

Davlet'yarova, E. P.; Zhukova, A. A.; Shutov, A. V.

Geometrization of the Fibonacci numeration system, with applications to number theory.
(English. Russian original) [Zbl 1369.11013](#)

St. Petersburg Math. J. 25, No. 6, 893-907 (2014); translation from *Algebra Anal.* 25, No. 6, 1-23 (2013).

Summary: A geometrization theorem is obtained for the Fibonacci numeration system. As applications, several classical problems are solved concerning numbers that have a given tail of the expansion with respect to the Fibonacci numeration system.

MSC:

11B39 Fibonacci and Lucas numbers and polynomials and generalizations

11A67 Other number representations

Cited in **3** Documents

Keywords:

Fibonacci numeration system; geometrization theorem; ternary Goldbach problem

Full Text: [DOI](#)

References:

- [1] I. M. Vinogradov, A new method in analytic number theory, *Trudy Mat. Inst. Steklov.* 10 (1937), no. 5, 5-122. (Russian)
- [2] Ronald L. Graham, Donald E. Knuth, and Oren Patashnik, *Concrete mathematics*, 2nd ed., Addison-Wesley Publishing Company, Reading, MA, 1994. A foundation for computer science. · [Zbl 0836.00001](#)
- [3] S. A. Gritsenko and N. N. Mot'kina, The Hua Loo-Keng problem involving prime numbers of a special type, *Dokl. Akad. Nauk Resp. Tadjikistan* 52 (2009), no. 7, 497-500. (Russian)
- [4] -, On some additive problems in number theory, *Nauchn. Vedomosti Belgor. Univ. Ser. Mat. Fiz.* 5(76) (2010), no. 18, 83-87. (Russian)
- [5] -, On one version of the ternary Goldbach problem, *Dokl. Akad. Nauk Resp. Tadjikistan* 52 (2009), no. 6, 413-417. (Russian)
- [6] A. Brudnyi and Y. Brudnyi, Linear and nonlinear extensions of Lipschitz functions from subsets of metric spaces, *Algebra i Analiz* 19 (2007), no. 3, 106 – 118; English transl., *St. Petersburg Math. J.* 19 (2008), no. 3, 397 – 406. · [Zbl 1162.46042](#) ·
- [7] V. G. Zhuravlev, One-dimensional Fibonacci tilings, *Izv. Ross. Akad. Nauk Ser. Mat.* 71 (2007), no. 2, 89 – 122 (Russian, with Russian summary); English transl., *Izv. Math.* 71 (2007), no. 2, 307 – 340. · [Zbl 1168.11006](#) · [doi:10.1070/IM2007v071n02ABEH002358](#) · [doi.org](#)
- [8] V. G. Zhuravlev, Sums of squares over the Fibonacci \mathfrak{o} -ring, *Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI)* 337 (2006), no. Anal. Teor. Chisel. i Teor. Funkts. 21, 165 – 190, 290 (Russian, with Russian summary); English transl., *J. Math. Sci. (N.Y.)* 143 (2007), no. 3, 3108 – 3123. · [Zbl 1155.11014](#) · [doi:10.1007/s10958-007-0195-1](#) · [doi.org](#)
- [9] V. G. Zhuravlev, The Pell equation over the Fibonacci \deg -ring, *Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI)* 350 (2007), no. Analiticheskaya Teoriya Chisel i Teoriya Funktsii. 22, 139 – 159, 202 (Russian, with Russian summary); English transl., *J. Math. Sci. (N.Y.)* 150 (2008), no. 3, 2084 – 2095. · [doi:10.1007/s10958-008-0123-z](#) · [doi.org](#)
- [10] V. G. Zhuravlev, Even Fibonacci numbers: the binary additive problem, the distribution over progressions, and the spectrum, *Algebra i Analiz* 20 (2008), no. 3, 18 – 46 (Russian, with Russian summary); English transl., *St. Petersburg Math. J.* 20 (2009), no. 3, 339 – 360. ·
- [11] L. Kuipers and H. Niederreiter, *Uniform distribution of sequences*, Wiley-Interscience [John Wiley & Sons], New York-London-Sydney, 1974. Pure and Applied Mathematics. · [Zbl 0281.10001](#)
- [12] V. V. Krasil'shchikov and A. V. Shutov, Aspects of putting lattices in one-dimensional quasiperiodical tilings, *Vestnik Samar. Gosudarstv. Univ.* 7 (2007), 84-91. (Russian)
- [13] V. V. Krasil'shchikov, A. V. Shutov, and V. G. Zhuravlev, One-dimensional quasiperiodic tilings that admit enclosure of progressions, *Izv. Vyssh. Uchebn. Zaved. Mat.* 7 (2009), 3 – 9 (Russian, with English and Russian summaries); English transl., *Russian Math. (Iz. VUZ)* 53 (2009), no. 7, 1 – 6. · [Zbl 1195.11084](#) · [doi:10.3103/S1066369X09070019](#) · [doi.org](#)
- [14] Ju. V. Matijasevič, A connection between systems of word and length equations and Hilbert's tenth problem, *Zap. Naučn. Sem. Leningrad. Otdel. Mat. Inst. Steklov. (LOMI)* 8 (1968), 132 – 144 (Russian).
- [15] Ju. V. Matijasevič, Two reductions of Hilbert's tenth problem, *Zap. Naučn. Sem. Leningrad. Otdel. Mat. Inst. Steklov. (LOMI)* 8 (1968), 145 – 158 (Russian).
- [16] I. K. Shvagireva, Binary additive problems over the Fibonacci \circ -progressions, *Tr. VII Intern. Conf. "Algebra i Teor. Chisel: Sovrem. Probl. i Pril., Tul. Gosudarstv. Ped. Univ., Tula, 2010*, pp. 198-200. (Russian)

