

# Alexander V. Bochkov

DOCTOR OF SCIENCE · SCIENTIFIC SECRETARY

JSC NIIAS (Joint Stock Company «Design & Research Institute for Information Technology, Signalling and Telecommunications on Railway Transport»), Bldg 1, 5 Orlikov Pereulok, Moscow, 107078, Russia

✉ a.bochkov@gmail.com | 🌐 www.gnedenko.net/Personalities/Bochkov/Bochkov\_vizitka.htm | 🔗 alexander-bochkov-8034a815 |

📞 a.bochkov | ORCID ID: orcid.org/0000-0003-0211-8320; Researcher ID: A-4101-2014; Scopus Author ID: 57188739597

## Education

### Gazprom VNIIGAZ, LLC

*Proektiruemyj proezd 5537, 15, 1,  
Razvilka, s.p. Razvilkovskoe,  
Leninsky dist., Moscow region,  
142717, Russia  
2020*

#### DOCTOR OF SCIENCE

- Scientific Consultant: Prof., Dr. Valery Lesnykh

### Moscow Aviation Institute (National Research University), MAI

*Volokolamskoe shosse, 4,  
Moscow, 125993, Russia  
2000*

#### PHD

- Advisor: Prof., Dr. Nadejda Demidova

### Moscow Aviation Institute (National Research University), MAI

*Volokolamskoe shosse, 4,  
Moscow, 125993, Russia  
1989 - 1994*

#### BS UNDERGRADUATE DEGREE

- Faculty of Space Aircraft, Training area: Life Support Systems, Qualification: System Engineer
- Honors thesis/undergrad research advisor: Prof., Dr. Nadejda Demidova

### National Research Nuclear University MEPhI, Moscow Engineering Physics Institute

*31 Kashirskoe Shosse, Moscow,  
115409, Russia  
1985 - 1989*

#### UNDERGRADUATE DEGREE

- Theoretical Physics Faculty

## Professional Experience

2022-present **Scientific Secretary**, JSC NIIAS (Joint Stock Company «Design & Research Institute for Information Technology, Signalling and Telecommunications on Railway Transport»)

2020-present **Researcher**, Gazprom Gaznadzor, LLC

2020-2022 **Deputy Head of Integrated R&D Unit**, JSC NIIAS (Joint Stock Company «Design & Research Institute for Information Technology, Signalling and Telecommunications on Railway Transport»)

2018-2020 **Chief of Department**, Gazprom Gaznadzor, LLC

2011-2018 **Deputy Director of the Risk Analysis Center**, NIIGazeconomika, LLC

2006-2011 **Chief of Laboratory**, Gazprom VNIIGAZ, LLC

1994-2006 **Research Officer**, National Research Center «Kurchatov Institute»

## Areas of specialisation

- Risk Assessment, Analysis and Management
- System Analysis and Operation Research
- Vulnerability and Survivability of Large-Scale Systems
- Life-Support Systems

