

## EDITORS' PREFACE

This collection of articles (Volume 78 and part of Volume 79 of “Transactions of the Moscow Mathematical Society”) are devoted to the outstanding mathematician and remarkable teacher Ernest Borisovich Vinberg, who turned 80 on July 26, 2017.

Russian and international mathematical communities know well the name and scientific achievements of Ernest Borisovich. His scientific interests are very broad and cover various areas of algebra and geometry unified by the general notion of group symmetry. Vinberg made crucial contributions to such areas as Lie groups and Lie algebras, geometry of homogeneous spaces, algebraic transformation groups and invariant theory, discrete reflection groups, and symplectic and Poisson geometry. We mention just a few of his best known results: classification of homogeneous complex domains (jointly with S. G. Gindikin and I. I. Pyateski-Shapiro), invariant theory of theta-groups, the proof of non-existence of discrete reflection groups of compact or arithmetic type in Lobachevsky spaces of high dimension, the theory of commutative homogeneous spaces and coisotropic Hamiltonian transformations, and the use of “trancendent invariant theory” to prove the freeness of algebras of automorphic forms. These and other important results brought him broad recognition: Ernest Borisovich was an invited speaker at the International Congress of Mathematicians in Warsaw (1983), was awarded the prestigious Alexander von Humboldt Foundation Prize (1977), and gave an honorary European Mathematical Society lecture at the 50th “Sophus Lie” seminar in Bedlewo (Poland) in 2016. Topics of papers in this collection are related to E. B. Vinberg’s scientific interests, and some of them answer his questions.

Ernest Borisovich Vinberg is known not only as an outstanding mathematician but also as an excellent teacher and the founder of a scientific school. Among his students are world-renowned mathematicians, some of whom contributed to this volume. E.B. Vinberg advised 42 candidate dissertations and 7 doctoral dissertations. He is famous for choosing interesting meaningful problems, and he always very generously shares his ideas with students and colleagues. He spends a lot of time and effort disseminating mathematics, both on professional and popular levels. He authored several well-known monographs and textbooks; we particularly mention a series of surveys on fundamental directions in modern mathematics (jointly with D. V. Alexeevskii, V. V. Gorbatsevich, A. L. Onishchik, V. L. Popov, A. S. Solodovnikov, and O. V. Schvartsman), “Seminar on Lie Groups and Algebraic Groups” (jointly with A.L. Onishchik), and “A Course in Algebra”, which has already undergone several editions. The seminar “Lie Groups and Invariant Theory” by E. B. Vinberg and A. L. Onishchik at Moscow State University has been running for more than 50 years. Ernest Borisovich enthusiastically participates in organizing and running the summer and winter schools on Lie groups, algebraic groups, and invariant theory, and has given beautiful lecture series at many of these schools. (The last one took place in winter of 2017.) He advises a new generation of students at his courses and at the seminar “Algebra and Geometry”, which he runs at the Department of Mathematics of Moscow State University. As the Editor in Chief of the journal “Mathematical Education”, he pays a lot of attention to the popularization of mathematics.

Those who have been fortunate to meet Ernest Borisovich, all his students, friends, and colleagues, know him not only as an outstanding mathematician and talented teacher but also as a fair, intelligent, sensitive, and responsive person of high principles. The high esteem earned by E. B. Vinberg within the mathematical community can be seen from the outstanding list of authors of this volume. His attitude toward his profession, as well as his personal qualities, make him a kind of “reference point” in mathematics and in life.

We cordially congratulate Ernest Borisovich Vinberg on his 80th birthday anniversary and wish him good health and a long productive life.

