Curriculum Vitae of Dmitry Shirokov

Work Address
1) HSE University, Faculty of Economic Sciences, Department of Mathematics,
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2) Institute for Information Transmission Problems of Russian Academy of Sciences
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EDUCATION

Lomonosov Moscow State University 2004 – 2009
Faculty of Mechanics and Mathematics, Speciality: Mechanics,
With high honors.

Steklov Mathematical Institute of Russian Academy of Sciences 2007 – 2013
Successfully passed 17 advanced courses in Research and Educational Center
of Steklov Mathematical Institute of Russian Academy of Sciences.

Steklov Mathematical Institute of Russian Academy of Sciences 2009 – 2012
Postgraduate level, Department of Mathematical Physics,
Supervisor: Prof. N. G. Marchuk.

Steklov Mathematical Institute of Russian Academy of Sciences 05.2013
Ph.D. (Candidate of physical and mathematical sciences),
Speciality: 01.01.03 (Mathematical Physics),
Thesis theme: "Some problems of the theory of Clifford algebras arising in the field theory".

EMPLOYMENT

Kharkevich Institute for Information Transmission Problems of Russian Academy of Sciences, Moscow, 01.2014 – present
Researcher in Laboratory 7 (2014 – 2015),
Senior Researcher in Pinsker Laboratory 1 (2015 – present).

Bauman Moscow State University, 02.2014 – 08.2016
Faculty of Fundamental Sciences, Department of Higher Mathematics, Moscow,
Assistant (2014), Associate Professor (2014 – 1016).

HSE University, 01.2015 – present
Faculty of Economic Sciences, Department of Mathematics, Moscow,
Senior Lecturer (2015 – 2016), Associate Professor (2016 – present), and
Senior Research Fellow (2021 – present).

GRANTS AND AWARDS

Head of projects:

- grant 16-31-00347 of the Russian Foundation for Basic Research, 2016 – 2017
  "Algebraic and geometric methods in field theory",
- grant 17-01-0009 of the HSE Academic Fund Programme 2017 – 2018

"Lie groups and Lie algebras in Clifford algebras" (Individual Research Project),
- grant 18-71-00010 of the Russian Science Foundation "Algebraic and geometric methods in the theory of nonlinear equations of mathematical physics", 2018 – 2020
- grant 20-11-00009 of the Russian Foundation for Basic Research for publishing the book "Theory of Clifford algebras and spinors", 2020
- grant 20-01-003 of the HSE Academic Fund Programme "Computational problems in Clifford algebra theory" (Individual Research Project), 2020 – 2021
- grant MK-404.2020.1 of the President of the Russian Federation "Some problems of the theory of Clifford algebras arising in mathematical physics", 2020 – 2021
- grant 21-71-00043 of the Russian Science Foundation "Algebraic and geometric methods in theory of Yang–Mills equations", 2021 – 2023
- grant 22-00-001 of the HSE Academic Fund Programme "Clifford algebras and applications" (Research and Study Group). 2022

Scientific consultant of projects:
- initiative collective research project of HSE students "Clifford algebras: computational problems and applications". 2021

Performer of projects:
- grant 11-01-00828-a of the Russian Foundation for Basic Research, 2011 – 2013
- grant 8215 of Ministry of Education and Science of the Russian Federation, 2012 – 2013
- grant NSh-2928.2012.1 of the President of RF for the Leading Scientific Schools, 2012 – 2013
- grant 14-11-00687 of the Russian Science Foundation. 2014 – 2016

Awards and Accomplishments at the HSE University:
- Best teacher, 2016, 2017, 2018, 2019, 2020, 2021, 2022
- Winner of the "Competition of the best Russian-language scientific and popular scientific works of HSE employees" in the scientific category Mathematics, 2022
- Young Faculty Support Program (Group of Young Academic Professionals),
  – Category "Future Professoriate", 2018 – 2019
  – Category "New Lecturers", 2016 – 2017
- Acknowledgment from the Department of Mathematics of the HSE University (February 2020),
- Academic allowance, 2015 – 2016, 2017 – 2018
- Allowance for an article in a foreign peer-reviewed scientific journal, 2016 – 2017, 2018 – 2020, 2022 – 2023
- Personal allowance of the rector. 2021 – 2022