## Publications

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### JOURNAL ARTICLES

- Bochkov, A.V.**, Golovin, V. N. Agriculture as an energy consumer. *Energia* No. 6, 1997, pp. 2-8
- Bochkov, A.V.**, Demidova, N. S., Shangin, I. A. Experimental and theoretical study of an individual electrochemical water treatment system on an automated stand for use in transport. *Bulletin of MSTU (GA)* No. 7, Series: "Flight safety", UDC No. 629.7.06.9, 1998
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- Bochkov, A.V.** Using the hierarchy analysis method for categorizing critical objects according to the degree of cumulative damage and the risk of illegal actions. *ISSN 1812-5220, "Problems of risk analysis"*, No. 4 (volume 5), 2008, pp. 6-13
- Bochkov, A.V.**, Radaev, N. N. Assessment of the terrorist threat to the object. *Proceedings of the International Scientific School IADB-2008-Modeling and Analysis of Security and Risk in Complex Systems*, St. Petersburg, June 24-28, 2008.
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- Bochkov, A.V.**, Radaev, N.N. Determining a priori distribution of error-free running time for high reliability components by Delphi method- *ISSN 1932-2321, e-Journal "Reliability and Risk Analysis: Theory and Applications"*, №1, March, 2009, p. 47-56
- Bochkov, A.V.**, Lesnykh, V. V., Timofeeva, T. B. Method of constructing an a priori dependence of the specific damage value on the duration of power supply interruptions to end users. *Proceedings of the International Scientific School IADB-2009-Modeling and Analysis of Security and Risk in Complex Systems*, St. Petersburg, July 7-11, 2009.
- Bochkov, A.V.** Categorizing critical objects by vulnerability to possible illegal actions. Expert approach. *BDI (Security, Reliability, information)*, No. 1 [82] January-February, 2009, pp. 28-30
- Bochkov, A.V.**, Lesnykh, V. V., Lavrukhin, Yu. N. Methodological issues of ensuring the safety and survivability of onshore and offshore oil and gas facilities-*ISSN 1812-5220, "Problems of risk analysis"*, No. 3 (volume 7), 2010, pp. 6-32
- Bochkov, A.V.**, Lesnykh, V. V. Metodicheskie podkhody k obespecheniyu zashchity morskikh i shel'fovykh neftegazovykh obektov ot illegalnykh deystvii [Methodological approaches to providing protection of sea and Off-shore Oil and Gas Objects Protection From Illegal Actions] // Springer Publishing House, in the series "NATO: Security through Science" (Springer, NATO Security Through Science Series) in the proceedings of the Russia-NATO seminar "Comparative Analysis of the impact of technological and intellectual terrorism on complex technical systems", 5-7 April 2011, Moscow. NATO Science for Peace and Security Series E: Human and Societal Dynamics - Vol. 102 // Comparative Analysis of Technological and Intelligent Terrorism Impacts on Complex v Technical Systems – N.A. Makhutov and G.B. Baecher (Eds.), IOS Press, 2012, 69-80 pp. – 216 p.
- Bochkov, A.V.**, Demidova, N. S. Self-organization of space-time structures of transport processes in sorption systems for maintaining the gas composition of space objects. *Bulletin of the Moscow Aviation Institute*, No. 2, 2012, vol. 19 (ISSN 0869-6101 – - pp. 35-46
- Bochkov, A.V.**, Zhigirev, N.N., Lesnykh, V.V. Dynamic Multi-Criteria Decision Making Method for Sustainability Risk Analysis of Structurally Complex Techno-Economic Systems - *ISSN 1932-2321, e-Journal "Reliability: Theory and Applications"*, Vol. 1, № 2(25), 2012, June, p.36-42
- Bochkov, A.V.**, Ushakov, I. A. Solving the problem of allocating resources designed to protect critical infrastructure facilities from terrorist attacks based on subjective expert assessments., №1(52). – 2015. – pp. 88-92 (russ.)