I. V. Arzhantsev, D. A. Timashev

June 5, 2017

#### ERNEST BORISOVICH VINBERG'S PUBLICATIONS

- [1] È. B. Vinberg, *On invariant linear connections* (Russian), Dokl. Akad. Nauk SSSR **128** (1959), 653–654. MR0110073
- [2] È. B. Vinberg, *Invariant linear connections in a homogeneous space* (Russian), Trudy Moskov. Mat. Obšč. **9** (1960), 191–210. MR0176418
- [3] È. B. Vinberg, *Homogeneous cones*, Soviet Math. Dokl. **1** (1960), 787–790. MR0141680
- [4] È. B. Vinberg, *The Morozov-Borel theorem for real Lie groups* (Russian), Dokl. Akad. Nauk SSSR **141** (1961), 270–273. MR0142683
- [5] È. B. Vinberg, *Convex homogeneous domains* (Russian), Dokl. Akad. Nauk SSSR **141** (1961), 521–524. MR0142684
- [6] È. B. Vinberg, *Automorphisms of homogeneous convex cones* (Russian), Dokl. Akad. Nauk SSSR **143** (1962), 265–268. MR0132768
- [7] È. B. Vinberg, *Lie groups and homogeneous spaces* (Russian), Itogi Nauki (Algebra. Topology. 1962), Akad. Nauk SSSR Inst. Naučn. Informacii, Moscow, 1963, pp. 5–32. MR0169957
- [8] È. B. Vinberg, *The theory of homogeneous convex cones* (Russian), Trudy Moskov. Mat. Obšč. **12** (1963), 303–358. MR0158414
- [9] È. B. Vinberg, S. G. Gindikin, and I. I. Pjateckiĭ-Šapiro, *Classification and canonical realization of complex homogeneous bounded domains* (Russian), Trudy Moskov. Mat. Obšč. **12** (1963), 359–388. MR0158415
- [10] È. B. Vinberg, *Structure of the group of automorphisms of a homogeneous convex cone* (Russian), Trudy Moskov. Mat. Obšč. **13** (1965), 56–83. MR0201575
- [11] È. B. Vinberg, *On the theorem concerning the infinite-dimensionality of an associative algebra* (Russian), Izv. Akad. Nauk SSSR Ser. Mat. **29** (1965), 209–214. MR0172892
- [12] È. B. Vinberg, *Construction of the exceptional simple Lie algebras, Lie groups and invariant theory*, Amer. Math. Soc. Transl. Ser. 2, vol. 213, Amer. Math. Soc., Providence, RI, 2005, pp. 241–242. Translated from Trudy Sem. Vekt. Tenz. Anal. **13** (1966), 7–9. MR2140725
- [13] È. B. Vinberg, *Lectures on linear algebra and geometry*, Moscow State University, Moscow, 1966, 81 pp.
- [14] È. B. Vinberg and S. G. Gindikin, *Construction of homogeneous Kähler manifolds*, Reports of Short Communications, Intern. Congress of Mathematicians, Moscow, 1966, Section 10, p.12
- [15] È. B. Vinberg, S. G. Gindikin, and I. I. Pjatesky-Shapiro, *Homogeneous Kähler manifolds*, Proc. 4th All-Union Topology Conf. (Tashkent, 1967), 2967. pp. 45–57. MR0238237
- [16] È. B. Vinberg, *Compact Lie Groups* (Russian), Izdat. Moskov. Univ., Moscow, 1967. MR0260929
- [17] È. B. Vinberg, *Discrete groups generated by reflections in Lobachevskii spaces*, Mat. Sb. (N.S.) **72** (114) (1967), 471–488; correction, ibid. 73 (115) (1967), 303. MR0207853
- [18] È. B. Vinberg, *Letter to the Editor*, Mat. Sb. **73**(115):2 (1967), p. 303.
- [19] È. B. Vinberg and S. G. Gindikin, *Kähler manifolds admitting a transitive solvable group of automorphisms*, Mat. Sb. (N.S.) **74** (116) (1967), 357–377. MR0224114
- [20] È. B. Vinberg and V. G. Kac, *Quasi-homogeneous cones*, Mat. Zametki **1** (1967), 347–354. MR0208470
- [21] E. M. Andreev, È. B. Vinberg, and A. G. Èlašvili, *Orbits of highest dimension of semisimple linear Lie groups*, Funkcional. Anal. i Prilozhen. **1** (1967), no. 4, 3–7. MR0267040

