372
22. (1987a) Malliavin calculus and its applications to some limit theorems. *Proc. 1 - st World Congress Bernoulli Soc., Tashkent, 1986.* Vol. 1. Utrecht: VNU Sci. Press. 557-566
23. (1987b) Bounds for the mixing rate in the theory of stochastic equations. *Theory Probab. Appl.* 32(2), 273-281
24. (1988a) On strong solutions of Ito stochastic equations with jumps. *Theory Probab. Appl.* 32, 148-152
25. (1988b) Rate of convergence of stochastic iteration procedures in ill - posed problems. *Aut. Remote Control.* 49(1), 56-60
26. (1989a) Probability density of stochastic differential equations. In: *Statistics and Control of Stochastic Processes. Steklov seminar 1985-1986.* Vol. 2. Ed. by A. N. Shiryaev et al. N.Y. Optimization Software, Inc. Publ. Division. 233-237
27. (1989b) Optimal stabilization of controllable random processes with fast oscillating noise. *Aut. Remote Control,* 50(8), 1061-1065
28. (1989c) The mixing rate and the averaging principle for hypoelliptic stochastic differential equations. (Russian) *Izv. Akad. Nauk SSSR Ser. Mat.* 52 (1988), no. 5, 899-908, 1118; translation in *Math. USSR-Izv.* 33 (1989), no. 2, 221-231
29. (1990a) On large deviations in averaging principle for stochastic differential equations with periodic coefficients. 1. - *Probab. Theory and Math. Statistics. Proc. Fifth Vilnius Conf. (1989).* Ed. by B.Grigelionis et. al. Vilnius, Lithuania: Mokslas and Utrecht, The Netherlands: VSP, Vol. 2, 542-551
30. (1990b) (with O. V. Gulinskii) Rate of mixing and the averaging principle for stochastic recursive procedures. *Aut. Remote Control.* 51(6), 779-788
31. (1990c) On hypoellipticity conditions and estimates of the mixing rate for stochastic differential equations. *Soviet Math. Dokl.* 40(1), 94-97
32. (1991a) (with A. V. Dobrovidov and P. V. Pakshin) Ergodicity and mixing conditions of Markov processes in nonparametric filtering problems. *Aut. Remote Control USSR,* 52(4), 472-479
33. (1991b) On the averaging principle for systems of stochastic differential equations. *Math. USSR Sborn.,* 69(1), 271-284
34. (1991c) Estimates for the mixing rate for Markov processes. (Russian) *Litovsk. Mat. Sb.* 31(1) (1991), 40-49; Engl. transl. in *Lithuanian Math. J.* 31(1) (1991), 27-34 (1992)



35. (1992a) On large deviations in the averaging principle for stochastic differential equations with periodic coefficients. 2. - Math. USSR Izvestia. 39(1), 677-701
36. (1992b) On large deviations for stochastic iterative procedures in Hilbert space. Numerical Methods and Optimization, Vol.3. Tallinn: Estonian Academy of Sciences, 1992, 88-96
37. (1992c) On asymptotic properties of stationary processes: large deviations and exponential mixing. Proc. VI Soviet - Japan Symp. on Probab. Theory and Mathem. Stat. (Kiev, 1991). World Scientific, Singapore et al. 1992, 403-413
38. (1992d) On large deviations for ergodic process empirical measures. Advances in Soviet Math. Vol. 12, 125-133
39. (1993a) On large deviations for Markov process additive functionals. 1. Theory Probab. Appl. 38(3), 758-774 (in Russian)
40. (1993b) On large deviations and averaging principle for stochastic - difference equation on a torus. Proc. Steklov Inst. of Math., 1994, Issue 4, 27-33
41. (1994a) Large deviations in averaging principle for stochastic differential equation systems (noncompact case). Stochastic and Stochastics Reports, 48, 83-96
42. (1994b) On large deviations for diffusion processes under minimal smoothness conditions. Comptes Rendus, vol. 319, Ser. A, N 7, Oct. 1994, 727-732
43. (1994c) On large deviations in averaging principle for systems of stochastic differential equations with unbounded coefficients. Probability Theory and Mathematical Statistics. Proc. Sixth Vilnius Conf. (28 June - 3 July, 1993). Ed. B.Grigelionis et al. VSP, Utrecht, The Netherlands and Tokyo, Japan
44. (1995a) On backward filtering equations for SDE systems (direct approach). In: Stochastic Partial Differential Equations, ed. by A.Etheridge. London Math. Soc. Lecture Notes Series, Cambridge Univ. Press, vol. 216, 304-311
45. (1995b) On large deviations for diffusion processes with measurable coefficients, Russian Math. Surveys, 50(5), 977-987
46. (1996a) On large deviations for SDE systems without bounded coefficient derivatives, Stoch. Anal. and Appl., Proc. 5th Gregynog Symp., Gregynog, Powys, 9-14 July 1995, Publ.Co. World Sci. Press, 1996, 471-478
47. (1996b) On large deviations for stationary processes under local ratio-mixing conditions, Uspehi Teorii Veroyatnostej i ee Primenenij, Proc. 4th Russian-Finnish Symp. on Probability Theory and Mathematical Statistics (3-8 oct. 1993, Moscow), ed. by A.N.Shiryaev et al., TVP, Moscow, 1996, 217-222
48. (1997a) (with E. Pardoux) Averaging for backward stochastic differential equations, with applications to semi-linear PDE's, Stochastics and Stochastics Reports, 60, 255-270
49. (1997b) On polynomial mixing bounds for stochastic differential equations, Stoch. Processes Appl. 70, 115-127