PROFESSIONAL EXPERIENCE

Head of Research and study group:
- "Clifford algebra and applications" (economics.hse.ru/clifford). 2022 – present

Organizer of scientific seminar:
- "Clifford algebra and applications" (economics.hse.ru/clifford/seminar). 2022 – present

Internships and scientific visits:
- University College London, London, United Kingdom, 01.04 – 15.05.2018
- Chinese Academy of Sciences, Academy of Mathematics and Systems Science. Beijing, China, 09.04 – 23.05.2019

Editorial:
- Associate Editor of the journal "Journal of Geometry and Symmetry in Physics" (Bulgaria), http://geometry.imbm.bas.bg/jgsp/ 2021 – present
- Review Editor for Mathematical Physics of the journals "Frontiers in Physics" and "Frontiers in Applied Mathematics and Statistics" (Switzerland), https://loop.frontiersin.org/people/1955313 2022 – present
- Guest Editor of the journal "Advances in Applied Clifford Algebras" (Switzerland), Topical Collection 2019 Alterman Conference on Geometric Algebra / Kahler Calculus. 2019

Refereeing for journals and book series:

- "Advances in Applied Clifford Algebras" (Switzerland), "Advances in Pure Mathematics" (China), "AIMS Mathematics" (United States), "Applied Mathematics and Computation" (United States), "Communications in Theoretical Physics" (United States), "European Physical Journal Plus" (United States), "Extracta Mathematicae" (Spain), "International Journal of Modern Physics A" (Singapore), "Journal of Computational and Applied Mathematics" (Netherlands), "Journal of Geometry and Symmetry in Physics" (Bulgaria), "Journal of Mathematical Sciences: Advances and Applications" (India), "Journal of Mathematics" (Egypt), "Journal of Physics A: Mathematical and Theoretical" (United Kingdom), "Journal of Samara State Technical University" (Russia), "Lecture Notes in Computer Science (book series, Germany), "Linear Algebra and Its Applications" (Netherlands), "Linear and multilinear algebra" (United Kingdom), "Mathematical Methods in the Applied Sciences" (United Kingdom), "Mathematics" (MDPI, Switzerland), "Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science" (United Kingdom), "Proceedings of the Steklov Institute of Mathematics" (Russia), "Quasigroups and Related Systems" (Moldova), "Russian Mathematics" (Russia), "Scientific Reports" (Nature Publishing Group, United Kingdom), "The Bulletin of Udmurt University. Mathematics. Mechanics. Computer Science" (Russia), "Theoretical and Mathematical Physics" (Russia).

Lecturer of courses at the Steklov Mathematical Institute of Russian Academy of Sciences:

- "Clifford algebra and spinors" (program), 09 – 12.2011
- "Clifford algebras and field theory equations" (program), 09 – 12.2014
- "Foundations of the theory of Clifford algebras and spinors" (program). 02 – 05.2021

Lecturer of course at the International Summer School:

- "Introduction to the theory of Clifford algebras" (program), International Summer School "Hypercomplex Numbers, Lie Groups, and Applications", Varna, Bulgaria. 06.2017

Lecturer and seminarist of courses at the HSE University:

- "Linear algebra", Faculty of Economic Sciences, 2015 – present
- "Linear algebra", Graduate School of Business, 2020 – present
- "Algebra and geometry", Faculty of Business and Management, 2015 – 2020
- "Foundations of the theory of Clifford algebras", Magolego (Elective Course for master students), 2020, 2022
- "Foundations of the theory of Clifford algebras and spinors" (Open optional course). 2020

Seminarist of courses at the HSE University:

- "Mathematical analysis – 2", Faculty of Computer Science, 2015
- "Linear algebra and geometry", Faculty of Computer Science. 2015

Lecturer and seminarist of courses at the Bauman Moscow State University:

- "Analytic geometry", 2014, 2015
- "Mathematical analysis", 2015
- "Integrals and differential equations". 2014, 2016