- [22] È. B. Vinberg, *Invariant norms in compact Lie algebras*, Funkcional. Anal. i Priložen. **2** (1968), no. 2, 89–90. MR0235076
- [23] S. G. Gindikin, I. I. Pjateckiĭ Šapiro, and È. B. Vinberg, *Homogeneous Kähler manifolds*, Geometry of Homogeneous Bounded Domains (C.I.M.E., 3 Ciclo, Urbino, 1967), 1968, pp. 3–87. MR0238237
- [24] È. B. Vinberg, *Some examples of crystallographic groups in Lobachevskii spaces*, Mat. Sb. (N.S.) **78** (120) (1969), 633–639. MR0246193
- [25] È. B. Vinberg and A. L. Onishchik, *Seminar on algebraic groups and Lie groups*, Moscow State University, Moscow, 1969, 230 pp.
- [26] È. B. Vinberg, *Geometric representations of Coxeter groups*, Uspehi Mat. Nauk **25** (1970), no. 2 (152), 267–268. MR0262377
- [27] È. B. Vinberg, *Rings of definition of dense subgroups of semisimple linear groups*, Izv. Akad. Nauk SSSR Ser. Mat. **35** (1971), 45–55. MR0279206
- [28] È. B. Vinberg, *Discrete linear groups that are generated by reflections*, Izv. Akad. Nauk SSSR Ser. Mat. **35** (1971), 1072–1112. MR0302779
- [29] È. B. Vinberg, *The groups of units of certain quadratic forms*, Mat. Sb. (N.S.) **87** (129) (1972), 18–36. MR0295193
- [30] È. B. Vinberg, *Algebraic transformation groups of maximal rank*, Mat. Sb. (N.S.) **88** (130) (1972), 493–503. MR0309939
- [31] È. B. Vinberg, *The unimodular integral quadratic forms*, Funkcional. Anal. i Priložen. **6** (1972), no. 2, 24–31. MR0299557
- [32] È. B. Vinberg and V. L. Popov, *A certain class of quasihomogeneous affine varieties*, Izv. Akad. Nauk SSSR Ser. Mat. **36** (1972), 749–764. MR0313260
- [33] È. B. Vinberg, *Certain properties of the root decomposition of a semisimple Lie algebra over a non-algebraically closed field*, Funkcional. Anal. i Priložen. **9** (1975), no. 1, 20–24. MR0366999
- [34] È. B. Vinberg, *Linear groups that are connected with periodic automorphisms of semisimple algebraic groups*, Dokl. Akad. Nauk SSSR **221** (1975), no. 4, 767–770. MR0486173
- [35] È. B. Vinberg, *The Schoenflies-Bieberbach theorem*, Dokl. Akad. Nauk SSSR **221** (1975), no. 5, 1013–1015. MR0486187
- [36] È. B. Vinberg, *The classification of nilpotent elements of graded Lie algebras*, Dokl. Akad. Nauk SSSR **225** (1975), no. 4, 745–748. MR0506488
- [37] È. B. Vinberg, *Some arithmetical discrete groups in Lobachevskii spaces*, Discrete subgroups of Lie groups and applications to moduli (Internat. Colloq., Bombay, 1973), Oxford Univ. Press, Bombay, 1975, pp. 323–348. MR0422505
- [38] È. B. Vinberg, *The Weyl group of a graded Lie algebra*, Izv. Akad. Nauk SSSR Ser. Mat. **40** (1976), no. 3, 488–526, 709. MR0430168
- [39] V. G. Kac, V. L. Popov, and È. B. Vinberg, *Sur les groupes linéaires algébriques dont l’algèbre des invariants est libre*, C. R. Acad. Sci. Paris Sér. A-B **283** (1976), no. 12, Ai, A875–A878. MR0419468
- [40] È. B. Vinberg and I. M. Kaplinskaja, *The groups  $O_{18,1}(Z)$  and  $O_{19,1}(Z)$* , Dokl. Akad. Nauk SSSR **238** (1978), no. 6, 1273–1275. MR0476640
- [41] È. B. Vinberg and B. N. Kimel’fel’d, *Homogeneous domains on flag manifolds and spherical subsets of semisimple Lie groups*, Funktsional. Anal. i Prilozhen. **12** (1978), no. 3, 12–19, 96. MR509380
- [42] È. B. Vinberg and O. V. Švarcman, *Riemann surfaces*, Algebra, Topology, Geometry, Vol. 16 (Russian), 1978, pp. 191–245, 247 (errata insert). MR538254
- [43] È. B. Vinberg and A. G. Elašvili, *A classification of the three-vectors of nine-dimensional space*, Trudy Sem. Vektor. Tenzor. Anal. **18** (1978), 197–233. MR504529
- [44] V. Kac and È. B. Vinberg, *Spinors of 13-dimensional space*, Adv. in Math. **30** (1978), no. 2, 137–155. MR513846
- [45] È. B. Vinberg, *Classification of homogeneous nilpotent elements of a semisimple graded Lie algebra*, Trudy Sem. Vektor. Tenzor. Anal. **19** (1979), 155–177. MR549013
- [46] È. B. Vinberg, *Algebra of polynomials*, Prosveshchenie, Moscow, 1980, 175 pp.
- [47] È. B. Vinberg, *Invariant convex cones and orderings in Lie groups*, Funktsional. Anal. i Prilozhen. **14** (1980), no. 1, 1–13, 96. MR565090
- [48] È. B. Vinberg, *On the closure of an orbit of a resuctive linear group*, Algebra, Moscow State Univ., 1980 31–36.
- [49] È. B. Vinberg, *The nonexistence of crystallographic reflection groups in Lobachevskii spaces of large dimension*, Funktsional. Anal. i Prilozhen. **15** (1981), no. 2, 67–68. MR617472
- [50] È. B. Vinberg, *Rationality of the field of invariants of a triangular group*, Vestnik Moskov. Univ. Ser. I Mat. Mekh. **2** (1982), 23–24, 115. MR655396