50. (1997c) (with M. Kelbert) On the estimation of mixing coefficients for a multiphase service systems, *Queueing Systems and Applications (QUESTA)*, 25, 325-337
51. (1997d) (with E. Schock) Iterative methods with perturbations in ill-posed problems, *Aut. Remote Control*, 58(4), 75-84
52. (1998a) (with P. Priouret) A remark on the stability of the l.m.s. tracking algorithm, *Stoch. Anal. Appl.* 16(1), 118-128
53. (1998b) On large deviations for stochastic differential equations with a small diffusion and averaging, *Probab. Theory Appl.*, 43(2), 349-351 (Russian)
54. (1998c) On large deviations in the averaging principle for SDE's with a "complete dependence", *Probab. Theory Appl.*, 43(4), 765-767
55. (1999a) On large deviations in the averaging principle for SDE's with a "full dependence", *Ann. Probab.* 1999, 27(1), 284-296
56. (1999b) On polynomial mixing and convergence rate for stochastic difference and differential equations, *Probab. Theory Appl.* 44(2), 317-321
57. (1999c) On Castellana-Leadbetter's Condition for Diffusion Density Estimation, *Statistical Inference for Stochastic Processes*, 2(1), 1-9
58. (1999d) On KPP equations with various wave front speeds, the Larson result via large deviations, in: *Probability Theory and Mathematical Statistics: Proceedings of the 7th Vilnius Conference (1998) Vilnius, Lithuania (12-18 August, 1998)*, TEV, Vilnius, Lithuania, and VSP, Utrecht, the Netherlands and Tokyo, Japan, 1999, 707-714
59. (2000a) (with E. Pardoux) On regularity of an invariant density of a Markov chain in a parameter, *Russian Math. Dokl.*, 370(2) (2000), 158-160 (Russian)
60. (2000b) On large deviations for SDEs with small diffusion and averaging. *Stochastic Process. Appl.* 89(1), 69-79
61. (2000c) (with G. N. Milstein) On deterministic and stochastic sliding modes via small diffusion approximation. *Markov Process. Related Fields* 6(3), 371-395
62. (2001a) On polynomial mixing estimates for stochastic differential equations with a gradient drift. *Theory Probab. Appl.* 45(1), 160-163.
63. (2001b) (with E. Pardoux) On the Poisson equation and diffusion approximation. I. *Ann. Probab.* 29 (2001), no. 3, 1061-1085.
64. (2002a) (with A. B. Varakin) On parameter estimation for "polynomial ergodic" Markov chains with polynomial growth loss functions, *Markov processes and related fields*, 2002, 8(1), 127-144.
65. (2002c) On large deviations for approximate solutions of stochastic differential equations on a torus, *Teor. Veoryatn. i Primenen.* 47(4) (2002), 772-780 (Russian); Engl. transl. in *Theory Probab. Appl.* 47(4) (2003), 733-741.