Seminarist of courses at the Bauman Moscow State University:

- "Linear algebra and multivariable functions", 2014
- "Theory of probability and mathematical statistics", 2015
- "Theory of functions of a complex variable and operational calculus". 2015

BOOKS

1. Marchuk N. G., Shirokov D. S., *Theory of Clifford algebras and spinors* (in Russian), Krasand (URSS), Moscow, 560 pp., 2020 (1st edition, RFBF, not for sale), 2021 (2nd edition, http://urss.ru/cgi-bin/db.pl?&page=Book&id=272661), ISBN 978-5-396-01014-7
2. Shirokov D. S., *Lectures on Clifford algebras and spinors* (in Russian), Lects. Kursy NOC 19, Steklov Math. Inst., RAS, Moscow, 2012, 180 pp., ISBN 978-5-98419-044-2, ISSN 2226-8782, https://doi.org/10.4213/book1373
3. Marchuk N. G., Shirokov D. S., *Introduction to the theory of Clifford algebras* (in Russian), Phasis, Moscow, 2012, 590 pp., ISBN 978-5-7036-0132-0

LECTURES IN PROCEEDINGS

1. Shirokov D. S., *Clifford algebras and their applications to Lie groups and spinors* (Lectures), Proceedings of the Nineteenth International Conference on Geometry, Integrability and Quantization (Varna, Bulgaria, June 2017), eds. I. Mladenov and A. Yoshioka, Avangard Prima, Sofia, Bulgaria, 2018, 11 – 53, https://doi.org/10.7546/giq-19-2018-11-53, arXiv:1709.06608

PUBLICATIONS IN REFEREED JOURNALS

1. Marchuk N. G., Shirokov D. S., *Unitary spaces on Clifford algebras*, Advances in Applied Clifford Algebras, 18:2, 237–254, (2008), https://doi.org/10.1007/s00006-008-0066-y, arXiv:0705.1641
2. Shirokov D. S., Classification of elements of Clifford algebras according to quaternionic types, Dokl. Math., 80:1 (2009), 610–612, https://doi.org/10.1134/S1064562409040401
3. Shirokov D. S., *A classification of Lie algebras of pseudo-unitary groups in the techniques of Clifford algebras*, Advances in Applied Clifford Algebras, 20:2, 411–425 (2010), https://doi.org/10.1007/s00006-009-0177-0, arXiv:0705.3368
4. Shirokov D. S., *Theorem on the norm of elements of spinor groups*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 1(22), 2011, 165–171, https://doi.org/10.14498/vsgtu875
5. Shirokov D. S., *On some relations between spinor and orthogonal groups*, p-Adic Numbers, Ultrametric Analysis and Applications, 3:3, 212 – 218 (2011), https://doi.org/10.1134/S2070046611030058
6. Shirokov D. S., *Extension of Pauli's theorem to Clifford algebras*, Dokl. Math., 84, 2, 699–701 (2011), https://doi.org/10.1134/S1064562411060329
7. Shirokov D. S., *Quaternion typification of Clifford algebra elements*, Advances in Applied Clifford Algebras, 22:1, 243–256 (2012), https://doi.org/10.1007/s00006-011-0288-2, arXiv:0806.4299
8. Shirokov D. S., *Development of the method of quaternion typification of Clifford algebra elements*, Advances in Applied Clifford Algebras, 22:2, 483–497 (2012), https://doi.org/10.1007/s00006-011-0304-6, arXiv:0903.3494
9. Shirokov D. S., *Pauli theorem in the description of n-dimensional spinors in the Clifford algebra formalism*, Theoret. and Math. Phys., 175:1 (2013), 454–474, https://doi.org/10.1007/s11232-013-0038-9
10. Shirokov D. S. *The use of the generalized Pauli's theorem for odd elements of Clifford algebra to analyze relations between spin and orthogonal groups of arbitrary dimensions*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 1(30), 2013, 279–287, https://doi.org/10.14498/vsgtu1176
11. Shirokov D. S., *Generalization of Pauli's theorem on the case of Clifford algebras*, Nanostuctures. Mathematical physics and Modelling, 9:1 (2013), 93–104, https://nano-journal.ru/images/8/8e/94_pdfsam_Nano15.pdf
12. Shirokov D. S., *Calculations of elements of spin groups using generalized Pauli's theorem*, Advances in Applied Clifford Algebras, 25:1, 227–244 (2015), https://doi.org/10.1007/s00006-014-0471-3, arXiv:1409.2449
13. Shirokov D. S., *Contractions on ranks and quaternion types in Clifford algebras*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 19:1 (2015), 117–135, https://doi.org/10.14498/vsgtu1387
14. Shirokov D. S., *Symplectic, orthogonal and linear Lie groups in Clifford algebra*, Advances in Applied Clifford Algebras, 25:3, 707–718 (2015), https://doi.org/10.1007/s00006-014-0520-y, arXiv:1409.2452
15. Marchuk N. G., Shirokov D. S., *General solutions of one class of field equations*, Reports on mathematical physics, 78:3, 2016, 305–326, https://doi.org/10.1016/S0034-4877(17)30011-3, arXiv:1406.6665
16. Shirokov D., *On some Lie groups containing spin group in Clifford algebra*, Journal of Geometry and Symmetry in Physics, 42 (2016), 73–94, https://doi.org/10.7546/jgsp-42-2016-73-94, arXiv:1607.07363
17. Marchuk N., Shirokov D., *Constant solutions of Yang–Mills equations and generalized Proca equations*, Journal of Geometry and Symmetry in Physics, 42 (2016), 53–72, https://doi.org/10.7546/jgsp-42-2016-53-72, arXiv:1611.03070
18. Shirokov D. S., *Method of averaging in Clifford algebras*, Advances in Applied Clifford Algebras, 27:1, 149–163 (2017), https://doi.org/10.1007/s00006-015-0630-1, arXiv:1412.0246
19. Shirokov D. S., *Covariantly constant solutions of the Yang–Mills equations*, Advances in Applied Clifford Algebras, 28 (2018), 53, 16 pp., https://doi.org/10.1007/s00006-018-0868-5, arXiv:1709.07836