- [51] È. B. Vinberg, *Effective theory of invariants*, Algebra (1982), 27–33. MR790700
- [52] È. B. Vinberg, *Discrete groups of reflections in Lobachevskii spaces of large dimensions. Modules and algebraic groups*, 2, Zap. Nauchn. Sem. Leningrad. Otdel. Mat. Inst. Steklov. (LOMI) **132** (1983), 62–68. MR717573
- [53] È. B. Vinberg, *Reflective hyperbolic lattices*, Dokl. Akad. Nauk SSSR **272** (1983), no. 6, 1298–1301. MR722868
- [54] È. B. Vinberg, *Discrete reflection groups in Lobachevsky spaces*, Proceedings of the International Congress of Mathematicians, Vol. 1, 2 (Warsaw, 1983), 1984, pp. 593–601. MR804716
- [55] È. B. Vinberg, *The two most algebraic K3 surfaces*, Math. Ann. **265** (1983), no. 1, 1–21. MR719348
- [56] È. B. Vinberg, *Absence of crystallographic groups of reflections in Lobachevskii spaces of large dimension*, Trudy Moskov. Mat. Obshch. **47** (1984), 68–102, 246. MR774946
- [57] È. B. Vinberg, *Hyperbolic groups of reflections*, Uspekhi Mat. Nauk **40** (1985), no. 1(241), 29–66, 255. MR783604
- [58] È. B. Vinberg, *Linear representations of groups (Russian)*, “Nauka”, Moscow, 1985. MR810402
- [59] È. B. Vinberg, *Complexity of actions of reductive groups*, Funktsional. Anal. i Prilozhen. **20** (1986), no. 1, 1–13, 96. MR831043
- [60] È. B. Vinberg, *Reflection subgroups in Bianchi groups*, Problems in group theory and homological algebra (Russian), 1987, pp. 121–127. MR1174800
- [61] V. A. Artamonov, Yu. A. Bakhturin, and È. B. Vinberg, et al., *Problems in Algebra*, A. I. Kostrikin (Ed.), Nauka, Moscow, 1987, 352 pp.
- [62] È. B. Vinberg and A. L. Onishchik, *Seminar on Lie groups and algebraic groups (Russian)*, “Nauka”, Moscow, 1988. MR1090326
- [63] È. B. Vinberg and A. L. Onishchik, *Foundations of the theory of Lie groups*, Current problems in mathematics. Fundamental directions, Vol. 20 (Russian), 1988, pp. 5–101, 246. MR950862
- [64] È. B. Vinberg, V. V. Gorbatsevich, and O. V. Shvartsman, *Discrete subgroups of Lie groups*, Current problems in mathematics. Fundamental directions, Vol. 21 (Russian), 1988, pp. 5–120, 215. MR968445
- [65] D. V. Alekseevskii, È. B. Vinberg, and A. S. Solodovnikov, *Geometry of spaces of constant curvature*, Geometriya II, Akad. Nauk SSSR, Vsesoyuz. Inst. Nauchn. i Tekhn. Inform., Moscow, 1988, pp. 5–146.
- [66] O. V. Shvartsman and È. B. Vinberg, *Discrete groups of motions of spaces of constant curvature*, Geometriya II, Akad. Nauk SSSR, Vsesoyuz. Inst. Nauchn. i Tekhn. Inform., Moscow, 1988, pp. 147–259.
- [67] È. B. Vinberg, *Real entire functions with prescribed critical values*, Problems in group theory and in homological algebra (Russian), 1989, pp. 127–138. MR1068773
- [68] È. B. Vinberg and V. L. Popov, *Invariant theory*, Algebraic geometry, 4 (Russian), 1989, pp. 137–314, 315. MR1100485
- [69] È. B. Vinberg, *Linear representations of groups*, Basler Lehrbücher [Basel Textbooks], vol. 2, Birkhäuser Verlag, Basel, 1989. Translated from the Russian by A. Iacob. MR1013789
- [70] È. B. Vinberg, *Some commutative subalgebras of a universal enveloping algebra*, Izv. Akad. Nauk SSSR Ser. Mat. **54** (1990), no. 1, 3–25, 221. MR1044045
- [71] È. B. Vinberg, V. V. Gorbatsevich, and A. L. Onishchik, *Structure of Lie groups and Lie algebras*, Current problems in mathematics. Fundamental directions, Vol. 41 (Russian), 1990, pp. 5–259. MR1056486
- [72] A. L. Onishchik and È. B. Vinberg, *Lie groups and algebraic groups*, Springer Series in Soviet Mathematics, Springer-Verlag, Berlin, 1990. Translated from the Russian and with a preface by D. A. Leites. MR1064110
- [73] È. B. Vinberg, *The volume of polyhedra on a sphere and in Lobachevsky space*, Algebra and analysis (Kemerovo, 1988), 1991, pp. 15–27. MR1109060
- [74] H. Helling, J. J. Mennicke, and È. B. Vinberg, *On some general triangle groups and 3-dimensional orbifolds*, Preprint 91-057, Universität Bielefeld, 1991, 10 pp.
- [75] È. B. Vinberg, *Lectures in algebra*, First year, Second Semester, Independent Univ. Moscow, 1993, 103 pp.
- [76] È. B. Vinberg, *The smallest field of definition of a subgroup of the group  $\mathrm{PSL}_2$* , Mat. Sb. **184** (1993), no. 10, 53–66. MR1249413
- [77] È. B. Vinberg, *Volumes of non-Euclidean polyhedra*, Uspekhi Mat. Nauk **48** (1993), no. 2(290), 17–46. MR1239859
- [78] A. L. Onishchik and È. B. Vinberg, *Foundations of Lie theory [see MR0950861 (89m:22010)]*, Lie groups and Lie algebras, I, 1993, pp. 1–94, 231–235. MR1306738