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- Bochkov, A.V.**, Lesnykh, V.V., Lavrukhin, Yu.N., Zhigirev, N.N. Some methodical aspects of critical infrastructure protection. *Safety Science* 79(2015), pp. 229-242. doi:10.1016/j.ssci.2015.06.008
- Bochkov, A.V.**, Zhigirev, N.N. On some applied problems of safety and situational management of the Unified gas supply system based on the analysis of the estimated data flow by the reference vector method. *Vesti gazovoi nauki: nauchno-tekhnicheskii sb.* – Moscow: Gazprom VNIIGAZ, 2017. – № 1 (29): Improving the reliability and safety of gas industry facilities. – 278 p. – pp. 129-141.
- Bochkov, A.V.**, Zhigirev, N. N., Ridley, A. N. Method for restoring the priority vector of alternatives in conditions of uncertainty or incompleteness of expert assessments. *Dependability*. 2017; 17(3): 41-48. DOI:10.21683/1729-2646-2017-17-3-41-48.
- Bochkov, A.V.**, Ponomarenko, D. V. Scientific and methodological bases for monitoring and forecasting the state of industrial safety of Gazprom PJSC. *Gas industry*. 2017. No. 3 (749), pp. 20-30.
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- Bochkov, A.V.** Problems of hazard assessment and risk management of Gazprom Group's critical Infrastructure facilities: an analytical review. *Vesti gazovoi nauki: nauchno-tekhnicheskii. sb.* – Moscow: Gazprom VNIIGAZ, 2018. – № 2 (34): Improving the reliability and safety of gas industry facilities – p. 51-87.
- Bochkov, A.V.**, Lesnykh, V. V., Ponomarenko, D. V. Modern approaches to monitoring the state of industrial safety of hazardous production facilities. "Problems of risk analysis", No. 1 (volume 15), 2018, pp. 6-17.
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- Bochkov, A.V.** Vulnerability Assessment Methodology and Some Methodical Aspects of Critical Infrastructure Protection *Bochkov, A.V. Int J Syst Assur Eng Manag* (2019), pp. 1-13. <https://doi.org/10.1007/s13198-019-00910-w>
- Bochkov, A.V.** On the method of risk synthesis in security management of structurally complex systems. *Dependability*. 2020; 1: 57-67. <https://doi.org/10.21683/1729-2646-2020-20-1-57-67>
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- Bochkov, A.V.**, Bochkov, A.V., Demidova, N. S., Bashkin, V. N. Mathematical modeling of transport processes in human life support and protection systems under extreme environmental conditions. Series "News of Gas Science", Moscow: Gazprom VNIIGAZ, 2012-282 p.
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## CHAPTER

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- Bochkov, A.V.**, Zhigirev, N.N. Development of Computation Algorithm and Ranking Methods for Decision-Making under Uncertainty, pp. 121-154. In: Ram M., Davim J. (eds) Advanced Mathematical Techniques in Engineering Science. Publisher Name: CRC Press, ISBN 9781138554399 – CATK43293. Series: Science, Technology and Management (May 17, 2018) – 336 p.
- Bochkov, A.V.** The Integral Method of Hazard and Risk Assessment for the Production Facilities Operations, pp. 149-200 In: Ram M., Pham H. (eds) Advances in Reliability Analysis and its Applications, Springer Series in Reliability Engineering. Springer Nature Switzerland AG 2020. – 391 p., [https://doi.org/10.1007/978-3-030-31375-3\\_4](https://doi.org/10.1007/978-3-030-31375-3_4)
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## CONFERENCE PAPERS

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- Bochkov, A.V.**, S. G. Malyshev Mathematical and full-scale modeling of flame foci in zero gravity // Materials of the XXI scientific readings on cosmonautics, Moscow, Nauka, Russian Academy of Sciences, 1997
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- Bochkov, A.V.**, Safonov, V. S., Lesnykh, V. V., Radaev, N. N. Review of the current state of work performed by VNIIGAZ LLC as part of the implementation of the Integrated Target Program for 2005-2007 for the Creation, modernization, unification, design and equipping of Gazprom's facilities with ITSO and SAZ complexes. report at the V All-Russian Conference "Ensuring Information Security. Regional Aspects", Sochi, September 12-16, 2006, 2006
- Bochkov, A.V.**, Bochkov, A.V., Lesnykh, V. V. Report at the III Scientific and Practical Conference "Improvement of Civil Defense in the Russian Federation", Moscow, October 10, 2006, 2006
- Bochkov, A.V.**, Ushakov, I.A., Lesnykh, V.V. Risk Analysis under Uncertain Conditions: Min-max Approach. SRA 2006 Annual Meeting Risk Analysis in a Dynamic World: Making a Difference December 3-6, 2006 - Baltimore, Maryland
- Bochkov, A.V.** The problem of rational resource allocation for the protection of an important industrial facility. report at the scientific seminar CREATE-VNIIGAZ, Los Angeles (California, USA), 2007
- Bochkov, A.V.**, Samsonov, R.O., Safonov, V.S., Lesnykh, V.V., Radaev, N.N. Methodological and model aspects of ensuring the RF Gas Supply Unified System's resistance to terrorist attacks. International Workshop on Natural Disasters and Emergency Management, September 22-24, 2007, Beijing, China

