

## **Alexander B. Kurzanski (Kurzanskiy)**



(Alexandr Borisovich Kurzanski)

[In Russian](#)

**Full member of Russian Academy of Sciences, Distinguished Professor, Head of Department at Lomonosov Moscow State University (Faculty of Computational Mathematics and Cybernetics).**

Tel./Fax: +7 (495) 932-88-50

e-mail: [kurzans@mail.ru](mailto:kurzans@mail.ru)

119992, Moscow, Leninskiye Gory, Lomonosov Moscow State University, 2-nd educational building, Faculty of Computational Mathematics and Cybernetics, rooms 536-537.

## **Biography**

Graduated with honors in Electrical Engineering from the Technical University of Ural, graduate

studies in Mathematics from the University of Ural, (both at Yekaterinburg, former Sverdlovsk), 1962. Received the degree of «candidate in mathematical and physical sciences» (PhD equivalent) in 1965 and his habilitation «doctorate» from the University of Ural (in 1971), where he became full professor. In 1967-1984 he worked at the Sverdlovsk Branch of the Steklov Mathematical Institute, renamed in 1971 as Institute of Mathematics and Mechanics of the Ural Branch of the Academy of Sciences of USSR - as Senior Researcher, Head of Department and Director. USSR National Lenin Prize in Science and Technology, 1976.

Within 1984-1992 the Chairman of the Systems and Decision Sciences Program and since 1987 also Deputy Director of IIASA (the International Institute of Applied Systems Analysis), located in Laxenburg, Austria. Honorary Scholar of IIASA since 1992.

From 1992 till present - organizer and head of Department of Systems Analysis at the Lomonosov Moscow State University (MSU), Faculty of Computational Mathematics and Cybernetics, Distinguished Professor of MSU (1999). Since 1998 also Visiting Research Scholar at the University of California at Berkeley.

Kurzhanski was Elected Associate Member of USSR Academy of Sciences (now changed to Russian Academy of Sciences) in 1981 and Full Member in 1990. He is the Chairman of the Russian National Committee on Automatic Control (the IFAC NMO).

His research interests and achievements are in the field of estimation and control under incomplete (realistic) information, control of complex systems, new dynamic programming techniques, inverse problems of mathematical physics, numerical methods and set-valued techniques in dynamics and control as well as problems of team control and impulse control and mathematical modeling for applied systems analysis.

## Membership in editorial boards of scientific journals

- Monograph series «Lecture Notes in Control and Information Sciences» (Springer), member of the Series Advisory Board.
- Monograph series «Systems and Control: Foundations and Applications» (Birkhauser), member of the Editorial Board.
- The journal «Automation and Remote Control» (Russia), member of the Editorial Board.
- The journal «Differential Equations» (Russia), member of the Editorial Board.
- The journal «Cybernetics and Systems Analysis» (Ukraine), member of the Editorial Board.
- The journal «Applied Mathematics Letters» (USA), member of the Editorial Board.
- The journal «Optimization Methods and Software» (Great Britain), member of the Editorial Board.
- The «Journal of Systems Science and Systems Engineering» (China), member of the Editorial Board.
- The journal «Nonlinear Analysis», Ser III (USA), member of the Editorial Board.
- The journal «Ecology and Life» (Russia), member of the Editorial Board.
- The journal «Moscow University Computational Mathematics and Cybernetics» («Vestnik Moskovskogo Universiteta. Seriya 15. Vychislitel'naya Matematika i Kibernetika») (Russia), member of the Editorial Board.
- EOLSS - the Encyclopedia of Life Support Systems, Member of the Editorial Board.

## Membership in scientific communities

- Member of IFAC Council - the supervising board of the International Federation of Automatic Control (2005-2011).
- Chairman of Russian National Committee of Automatic Control.
- Member of Russian National Committee on Theoretical and Applied Mechanics.
- Member of Committee of System Analysis at the Presidium of Russian Academy of Sciences.