- [79] D. V. Alekseevskij, È. B. Vinberg, and A. S. Solodovnikov, *Geometry of spaces of constant curvature*, Geometry, II, 1993, pp. 1–138. MR1254932
- [80] È. B. Vinberg and O. V. Shvartsman, *Discrete groups of motions of spaces of constant curvature*, Geometry, II, 1993, pp. 139–248. MR1254933
- [81] È. B. Vinberg, V. V. Gorbatsevich, and O. V. Shvartsman, *Discrete subgroups of Lie groups [MR0968445 (90c:22036)]*, Lie groups and Lie algebras, II, 2000, pp. 1–123, 217–223. MR1756407
- [82] V. L. Popov and È. B. Vinberg, *Invariant theory*, Encyclopaedia of Mathematical Sciences, **55**, Springer-Verlag, 1994, 123–278.
- [83] È. B. Vinberg, *Basics of algebra*, First year, First Semester, Independent Univ. Moscow, 1995, 184 pp.
- [84] È. B. Vinberg, *Lectures in algebra*, Second year, First and Second Semesters, Independent Univ. Moscow, 1995, 150 pp.
- [85] V. A. Artamonov, Yu. A. Bakhturin, È. B. Vinberg, et al., *Problems in algebra*, A. I. Kostrikin (Ed.), Faktorial, Moscow, 1995, 454 pp.
- [86] È. B. Vinberg, I. Mennike, and Kh. Khelling, *On some generalized triangular groups and three-dimensional orbifolds*, Trudy Moskov. Mat. Obshch. **56** (1995), 5–32, 350. MR1468463
- [87] È. B. Vinberg, *Generalized derivations of algebras*, Algebra and analysis (Irkutsk, 1989), 1995, pp. 185–188. MR1331395
- [88] F. I. Karpelevich, A. L. Onishchik, and È. B. Vinberg, *On the work of È. B. Dynkin in the theory of Lie groups*, Lie groups and Lie algebras: È. B. Dynkin's Seminar, 1995, pp. 1–13. MR1364449
- [89] È. B. Vinberg, *On reductive algebraic semigroups*, Lie groups and Lie algebras: È. B. Dynkin's Seminar, 1995, pp. 145–182. MR1364458
- [90] È. B. Vinberg, *The asymptotic semigroup of a semisimple Lie group*, Semigroups in algebra, geometry and analysis (Oberwolfach, 1993), 1995, pp. 293–310. MR1350337
- [91] È. B. Vinberg, *On invariants of a set of matrices*, J. Lie Theory **6** (1996), no. 2, 249–269. MR1424635
- [92] È. B. Vinberg, *Groups defined by periodic pairwise relations*, Mat. Sb. **188** (1997), no. 9, 3–12. MR1481661
- [93] È. B. Vinberg, *Invariants of  $2 \times 2$  matrices*, Preprint 97-084, Universität Bielefeld, 1997, 16 pp.
- [94] È. B. Vinberg, *On limits of algebraic subgroups*, Notes of Tambov University, **2**:4 (1997), 420–427.