- Bochkov, A.V.**, Safonov, V. S., Lesnykh, V. V., Radaev, N. N. Quantitative assessments of the terrorist threat to an object. Report at the scientific and practical conference "The practice of applying system analysis and special software in creating complex security systems and anti-terrorist protection of objects", St. Petersburg, October 18, 2007, 2007
- Bochkov, A.V.**, Safonov, V. S., Lesnykh, V. V., Radaev, N. N. Structure of the formalized intruder model. Report at the scientific and practical conference "The practice of applying system analysis and special software in creating complex security systems and anti-terrorist protection of objects", St. Petersburg, October 18, 2007, 2007
- Bochkov, A.V.**, Safonov, V. S., Lesnykh, V. V., Radaev, N. N. Problems of developing an external intruder model in the task of evaluating the effectiveness of the physical protection system of a marine object. Report at the conference "Safety of Marine Facilities" (SOF-2007), October 30-31, 2007, VNIIGAZ, Moscow, 2007
- Bochkov, A.V.**, Radaev, N. N. Assessment of the terrorist threat to the object. Proceedings of the International Scientific School IADB-2007-Modeling and Analysis of Security and Risk in Complex Systems, St. Petersburg, September 4-8, 2007.
- Bochkov, A.V.**, Radaev, N. N. Assessment of terrorist risk in the operation of facilities. Proceedings of the International Scientific School IADB-2008-Modeling and Analysis of Security and Risk in Complex Systems, St. Petersburg, June 24-28, 2008.
- Bochkov, A.V.**, Lesnykh, V. V. Methodological base for categorizing Gazprom objects by vulnerability to illegal actions. Report at the international conference "The Path of Innovation and New Technologies in the Gas Industry", October 15-16, 2008, Moscow, Gazprom VNIIGAZ LLC»
- Bochkov, A.V.**, Radaev, N.N. Application of analytic hierarchy process to determining a priori distribution of error-free running time for high-reliability components. Proceedings of the International Conference ISAHP 2009, July 29-August 1, 2009, Pittsburgh, USA
- Bochkov, A.V.**, Lesnykh, V. V., Krasnykh, G. V. Conceptual foundations of a decision support system for improving the security of critical objects of structurally complex fuel and energy systems. Proceedings of the conference Safety of critical Infrastructures and Territories: Proceedings of the III All-Russian Conference and the XIII School of Young Scientists. Yekaterinburg: Ural Branch of the Russian Academy of Sciences, 2009, 404 p., ISBN 5-7691, pp. 37-38
- Bochkov, A.V.**, Krasnykh, G. V. Scientific and methodological aspects of analysis, assessment, provision and management of security of critical infrastructure facilities from illegal actions. Analytical report, Analyst-2009 contest, Gazprom VNIIGAZ LLC»
- Bochkov, A.V.**, Barsukov, A. N., Lesnykh, V. V., Diakonov, M. N. Problems of building a corporate situational management system. Proceedings of the conference "Situational Centers and Information and Analytical Tools for Decision Support", Russian Presidential Academy of Public Administration, April 27-28, 2010.
- Bochkov, A.V.**, Zhigirev, N. N., Krasnykh, G. V., Eremkin, G. V. Development of methodological foundations and algorithms for implementing an adaptive scheme for calculating indicators of emergency and pre-crisis situations at Russian UGSS facilities. Proceedings of the conference "Situational Centers and Information and Analytical Tools for Decision Support", Russian Presidential Academy of Public Administration, April 27-28, 2010.
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- Bochkov, A.V.**, Krasnykh, G. V. A method for constructing a dominant sequence in the problem of situational operational risk management of complex oil and gas projects. Proceedings of the II-th International Scientific and Practical Conference "Effective Management of Complex Oil and Gas Projects", September 21-24, 2010, Branch of Gazprom VNIIGAZ LLC in Ukhta
- Bochkov, A.V.** Approaches To The Construction Of Adaptive Situation Control Systems Of Structurally Complex Systems Under Uncertainty. Proceedings of the International Conference ISAHP-2011, Sorrento (Naples-ITALY) from June 15 to June 18, 2011
- Bochkov, A.V.**, Barsukov, A.N., Lesnykh, V.V., Diakonov, M.N. Experience in building, methodological and software support for Gazprom's corporate situational management system. Proceedings of the 9th Scientific and Practical Conference "Situational Centers 2011" (Situational Centers and E-Government, Russian Presidential Academy of Public Administration, April 26-27, 2011