20. Shirokov D. S., *Classification of Lie algebras of specific type in complexified Clifford algebras*, Linear and multilinear algebra, 66:9, 1870–1887 (2018), https://doi.org/10.1080/03081087.2017.1376612, arXiv:1704.03713
21. Shirokov D. S., *Calculation of elements of spin groups using method of averaging in Clifford's geometric algebra*, Advances in Applied Clifford Algebras, 29 (2019), 50, 12 pp., https://doi.org/10.1007/s00006-019-0967-y, arXiv:1901.09405
22. Marchuk N. G., Shirokov D. S., *Local generalization of Pauli's Theorem*, Azerbaijan Journal of Mathematics, 10:1 (2020), 38–56, https://azjm.org/volumes/1001/pdf/1001-3.pdf, arXiv:1201.4985
23. Shirokov D. S., *On constant solutions of* SU(2) *Yang–Mills equations with arbitrary current in Euclidean space* $\mathbb{R}^n$, Journal of Nonlinear Mathematical Physics, 27:2 (2020), 199–218, https://doi.org/10.1080/14029251.2020.1700625, arXiv:1804.04620
24. Marchuk N. G., Shirokov D. S., *On some equations modeling the Yang–Mills equations*, Physics of Particles and Nuclei, 51:4 (2020), 589–594, https://doi.org/10.1134/S1063779620040498
25. Shirokov D. S., *A note on the hyperbolic singular value decomposition without hyperexchange matrices*, Journal of Computational and Applied Mathematics, 391 (2021), 113450, https://doi.org/10.1016/j.cam.2021.113450, arXiv:1812.02460
26. Shirokov D. S., *On inner automorphisms preserving fixed subspaces of Clifford algebras*, Advances in Applied Clifford Algebras, 31 (2021), 30, 23 pp., https://doi.org/10.1007/s00006-021-01135-6, arXiv:2011.08287
27. Shirokov D. S., *On computing the determinant, other characteristic polynomial coefficients, and inverse in Clifford algebras of arbitrary dimension*, Computational and Applied Mathematics, 40 (2021), 173, 29 pp., https://doi.org/10.1007/s40314-021-01536-0, arXiv:2005.04015
28. Shirokov D. S., *Basis-free solution to Sylvester equation in Clifford algebra of arbitrary dimension*, Advances in Applied Clifford Algebras, 31 (2021), 70, 19 pp., https://doi.org/10.1007/s00006-021-01173-0, arXiv:2109.01816
29. Shirokov D. S., *Hyperbolic Singular Value Decomposition in the Study of Yang—Mills and Yang—Mills—Proca Equations*, Computational Mathematics and Mathematical Physics, 62:6 (2022), 1007–1019, https://doi.org/10.1134/S0965542522060136
30. Abdulkhaev K. S., Shirokov D. S., *Basis-free Formulas for Characteristic Polynomial Coefficients in Geometric Algebras*, Advances in Applied Clifford Algebras, 32 (2022), 57, 27 pp., https://doi.org/10.1007/s00006-022-01232-0, arXiv:2205.13449
31. Filimoshina E. R., Shirokov D. S., *On generalization of Lipschitz groups and spin groups*, Mathematical Methods in the Applied Sciences, 26 pp., 2022, https://doi.org/10.1002/mma.8530, arXiv:2205.06045