- [95] È. B. Vinberg, *Classification of 2-reflective hyperbolic lattices of rank 4*, Preprint 98-113, Universität Bielefeld, 1998, 35 pp. MR2429266
- [96] È. B. Vinberg, *A course in algebra*, Faktorial, Moscow, 1999, 527 pp. MR1974508
- [97] D. N. Akhiezer and È. B. Vinberg, *Weakly symmetric spaces and spherical varieties*, Transform. Groups **4** (1999), no. 1, 3–24. MR1669186
- [98] D. I. Panyushev and È. B. Vinberg, *An infinitesimal characterization of the complexity of homogeneous spaces*, Transform. Groups **4** (1999), no. 1, 97–101. MR1669170
- [99] È. B. Vinberg, *On stability of actions of reductive algebraic groups*, Lie Algebras, Rings and Related Topics, eds. Y. Fong, A. A. Mikhalev, E. Zelmanov, Springer-Verlag, 2000, 188–202.
- [100] V. V. Gorbatsevich, O. V. Shvartsman, È. B. Vinberg, *Discrete subgroups of Lie groups*, Encyclopaedia of Mathematical Sciences, **20**, Springer-Verlag, 2000, 1–123. MR1756407
- [101] Y. Kaplinsky and È. B. Vinberg, *Pseudo-finite generalized triangle groups*, Preprint 00-003, Universität Bielefeld, 2000, 28 pp. MR2073359
- [102] G. A. Margulis and È. B. Vinberg, *Some linear groups virtually having a free quotient*, J. Lie Theory **10** (2000), no. 1, 171–180. MR1748082
- [103] È. B. Vinberg, *Commutative homogeneous spaces and co-isotropic symplectic actions*, Uspekhi Mat. Nauk **56** (2001), no. 1(337), 3–62. MR1845642
- [104] È. B. Vinberg, I. M. Gel'fand, S. G. Gindikin, and et al., *Fridrikh Izrailevich Karpelevich*, Uspekhi Mat. Nauk **56** (2001), no. 1(337), 147–152. MR1845645
- [105] È. B. Vinberg, E. S. Golod, E. I. Zel'manov, and et al., *Aleksei Ivanovich Kostrikin [1929–2000]*, Uspekhi Mat. Nauk **56** (2001), no. 3(339), 143–145. MR1859725
- [106] È. B. Vinberg, *A course in algebra*, 2nd revised edition, Faktorial, Moscow, 2001, 543 pp. MR1974508
- [107] V. A. Artamonov, Yu. A. Bakhturin, È. B. Vinberg, et al., *Problems in algebra*, 3rd revised edition, A. I. Kostrikin (Ed.), Faktorial, Moscow, 2001, 464 pp.
- [108] È. B. Vinberg, *Equivariant symplectic geometry of cotangent bundles*, Mosc. Math. J. **1** (2001), no. 2, 287–299, 304. MR1878279
- [109] È. B. Vinberg, *A course in algebra*, 3rd revised edition, Faktorial, Moscow, 2002, 544 pp. MR1974508