## Selected Papers

- On the problem of control synthesis: (with N.B. Melnikov) // Sb. Math. 2000. V. 191. № 6. pp. 69-100. (translated from russian).
- On the reachability problem under persistent disturbances. (with P. Varaiya) // Doklady Mathematics. 2000. V. 61. № 3. pp. 3809-3814. (translated from russian).
- Ellipsoidal techniques for reachability analysis (with P. Varaiya) // Proc. Pittsburg conf. «Hybrid systems--2000». LNCS, Springer. 2000. V. 170. pp. 202-214.
- Ellipsoidal techniques for reachability analysis: internal approximation (with P. Varaiya) // System and Control Letters. 2000. V. 41. pp. 201-211.
- On the state estimation problem under mixed uncertainty (with I.A. Digailova) // Proc. MTNS-2000. Perpignan, 2000.
- Dynamic Optimization for Reachability Problems (with P. Varaiya) // J. of Optimization Theory and Applications. 2001. № 2. pp. 227-251.
- Ellipsoidal Techniques for Reachability Problems under Nonellipsoidal Constraints (with M.N. Kirilin) // Proc. NOLCOS-01. St.Petersburg. 2001. pp. 768.
- The state estimation problem under mixed uncertainty (with I.A. Digailova) // Proc. NOLCOS-01. St.Petersburg. 2001. pp. 584.
- Nonlinear Control Synthesis Under Two Types of Constraints (with A.N. Daryin) // Differential equations. 2001. V. 37. № 11. pp. 1549-1558. (translated from russian).
- On reachability under uncertainty (with P. Varaiya) // SIAM J. on Control and Optimization. 2002. V. 41. № 1. pp. 181-216.
- On Ellipsoidal Techniques for Reachability Analysis. Part I: External Approximations (with P. Varaiya) // Optimization Methods and Software. 2002. V. 17. pp. 177-206.
- On Ellipsoidal Techniques for Reachability Analysis. Part II: Internal approximations. Box-valued Constraints (with P. Varaiya) // Optimization Methods and Software. 2002. V. 17. pp. 207-237.
- Reachability Analysis for Uncertain Systems - the Ellipsoidal Technique (with P. Varaiya) // Dynamics of Continuous, Discrete and Impulsive Systems. Ser. B. 2002. V. 9. № 3. pp. 347-367.
- Reachability under State Constraints - the Ellipsoidal Technique (with P. Varaiya) // Proc. of IFAC-2002. Barcelona, 2002.
- The Principle of Optimality in Measurement Feedback Control for Linear Systems // Directions in Mathematical Systems Theory and Optimization / Eds.: Rantzer A., Byrnes C. Springer. 2003. Ser. LNCIS. V. 286.
- Control Under Indeterminacy and Double Constraints (with A.N. Daryin) // Differential equations. 2003. V. 39. № 11. pp. 1554-1567. (translated from russian).
- The problem of measurement feedback control // Journal of Applied Mathematics and Mechanics. 2004. V. 68. Issue 4. pp. 547-563. (translated from russian).
- On some nonstandard dynamic programming problems of control theory (with P. Varaiya) // Variational Methods and Applications / Eds.: Giannessi F., Mangeri A. New York: Kluwer Acad. Pub., 2004, pp. 613-627.
- Attainability problems under stochastic perturbations (with I.A. Digailova) // Differential equations. 2004. V. 40. № 11. pp. 1573-1578. (translated from russian).
- Differential equations in control synthesis problems: I. Ordinary systems // Differential equations. 2005. V. 41. № 1. pp. 10-21. (translated from russian).
- The diagnostics of safety zones in motion planning // Optimization Methods and Software. 2005 V. 20. № 2--3. pp. 225-233.
- The Dynamic Programming Method in Impulsive Control Synthesis (with A.N. Daryin, A.V. Seleznev) // Differential equations. 2005. V. 41. № 11. pp. 1566-1576. (translated from russian).
- Nonlinear Control Synthesis under Double Constraints (with A.N. Daryin) // Proc. of 16th IFAC World Congress. Prague, Czech Republic. July 3--8. 2005. pp. 6.
- Reachability analysis under control-dependent stochastic noise (with I.A. Digailova) // Proc. of 16th IFAC World Congress. Prague, Czech Republic. July 3--8. 2005. pp. 6.
- On some nonstandard dynamic programming problems of control theory (with P. Varaiya) // Nonconvex optimization and its applications / Eds.: Giannessi F., Mangeri A. New York: Springer, 2005.P. 589-603.