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- Bochkov, A.V.,** Vyukov, V. N. Application of the theory of wavelet transformations in the analysis of risks of emergency and crisis situations at gas industry facilities. Proceedings of the V All-Russian Scientific and Technical Conference with international participation, and Materials of the XIV School of Young Scientists "Safety of critical Infrastructures and Territories" and the Seminar "Safety Technologies of critical Infrastructures", Yekaterinburg: Ural Branch of the Russian Academy of Sciences, 2011, 404 p., ISBN 5-7691, pp. 37-38
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- Bochkov A.,** Kashtanov V, Zaitseva O. Theorem on the Structure of the Fractionally Linear Functional Extremal Function. Mathematics. 2023; 11(13):2886. <https://doi.org/10.3390/math11132886>
- Bochkov A.** Towards a Solution to the Problem of Safety Management of Structurally Complex Systems Journal of Applied-Math (JAM). 2023; 1(1): 1-14 DOI: <http://dx.doi.org/10.59400/ijm.v1i1>

## Awards, Fellowships, & Grants

2015	<b>2nd Gazprom Prize in Science and Technology for 2015</b> , Public Joint Stock Company Gazprom	\$ 5,000
2015	<b>Gazprom Grant Competition (awarded a Grant from the Chairman of the Gazprom Management Board to prepare a dissertation for the degree of Doctor of Science)</b> , Public Joint Stock Company Gazprom	\$ 9,500

## Outreach & Professional Development

### DEVELOPMENT

**I Participated in many Russian and International Conferences and Scientific Schools**, including the International Workshop on Natural Disasters Emergency Management, September 22-24, 2007, Beijing, China, and the CREATE - VNIIGAZ scientific seminar, Los Angeles (USA), March 2007), the International Symposium on the use of the Hierarchy Analysis method (ISAHP2009), the University of Pittsburgh (Pennsylvania, USA), the International Conference on Life Circle Engineering and Management (ICDQM-2016, Prijevor, Serbia)

### PEER REVIEW

Co-Founder and member of the Editorial Board of the journal **Reliability: Theory Applications** (ISSN 1932-2321), member of the Editorial Boards of the journals **Dependability** (ISSN 1729-2646) and the **International Journal of Performance Engineering** (ISSN 0973-1318), **Journal of AppliedMath (JAM)**

## PROFESSIONAL MEMBERSHIPS

Founder of the Gnedenko Forum ([www.gnedenko.net](http://www.gnedenko.net)) - International Group On Reliability

Member of the Russian Society for Risk Analysis.

Certificate of the International Center for Economics, Science and Technology, St. Petersburg on the improvement of the qualification on the topic "Analysis of the vulnerability of objects. Assessment of the effectiveness of the security system" from 8 to 10 November 2006.

Certificate of the Wintershall Holding AG seminar on "Internal Controlling and Risk Management" for Gazprom executives from November 19 to 28, 2007, Deidesheim.

Certificate of the training seminar "Blagovest-V" LLC, July 08-10, 2008, St. Petersburg "Modern technologies of anti-terrorist protection of objects of sea and river transport. The practice of implementing the requirements of the Law "On Transport Security".