- [110] J. Hilgert, A. Pasquale, and È. B. Vinberg, *The dual horospherical Radon transform for polynomials*, Mosc. Math. J. **2** (2002), no. 1, 113–126, 199. MR1900587
- [111] G. A. Noskov and È. B. Vinberg, *Strong Tits alternative for subgroups of Coxeter groups*, J. Lie Theory **12** (2002), no. 1, 259–264. MR1885045
- [112] È. B. Vinberg, *Kaleidoscopes and reflection groups*, Mat. Prosveshchenie, **7**, MCCME, Moscow, 2003, 45–63.
- [113] È. B. Vinberg, *Commutative homogeneous spaces of Heisenberg type*, Tr. Mosk. Mat. Obs. **64** (2003), 54–89. MR2030186
- [114] D. N. Akhiezer, È. B. Vinberg, V. V. Gorbatsevich, and et al., *Arkadii L'vovich Onishchik (on the occasion of his seventieth birthday)*, Uspekhi Mat. Nauk **58** (2003), no. 6(354), 193–200. MR2054110
- [115] È. B. Vinberg, *A course in algebra*, Graduate Studies in Mathematics, vol. 56, American Mathematical Society, Providence, RI, 2003. Translated from the 2001 Russian original by Alexander Retakh. MR1974508
- [116] J. Hilgert, A. Pasquale, and E. B. Vinberg, *The dual horospherical Radon transform as a limit of spherical Radon transforms*, Lie groups and symmetric spaces, 2003, pp. 135–143. MR2018358
- [117] È. B. Vinberg and R. Kaplinsky, *Pseudo-finite generalized triangle groups*, Groups: topological, combinatorial and arithmetic aspects, 2004, pp. 564–587. MR2073359
- [118] È. B. Vinberg, *Short  $SO_3$ -structures on simple Lie algebras and associated quasielliptic planes*, Lie groups and invariant theory, 2005, pp. 243–270. MR2140726
- [119] L. Potyagailo and È. Vinberg, *On right-angled reflection groups in hyperbolic spaces*, Comment. Math. Helv. **80** (2005), no. 1, 63–73. MR2130566
- [120] È. B. Vinberg, *Classification of 2-reflective hyperbolic lattices of rank 4*, Tr. Mosk. Mat. Obs. **68** (2007), 44–76. MR2429266
- [121] È. B. Vinberg, *On abelian coverings of surfaces*, Michigan Math. J. **55** (2007), no. 3, 631–649. MR2372619
- [122] È. B. Vinberg, *On some number-theoretic conjectures of V. Arnold*, Jpn. J. Math. **2** (2007), no. 2, 297–302. MR2342588
- [123] È. B. Vinberg, *Surprising arithmetic properties of binomial coefficients*, Mat. Prosveshchenie, **12**, MCCME, Moscow, 2008, 33–42.
- [124] È. B. Vinberg, *Small Fermat theorem and its generalizations*, Mat. Prosveshchenie, **12**, MCCME, Moscow, 2008, 43–53.
- [125] S. M. Gusein-Zade, Yu. S. Ilyashenko, G. A. Kabatiansky, S. K. Lando, A. G. Sergeev, O. K. Sheinman, O. V. Schwarzman, M. A. Tsfasman, È. B. Vinberg, *Sergey Natanzon*, Mosc. Math. J., **8**:4 (2008), 843–844. MR2499349
- [126] M. Kapovich, L. Potyagailo, and È. B. Vinberg, *Noncoherence of some lattices in  $\text{Isom}(\mathbb{H}^n)$* , The Zieschang Gedenkschrift, 2008, pp. 335–351. MR2484708
- [127] V. A. Arzhantsev, V. A. Artamonov, Yu. A. Bakhturin, and È. B. Vinberg, et al., *Problems in algebra*, new revised edition, A. I. Kostrikin (Ed.), Nauka, Moscow, 2009, 408 pp.
- [128] A. G. Elashvili, V. G. Kac, and È. B. Vinberg, *On exceptional nilpotents in semisimple Lie algebras*, J. Lie Theory **19** (2009), no. 2, 371–390. MR2572134
- [129] È. B. Vinberg, *On automorphic forms on symmetric domains of type IV*, Uspekhi Mat. Nauk **65** (2010), no. 3(393), 193–194. MR2682724
- [130] È. B. Vinberg, *Some free algebras of automorphic forms on symmetric domains of type IV*, Transform. Groups **15** (2010), no. 3, 701–741. MR2718942
- [131] D. I. Panyushev and È. B. Vinberg, *The work of Vladimir Morozov on Lie algebras*, Transform. Groups **15** (2010), no. 4, 1001–1013. MR2753267
- [132] È. B. Vinberg, *A course in algebra*, new revised edition, MCCME, Moscow, 2011, 590 pp. MR1974508
- [133] H. Abels and È. B. Vinberg, *Generating semisimple groups by tori*, J. Algebra **328** (2011), 114–121. MR2745556
- [134] S. Khoroshkin, M. Nazarov, and È. B. Vinberg, *A generalized Harish-Chandra isomorphism*, Adv. Math. **226** (2011), no. 2, 1168–1180. MR2737780
- [135] È. B. Vinberg, *Some examples of Fuchsian groups sitting in  $SL_2(\mathbb{Q})$* , Preprint 12-011, Universität Bielefeld, 2012, 4 pp.
- [136] È. B. Vinberg, *On the algebra of Siegel modular forms of genus 2*, Preprint 12-088, Universität Bielefeld, 2012, 14 pp. MR3235787
- [137] W. A. de Graaf, È. B. Vinberg, and O. S. Yakimova, *An effective method to compute closure ordering for nilpotent orbits of  $\theta$ -representations*, J. Algebra **371** (2012), 38–62. MR2975387