OTHER PREPRINTS AND CONFERENCE PROCEEDINGS

1. Shirokov D. S., *Quaternion types of Clifford algebra elements, basis-free approach*, Proceedings of 9th International Conference on Clifford Algebras and their Applications in Mathematical Physics, Weimar, Germany, 15 – 20 July (2011), arXiv:1109.2322
2. Shirokov D. S., *Concepts of trace, determinant and inverse of Clifford algebra elements*, Progress in analysis. Proceedings of the 8th congress of the International Society for Analysis, its Applications, and Computation (ISAAC), Moscow, Russia, August 22–27, 2011. Volume 1. Burenkov, V. I. (ed.); Goldman, M. L. (ed.); Laneev, E. B. (ed.); Stepanov, V. D. (ed.), Moscow: Peoples' Friendship University of Russia (ISBN 978-5-209-04582-3/hbk), 2012, 187–194, arXiv:1108.5447
3. Shirokov D. S., *On basis-free solution to Sylvester equation in geometric algebra*, In: Magnenat-Thalmann N. et al. (eds) Advances in Computer Graphics. CGI 2020. Lecture Notes in Computer Science, vol 12221. Springer, Cham, 2020, 541–548, https://doi.org/10.1007/978-3-030-61864-3_46
4. Shirokov D. S., *A note on subspaces of fixed grades in Clifford algebras*, AIP Conference Proceedings (ICMM-2020, Yakutsk, Russia), 2328, 060001 (2021), ISBN: 978-0-7354-4072-2. https://doi.org/10.1063/5.0042103
5. Abdulkhaev K. S., Shirokov D. S., *On explicit formulas for characteristic polynomial coefficients in geometric algebras*, In: Magnenat-Thalmann N. et al. (eds) Advances in Computer Graphics. CGI 2021. Lecture Notes in Computer Science, vol 13002. Springer, Cham, 2021, 670–681, https://doi.org/10.1007/978-3-030-89029-2_50

6. Shirokov D. S., *On solutions of the Yang–Mills equations in the algebra of h-forms*, Journal of Physics: Conference Series (International Conference "Marchuk Scientific Readings 2021" (MSR-2021) 4–8 October 2021, Novosibirsk, Russian Federation), 2099, IOP Publishing, 2021, 012015, https://doi.org/10.1088/1742-6596/2099/1/012015
7. Shirokov D. S., *On Noncommutative Vieta Theorem in Geometric Algebras*, In: Magnenat-Thalmann N. et al. (eds) Advances in Computer Graphics. CGI 2022. Lecture Notes in Computer Science. Springer, Cham, 2022 (to appear)
8. Filimoshina E. R., Shirokov D. S., *On some Lie groups in degenerate geometric algebras*, In: Eckhard Hitzer & Dietmar Hildenbrand (eds) First International Conference, ICACGA 2022, Colorado Springs, CO, USA, 2022, Proceedings. Lecture Notes in Computer Science. Springer, Cham, 2022 (to appear)
9. Shirokov D. S., *Method of generalized Reynolds operators in Clifford algebras*, arXiv:1409.8163
10. Shirokov D. S., *Classification of all constant solutions of* SU(2) *Yang–Mills equations with arbitrary current in pseudo-Euclidean space* $\mathbb{R}^{p,q}$, arXiv:1912.04996
11. Shirokov D. S., *Classification of all constant solutions of the Yang–Mills–Dirac equations*, arXiv:2207.12313