- A dynamic programming approach to the impulse control synthesis problem (with A.N. Daryin, A.V. Seleznev) // Proc. of Joint 44th IEEE conference on decision and control and European control conference ECC 2005. Seville, Spain. December 2005.
- Comparison principle for equations of the Hamilton-Jacobi type in control theory // Proceedings of the Steklov Institute of Mathematics. 2006. V. 251. № 1. pp. 185-195. (translated from russian).
- On the damping of a ladder-type vibration system subjected to uncertain perturbations (with I.V. Vostrikov, A.N. Daryin) // Differential equations. 2006. V. 42. № 11. pp. 1524-1535. (translated from russian).
- Optimization Techniques for State-Constrained Control and Obstacle Problems (with P. Varaiya) // J. of Optimization Theory and Applications (JOTA). 2006. V. 128. № 3. pp. 499-521.
- Ellipsoidal Techniques for Reachability under State Constraints (with P. Varaiya) // SIAM J. Control Optimization. 2006. V. 45. № 4. pp. 1369-1394.
- Control synthesis in a class of higher-order distributions (with A.N. Daryin) // Differential equations. 2007. V. 43. № 11. pp. 1479-1489. (translated from russian).
- The Hamilton-Jacobi Equations for Nonlinear Target Control and their Approximation (with P. Varaiya) // Analysis and Design of Nonlinear Control Systems (in Honor of Alberto Isidori). Springer-Verlag, 2007. pp. 77-90.
- Closed-loop impulse control of oscillating systems (with A.N. Daryin) // Proceeding of 3rd IFAC Workshop on Periodic Control Systems - PSYCO'07. St.Petersburg, August 2007.
- Dynamic Programming for Impulse Controls (with A.N. Daryin) // Annual Reviews in Control. 2008. V. 32. № 2. pp. 213-227.
- Impulse Control Inputs and the Theory of Fast Feedback Control (with A.N. Daryin) // Proc. of 17th World Congress IFAC. 6--11 July 2008. Seoul, 2008. pp. 4869-4874.
- Stochastic Reachability and Measurement Feedback (with I.A. Digailova, P. Varaiya) // Proc. of 17th World Congress IFAC. 6--11 July 2008. Seoul, 2008. pp. 14336-14341.
- Weakly invariant sets of hybrid systems (with P.A. Tochilin) // Differential equations. 2008. V. 44. № 11. pp. 1585-1594. (translated from russian).
- The problem of control for multi-agent motion: General relations // Doklady Mathematics. 2009. V. 79. № 3. pp. 314-318. (translated from russian).
- Impulse controls in models of hybrid systems (with P.A. Tochilin) // Differential equations. 2009. V. 45. № 5. pp. 731-742. (translated from russian).
- On synthesizing team target controls under obstacles and collision avoidance (with P. Varaiya) // «Journal of the Franklin Institute». 2010. V. 347. № 1. pp. 130-145.
- On synthesizing impulse controls and the theory of fast controls. // Proceedings of the Steklov Institute of Mathematics. 2010. V. 268. № 1. pp. 207-221. (translated from russian).
- Output feedback observers and control under non-gaussian types of noise (with Digailova I.A.) // Proc. 19th Intern. Symp. on Mathematical Theory of Networks and Systems (MTNS-2010). Budapest, Hungary: Elsevier, 2010. pp. 69-72.
- On the problem of output feedback control under set-membership uncertainty (with P. Varaiya) // Proc. of the 8th IFAC Symp. on Nonlinear Control Systems (NOLCOS-10). Bologna, Italy: Elsevier, 2010. pp. 60-65.
- Role of macromodeling in network active traffic management (with A.A. Kurzhanski, P. Varaiya) // Proceedings of MIPT. 2010. V. 2. № 4 (8). pp. 100-118. (in russian).
- Hamiltonian techniques for the problem of set-membership state estimation // International Journal of Adaptive Control and Signal Processing. 2010. V 25. № 3. pp. 249-263.
- Optimization of Output Feedback Control Under Set-Membership Uncertainty (with P. Varaiya) // Journal of Optimization Theory and Applications. 2011. V. 151. № 1. pp. 11-32.
- Optimal control of ellipsoidal motions (with A.I. Mesyats) // Differential equations. 2012. V. 48. № 11. pp. 1502-1509. (translated from russian).
- A method for calculating the invariant sets of high dimensional linear systems under uncertainty (with A.N. Daryin) // Doklady Mathematics. 2012. V. 86. № 2. pp. 684-687. (translated from russian).
- Tracking within a time interval on the basis of data supplied by finite observers (with P.A. Tochilin) // Differential Equations. 2013. V. 49. № 5. pp. 630-639. (translated from russian).
- Parallel algorithm for calculating the invariant sets of high-dimensional linear systems under uncertainty (with A.N. Daryin) // Computational Mathematics and Mathematical Physics. 2013. V. 53. № 1. pp. 34-43. (translated from russian).
- Control of ellipsoidal trajectories: Theory and numerical results (with A.I.

Mesyats) // Computational Mathematics and Mathematical Physics. 2014. V. 54. № 3. pp. 418–428.

- Dynamics and Control of Trajectory Tubes. Theory and Computation. (with P. Varaiya), Birkhäuser, 2014. 445 pages.

**Source URL:** <http://sa.cs.msu.su/staff/kurzhanski/en>