- [138] È. B. Vinberg, *A course in algebra*, 2nd new edition, MCCME, Moscow, 2013, 590 pp. MR1974508
- [139] È. B. Vinberg, *On the algebra of Siegel modular forms of genus 2*, Trans. Moscow Math. Soc. (2013), 1–13. MR3235787
- [140] A. G. Elashvili, V. G. Kac, and È. B. Vinberg, *Cyclic elements in semisimple Lie algebras*, Transform. Groups **18** (2013), no. 1, 97–130. MR3022760
- [141] È. B. Vinberg, *Limits of integrable Hamiltonians on semisimple Lie algebras*, Funktsional. Anal. i Prilozhen. **48** (2014), no. 2, 39–50. MR3288175
- [142] È. B. Vinberg, A. N. Parshin, V. L. Popov, A. N. Panov, I. A. Panin, V. P. Platonov, and N. A. Vavilov, *Valentin Evgen'evich Voskresenskiĭ*, Uspekhi Mat. Nauk **69** (2014), no. 4(418), 177–178. MR3400539
- [143] È. B. Vinberg, *Non-arithmetic hyperbolic reflection groups in higher dimensions*, Preprint 14-047, Universität Bielefeld, 2014, 10 pp. MR3427439
- [144] È. B. Vinberg, *On geometry textbook by A. V. Pogorelov*, Mat. Prosveshchenie, **19**, MCCME, Moscow, 2015, 199–205.
- [145] È. B. Vinberg, *Non-arithmetic hyperbolic reflection groups in higher dimensions*, Mosc. Math. J. **15** (2015), no. 3, 593–602, 606. MR3427439
- [146] A. Elashvili, M. Jibladze, and È. B. Vinberg, *Moduli algebras of some simplest non-semiquasihomogeneous singularities*, Preprint 15-039, Universität Bielefeld, 2015, 11 pp.
- [147] È. B. Vinberg and S. E. Kuznetsov, *Evgenii Borisovich Dynkin (obituary)*, Uspekhi Mat. Nauk **71** (2016), no. 2(428), 179–204. MR3588355
- [148] È. B. Vinberg, *A course in algebra*, 3rd new edition, MCCME, Moscow, 2017, 590 pp. MR1974508
- [149] A. Elashvili, M. Jibladze, and È. B. Vinberg, *Moduli algebras of some simplest non-semiquasihomogeneous singularities*, Funct. Anal. Appl., **51**:2 (2017),
- [150] È. B. Vinberg and O. V. Shvartsman, *A criterion for smoothness at infinity for an arithmetic quotient of the future tube*, Funktsional. Anal. i Prilozhen. **51** (2017), no. 1, 40–59. MR36047781
- [151] U. Rehmann and È. Vinberg, *On a phenomenon discovered by Heinz Helling*, Transform. Groups **22** (2017), no. 1, 259–265. MR3620773