CONFERENCE TALKS

1. Lomonosov Conference, Moscow State University, Department of Mechanics and Mathematics, 2008, Moscow, talk: *Method of quaternion typification of Clifford algebra elements*,
2. The Second International Conference on Mathematical Physics and Its Applications, August 29 – September 04, 2010, Samara, Russia, talk: *Structure of Euclidean and unitary space on hypercomplex number systems*
3. The 9th International Conference on Clifford Algebras and their Applications (ICCA), Weimar, Germany, July 15–20, 2011, talk: *Quaternion types of Clifford algebra elements, basis-free approach*,
4. 8th International ISAAC Congress, Moscow, August 22–27, 2011, talk: *Pauli's fundamental theorem for Clifford algebras*,
5. The 5th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2012), La Rochelle, France, July 2–4, 2012, talk: *Calculation of elements of spin groups using Generalized Pauli's theorem*, http://agacse2012.univ-lr.fr
6. School-Seminar "Interaction of Mathematics and Physics: New Perspectives" for graduate students and young researchers, Moscow, August 22–30, 2012, talk: *Generalization of Pauli's theorem on the case of Clifford algebra*,
7. The Third International Conference on Mathematical Physics and Its Applications, August 27 – September 2, 2012, Samara, Russia, talk: *Generalization of Pauli's theorem to the case of Clifford algebras*,
8. International conference "Representations, Dynamics, Combinatorics: in the Limit and Beyond" in honor of Anatoly Vershik's 80th birthday, June 9–14 , 2014, St. Petersburg, Russia, plenary talk (with academician V. P. Maslov): *Vershik's combinatorial approach and phase transitions in the classical thermodynamics*, http://www.pdmi.ras.ru/EIMI/2014/RDC/
9. The 10th International Conference on Clifford Algebras and their Applications (ICCA10), Tartu, Estonia, August 4–9, 2014, talk: *The method of contractions in Clifford algebras*,
10. The Fourth International Conference on Mathematical Physics and Its Applications, August 25 – September 1, 2014, Samara, Russia, talk: *Method of contractions in Clifford algebras with applications to the field theory equations*,
11. Physical And Mathematical Problems Of Advanced Technology Development (PhysMathTech-2014), devoted to the 50th Anniversary of the Scientific and Educational Division "Fundamental Sciences" of the Bauman Moscow State Technical University, November 17–19, 2014, Moscow, Russia, talk: *New class of gauge invariant solutions of Yang–Mills equations*,
12. Alterman Conference on Geometric Algebra and Summer School on Kähler Calculus, August 1–9, 2016, Brasov, Romania, talk: *On some Lie groups containing Spin groups in Clifford algebra*, http://www.xtec.cat/ rgonzal1/mirroralterman2016/