66. (2002d) (with R. Liptser and V. Spokoiny) Freidlin-Wentzell type large deviations for smooth processes, *Markov Processes Rel. Fields*, 8 (2002), 611-636.
67. (2002e) Coupling method for Markov chains under integral Doeblin type condition. *Theory Stoch. Process.* 8(24) (2002), no. 3-4, 383-390.
68. (2003a) On large deviations for approximations of SDEs, *Probab. Theory Rel. Fields*, 125(1) (2003), 135-152.
69. (2003b) On approximate large deviations for 1D diffusion. Dedicated to the memory of Professor Revaz Chitashvili. *Georgian Math. J.* 10(2) (2003), 381-399.
70. (2003c) (with E. Pardoux) On Poisson equation and diffusion approximation 2, *Annals of Probability*, 31 (2003), no. 3, 1166-1192.
71. (2003d) (with S. A. Klokov) Subexponential mixing rate for a class of Markov processes (multidimensional case). *Teoriya Veroyatn. Primen.*, 2003, 48(4) (Russian); Engl. transl. *Theory Probab. Appl.*, 2004, 49(1), 1-13.
72. (2003e) Essay on the Boris Vladimirovich Gnedenko theorem, *Ther. Probab. Math. Statist.* 69, 2004, 17-25 (transl. from Russian, *Teor. Imovirnost. Matem. Stat.*).
73. (2004a) (with S. A. Klokov) On mixing rate for Euler scheme for stochastic difference equations, *Doklady of Russian Academy of Sciences* 395(6) (2004), 1-2 (Russian).
74. (2004b) (with S. A. Klokov) Sub-exponential mixing rate for a class of Markov processes, *Math. Comm.* 9 (2004), 9-26.
75. (2004c) (with S. A. Klokov) Subexponential mixing rate for a class of Markov diffusions, *J. Math. Sci.* 123(1) (September 2004), 3816-3823.
76. (2005a) (with E. Pardoux) On the Poisson equation and diffusion approximation 3. *Ann. Probab.* 33(3), 1111-1133.
77. (2006a) On ergodic measures for McKean-Vlasov stochastic equations, In: *Monte Carlo and Quasi-Monte Carlo Methods 2004*, Niederreiter, H; Talay, D. (Eds.), Springer, Berlin et al., 471-486.
78. (2006b) On lower bounds for mixing coefficients of Markov diffusions, In: *From Stochastic Calculus to Mathematical Finance; The Shiryaev Festschrift*. Kabanov, Yu.; Lipster, R.; Stoyanov, J. (Eds.), Springer, Berlin et al., 623-633.
79. (2006c) (with S. A. Klokov) Mixing and convergence rates for a family of Markov processes approximating SDEs, *Random Oper. and Stoch. Equ.*, 14(2), 103-126.
80. (2007a) On asymptotic information integral inequalities. *Theory Stoch. Process.* 13(29) (2007), Part 1-2, 294-307.
81. (2007b) (with M. Kleptsyna) On ergodic filters with wrong initial data, *C.R.Acad. Sci. Paris, Ser. I*, 344(2007), 727-731.

82. (2008a) (with M. Kleptsyna) On discrete time filters with wrong initial data, *Probability Theory and Related Fields* 141 (2008), 411 – 444.
83. (2009a) (with M. Kleptsyna) On Continuous Time Ergodic Filters with Wrong Initial Data, *Theory Probab. Appl.* 53(2), 2009, 269-300.
84. (2009b) On rate of mixing and convergence to stationary regime for discrete Erlang problem, *Automation and Remote Control*, 70(12), 2009, 1992-2002.
85. (2009c) (with N.Abourashchi) On exponential mixing and rate of convergence for Student processes, *Theory Probab. Math. Statist.* 2009, 81, 1-12 (in Ukrainian); Engl. transl. 2010, 81, 1-13.
86. (2009d) (with N.Abourashchi) On exponential mixing bounds and convergence rate for reciprocal Gamma diffusion processes, *Mathematical Communications*, 14(2) (2009), 331-339.
87. (2010a) (with N.Abourashchi) On stochastic averaging and mixing, *Theory of Stochastic Processes*, 16(32)(1) (2010), 111-130.
88. (2010b) (with G. Aivaliotis) On Bellman's equations for mean and variance control of a Markov diffusion, *Stochastics: An International J. of Probability and Stochastic Processes*, 82(1), 2010, 41 - 51.
89. (2010c) (with M. Kleptsyna) On discrete time ergodic filters with wrong initial data, 2, *Stochastics: An International J. of Probability and Stochastic Processes*, 82(1), 2010, 25 - 40.
90. (2010d) On the rate of beta-mixing and convergence to a stationary distribution in continuous-time Erlang-type systems, *Problems of Information Transmission*, Volume 46 Issue 4, December 2010, 382-389.
91. (2010e) (with S.V.Anulova) On ergodic properties of degenerate hybrid stochastic control systems, in: *Decision and Control (CDC), 49th IEEE Conference, Atlanta, GA, 15-17 Dec. 2010*, pages 2292 - 2297, DOI: 10.1109/CDC.2010.5717412
92. (2011a) (with M.L.Kleptsyna) On filtering with unspecified initial data for nonuniformly ergodic signams, in: *The Oxford Handbook of nonlinear filtering*, D.Crisan and B.Rozovsky (Eds.), Oxford University Press, Oxford, 2011, 267-298.
93. (2011b) (With S.V.Anulova) On ergodicity of highly degenerate hybrid stochastic control systems. *International Mathematical Conference "50 years of IPPI"*, July 25-29 2011 Moscow, Russia Proceedings, ISBN 978-5-901158-15-9
94. (2011c) (With O.A.Butkovsky) On asymptotics of Vaserstein's coupling for a Markov chain. *International Mathematical Conference "50 years of IPPI"*, July 25-29 2011 Moscow, Russia Proceedings, ISBN 978-5-901158-15-9
95. (2011d) On Sobolev solutions of Poisson equations in  $R^d$  with a parameter (To 70th birthday of Professor N.V.Krylov), *Journal of mathematical sciences*, 179(1), 48-79, 2011.

### **Some preprints**

1. (2005a) On large deviations in the averaging principle for SDE's with a "full dependence", correction, arXiv:math/0502098v1 [math.PR]

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