- [17] A. V. Shutov, The arithmetic and geometry of one-dimensional quasilattices, *Chebyshevskii Sb.* 11 (2010), no. 1(33), 255 – 262 (Russian, with English and Russian summaries). · [Zbl 1290.11103](#)
- [18] A. V. Shutov, Inhomogeneous Diophantine approximations and the distribution of fractional parts, *Fundam. Prikl. Mat.* 16 (2010), no. 6, 189 – 202 (Russian, with English and Russian summaries); English transl., *J. Math. Sci. (N.Y.)* 182 (2012), no. 4, 576 – 585. · [Zbl 1296.11094](#) · [doi:10.1007/s10958-012-0762-y](#) · [doi.org](#)
- [19] A. V. Shutov, On the distribution of fractional parts, *Chebyshevskii Sb.* 5 (2004), no. 3(11), 112 – 121 (Russian, with English and Russian summaries). · [Zbl 1144.11060](#)
- [20] -, On the distribution of fractional parts. II, *Issled. po Algebre, Teor. Chisel, Func. Anal. i Smez. Voprosam*, 2005, vyp. 3, 146-158. (Russian)
- [21] -, On additive problems with numbers of a special type, *Matematika, Informatica, i Metodika ih Prepodavaniya*, Moscow, 2011, pp. 102-104. (Russian)
- [22] -, On additive problems with fractional parts, *Nauchn. Vedomosti Belgor. Univ. Ser. Mat. Fiz.* 5(148) (2013), no. 3, 111-120. (Russian)
- [23] A. V. Shutov, Renormalizations of circle rotations, *Chebyshevskii Sb.* 5 (2005), no. 4(12), 125 – 143 (Russian, with Russian summary). · [Zbl 1220.37032](#)
- [24] A. V. Shutov, Sturm sequences: Rauzy graphs and forcing, *Chebyshevskii Sb.* 8 (2007), no. 2(22), 128 – 139 (Russian, with Russian summary). · [Zbl 1236.11028](#)
- [25] A. V. Shutov, Derivatives of circle rotations, and similarity of orbits, *Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI)* 314 (2004), no. Anal. Teor. Chisel i Teor. Funkts. 20, 272 – 284, 291 (Russian, with Russian summary); English transl., *J. Math. Sci. (N.Y.)* 133 (2006), no. 6, 1765 – 1771. · [Zbl 1082.37040](#) · [doi:10.1007/s10958-006-0088-8](#) · [doi.org](#)
- [26] A. V. Shutov, Number systems and bounded remainder sets, *Chebyshevskii Sb.* 7 (2006), no. 3(19), 110 – 128 (Russian). · [Zbl 1241.11091](#)
- [27] E. Hecke, Eber Analytische Funktionen und die Verteilung van Zahlen mod Eins, *Math. Sem. Hamburg Univ.* 5 (1921), 54-76. · [Zbl 48.0197.03](#)
- [28] Donald E. Knuth, Fibonacci multiplication, *Appl. Math. Lett.* 1 (1988), no. 1, 57 – 60. · [Zbl 0633.10011](#) · [doi:10.1016/0893-9659\(88\)90176-0](#) · [doi.org](#)
- [29] Christopher Pinner, On sums of fractional parts $\{\frac{?}{?}+\frac{?}{?}\}$, *J. Number Theory* 65 (1997), no. 1, 48 – 73. · [Zbl 0886.11045](#) · [doi:10.1006/jnth.1997.2080](#) · [doi.org](#)
- [30] Tony van Ravenstein, The three gap theorem (Steinhaus conjecture), *J. Austral. Math. Soc. Ser. A* 45 (1988), no. 3, 360 – 370. · [Zbl 0663.10039](#)
- [31] A. V. Shutov, New estimates in the Hecke-Kesten problem, *Analytic and probabilistic methods in number theory/Analiziniai ir tikimybiniai metodai skaičių teorijoje*, TEV, Vilnius, 2007, pp. 190 – 203. · [Zbl 1165.11062](#)
- [32] H. Weyl, Über die Gibbs'sche Erscheinung und verwandte Konvergenzphänomene, *Rend. Circ. Mat. Palermo* 30 (1910), 377-407. · [Zbl 41.0528.02](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.