13. VI Russian-Armenian Conference on Mathematical Analysis, Mathematical Physics and Analytical Mechanics, September 11–16, 2016, Rostov-on-Don, Russia, talk: *Covariantly constant solutions of the Yang–Mills equations*, http://rus-arm.sfedu.ru/index_eng.html
14. International Conference "New trends in Mathematical and Theoretical Physics", October 3–7, 2016, Moscow, Russia, talk: *Covariantly constant solutions of the Yang–Mills equations*, http://www.mathnet.ru/eng/conf791
15. The 2nd French-Russian Conference "Random Geometry and Physics", October 17–21, 2016, Paris, France, talk: *On connection between two sets of higher-dimensional gamma matrices and a primitive field equation*, https://pperso.ijclab.in2p3.fr/page_perso/Rivasseau/RGP16/
16. International Summer School "Hypercomplex Numbers, Lie Groups, and Applications", June 9–12, 2017, Varna, Bulgaria, course of 5 lectures: *Introduction to the theory of Clifford algebras*, http://www.bio21.bas.bg/conference/school/
17. International Conference on Mathematical Modeling, July 4–8, 2017, Yakutsk, Russia, talk: *Local generalized Pauli's theorem and one field equation*, https://www.s-vfu.ru/universitet/nauka/mkmm2017/en/
18. The 11th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA11), August 1–11, 2017, Ghent, Belgium, talk: *Yang–Mills equations and Clifford algebras*, http://www.icca11.ugent.be
19. Operators, Functions, and Systems of Mathematical Physics Conference, May 21–24, 2018, Baku, Azerbaijan, talk: *On some solutions of Yang–Mills equations with SU(2) gauge symmetry*, https://sites.google.com/view/ofsmp2018/home
20. The 7th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2018), July 23–27, 2018, Campinas, Brazil, talk: *Calculation of elements of spin groups using method of averaging in Clifford's geometric algebra*, https://www.ime.unicamp.br/ agacse2018/
21. International conference "Modern Mathematical Physics. Vladimirov-95", November 12–16, 2018, Moscow, Russia, talk: *On some solutions of Yang–Mills equations with SU(2) gauge symmetry*, http://www.mathnet.ru/eng/conf1295
22. International Conference on Mathematical Methods in Physics, April 1–5, 2019, Marrakesh, Morocco, talk: *Method of averaging in Clifford algebras and applications*, http://www.icmmp2019.doodlekit.com/
23. International Symposium on Wen-Tsun Wu's Academic Thought and Mathematics Mechanization, May 12–17, 2019, Beijing, China, talk: *SVD and hyperbolic SVD for obtaining solutions of SU(2) Yang–Mills equations*, http://www.mmrc.iss.ac.cn/wu
24. The 2nd JNMP Conference on Nonlinear Mathematical Physics, May 26 – June 4, 2019, Santiago, Chile, talk: *On constant solutions of SU(2) Yang–Mills equations*, http://www.dmcc.usach.cl/JNMP-Conference-2019/
25. International Conference "Mathematical Physics, Dynamical Systems and Infinite-Dimensional Analysis", June 17–21, 2019, Dolgoprudny, Russia, talk: *On constant solutions of SU(2) Yang–Mills equations*, https://mipt.ru/education/chair/mathematics/conf/matematicheskaya-fizika-dinamicheskie-sistemy/
26. 4th Alterman Conference on Computational and Geometric Algebra-cum-Workshop on Kähler Calculus, July 8–13, 2019, Manipal, India, plenary talk: *Method of averaging in Clifford algebras and applications*, https://conference.manipal.edu/alterman2019/Home
27. IX-th International Conference "Solitons, Collapses and Turbulence: Achievements, Developments and Perspectives" (SCT-19) in honor of Vladimir Zakharov's 80th birthday, August 5–9, 2019, Yaroslavl, Russia, talk: *Classification of all constant solutions of SU(2) Yang–Mills equations with arbitrary current*, https://lomonosov-msu.ru/eng/event/5298/
28. International Bogolyubov Conference "Problems of theoretical and mathematical physics", September 9–13, 2019, Moscow – Dubna, Russia, talk: *On constant solutions of SU(2) Yang–Mills equations*, http://theor.jinr.ru/ bog2019
29. 9th International Conference on Mathematical Modeling, July 27 – August 1, 2020, Yakutsk, Russia, talk: *On determinant and inverses in Clifford algebras*, https://www.s-vfu.ru/universitet/nauka/mkmm2020/en/

30. The 12th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA12), August 3–7, 2020, Hefei, China, talk: *On determinant, other characteristic polynomial coefficients, and inverses in Clifford algebras*, http://www.smartchair.org/hp/ICCA2020/
31. International Conference "Computer Graphics International (CGI) 2020", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, October 20–23, 2020, Geneva, Switzerland, talk: *On basis-free solution to Sylvester equation in geometric algebra*, http://www.cgs-network.org/cgi20/
32. International Conference on Mathematical Physics in Memory of Academic V. S. Vladimirov, November 23–27, 2020, Moscow, Russia, talk (with N. G. Marchuk): *On some equations modeling the Yang–Mills equations*, http://www.mathnet.ru/eng/conf1677
33. International Conference "Mathematical Physics, Dynamical Systems and Infinite-Dimensional Analysis 2021", June 30 – July 9, 2021, Dolgoprudny, Russia, talk: *On constant solutions of the Yang–Mills–Dirac equations*, http://www.mathnet.ru/eng/conf1918
34. International Conference "Computer Graphics International (CGI) 2021", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, September 6–10, 2021, Geneva, Switzerland, talk (with K. Abdulkhaev, Runner Up Best Paper & Presentation Award of ENGAGE 2021): *On explicit formulas for characteristic polynomial coefficients in geometric algebras*, http://www.cgs-network.org/cgi21/
35. The 8th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2021), September 6–10, 2021, Brno, Czech Republic, talk: *On Lie groups defining inner automorphisms that leave invariant fundamental subspaces of geometric algebra*, http://agacse2021.fme.vutbr.cz/
36. International Conference "Marchuk Scientific Readings 2021" (MSR-2021), October 4–8, 2021, Akademgorodok, Novosibirsk, Russia, talk: *Hyperbolic SVD for obtaining solutions of SU(2) Yang–Mills equations*, http://conf.nsc.ru/msr2021
37. International Conference "Computer Graphics International (CGI) 2022", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, September 12–16, 2022, Geneva, Switzerland, talk: *On Noncommutative Vieta Theorem in Geometric Algebras*, http://www.cgs-network.org/cgi22/
38. International Conference of Advanced Computational Applications of Geometric Algebra (ICACGA 2022), October 2–5, 2022, Denver, USA, talk (with E. Filimoshina): *On some Lie groups in degenerate geometric algebras*, https://icacga.org/

SELECTED SEMINAR TALKS

- Seminar of the Department of Mathematical Physics (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Academician V. S. Vladimirov, Corr. memb. of RAS I. V. Volovich, (2011, 2021), http://www.mathnet.ru/eng/conf129
- Seminar of the Department of Theoretical Physics (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairman: Academician A. A. Slavnov, (2012), http://www.mathnet.ru/eng/conf130
- Seminar of the Department of gas and wave dynamics (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), (2007–2009),
- Seminar of Department of Higher Algebra (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), (2010, 2012),
- Seminar "Classical and quantum dynamics in some problems of mathematical physics" (Research and Educational Center of Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Academician V. V. Kozlov, Corr. memb. of RAS I. V. Volovich, Prof. S. V. Kozyrev, Prof. O. G. Smolyanov, (2009–2015);
- Seminar "Infinite dimensional analysis and mathematical physics", Department of Function theory and functional analysis (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), chairmen: Prof. O. G. Smolyanov, Prof. E. T. Shavgulidze, (2013, 2021), http://www.mathnet.ru/eng/conf542

- Seminar of Laboratory 5 “Integrable structures in statistical and field models” (Kharkevich Institute for Information Transmission Problems, Russian Academy of Sciences, Moscow), chairmen: Corr. memb. of RAS A. A. Belavin, Prof. A. B. Zamolodchikov, (2013), http://www.mathnet.ru/eng/conf355
- V. P. Mikhailov seminar (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Prof. A. K. Gushchin, Prof. V. V. Zharinov, (2018),
- Spectral Theory and PDE Seminar (Pontificia Universidad Catolica de Chile, Santiago, Chile), chairman: Prof. Georgi Raikov, (2019), https://www.mat.uc.cl/ graikov/seminar.html
- Seminar of Mathematics Mechanization Research Center, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China, chairman: Prof. Hongbo Li, (2019).

Modified: September 12, 2022