# TO THE MEMORY OF PROFESSOR
PAVEL DMITRIEVITS VARBANETS

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Abstract. This paper provides a summary of the life of P.D. Varbanets and its scientific activity in research of number theory, its applications and furthermore teaching. The Ukrainian variant of Pavel is Pavlo, sometimes we write Pavlo Dmitrovych instead of Pavel Dmitrievich. The first author is a friend, the second is the son of Pavel.

A. Curriculum vitae of Pavel Varbanets
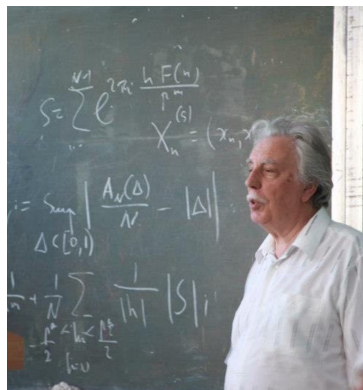
Professor Pavlo Dmytrovych Varbanets was born on November 18, 1936 in Odessa in a family of Bulgarian immigrants, descendants of peasants. His father, Varbanets Dmytro Kostyantynovich (1906–1996), was a talented person: having a fifth-grade education, he worked as the building statistical accounting manager in the one of the prison camps, where he served a prison term in the 1930s on the basis of flimsy formalities as the most of soviet people which were victimized by thuggish political regime. Mother, Varbanets Nadiya

Mykolayivna (1907–1999) devoted her whole life to children. So P. D. Varbanets, like his brother and sister, was brought up by their mother. Thanks to her unconditional love, the elder brother Varbanets Kostyantyn Dmytrovych (1929–2015) became a candidate of economic sciences, and his sister Varbanets Lyudmila Dmytrivna (born in 1940) became a doctor of biological sciences, professor, head of Department of Biochemistry of Microorganisms of the Institute of Microbiology and Virology of the National Academy of Sciences of Ukraine (Kyiv) and she has obtained the laureate of the state award in the field of science and technology in 2009 and laureate of the award named after D.K. Zabolotny, has a number of honorary degrees, including the Verkhovna Rada of Ukraine for his contribution to the development of biological science.

Family to right: brother Kostyantyn, Pavel D. Varbanets, mother Nadiya, sister Lyudmyla, father Dmytro

The wife of P.D. Varbanets - Varbanets Svitlana Kostyantynivna (born in 1945) is a specialist in the field of "Automatics and telemechanics" until 2021 worked in the field of computational mathematics, teaching computer disciplines in Odessa College of Transport Technologies (the former Odessa Technical College of Railway Transport named after F.E. Dzerzhynskyi). His eldest son - Kostyantyn Pavlovych Varbanets (1976-1989) was died at the age of thirteens from the serious childhood disease.

P. D. Varbanets wife Svitlana and grandson Matvey

P. D. Varbanets younger son Serhiy

The younger son - Varbanets Serhiy Pavlovich (born in 1983) is a doctor of physical and mathematical sciences, professor of the department of algebra, geometry and differential equations (former professor of the department of computer algebra and discrete mathematics), in 2010 he defended his PhD thesis on the topic "Generating the sequences of inverse congruent pseudo-random numbers" (specialized academic council D26.001.18 in the Kyiv Taras Shevchenko National University), and in 2021 - a doctoral dissertation "The method of exponential sums in the theory of congruential generators of pseudorandom numbers and asymptotic problems of number theory" (specialized academic council D 26.001.18 in the Kyiv Taras Shevchenko National University).

In 1959, P. D. Varbanets graduated with honours from Odessa State University named after I. I. Mechnikov (now Odessa National University named after I. I. Mechnikov), its academic supervisors were G. M. Mirakyan and M. I. Gavrilov. Postgraduate studies at the Institute of Mathematics of the Academy of Sciences of the USSR named after V. O. Steklov under the leadership of outstanding scientists academician I. M. Vinogradov and professor A. G. Postnikov determined the further path of P. D. Varbanets. In 1967, he defended his candidate thesis on the topic "Analytic theory of congruences with a prime power modules". Even then, he expressed a desire to find applications of the analytic number theory in various fields of knowledge. Thus, in the 1960s, P. D. Varbanets conducted research in the field of coding theory, and in 1976-1986 tooks part in the development of methods for recognizing the hereditary human diseases, and also studied the impact of polymeric materials on human health and developed the methods of statistical analysis in phonetic research. The results of his research were also used in the organization of logistics processes of the Odessa port, as well as in such a field as forensic examination.

Pavlo Dmytrovych worked in Odessa University since 1962, first as an assistant, a senior teacher, since 1972 as an associate professor, and since 1978 as the head of the department of algebra and number theory. From the mid of 1970s, P. D. Varbanets began to use his knowledge in the problems of applied mathematics. During this period, he successfully collaborated with scientists of the laboratory of experimental phonetics of Odessa State University (head of the laboratory prof. T. O. Brovchenko). The result of this cooperation was the monograph "The methods of mathematical statistics in experimental phonetics" (authors T. O. Brovchenko, P. D. Varbanets, V. G. Taranets). At the end of the 1970s, in collaboration with the well-known doctor of medical sciences, academician B. Ya. Reznyk, P.D. Varbanets proposed the diagnostic tables he built on to recognize the nature of the disease (hereditary or acquired). This method was confirmed in practice in one of the Odessa hospitals, when the doctors skeptical to mathematics suggested testing it on several patients, one of whom was a little girl. Unfortunately, the patient had a serious illness and the method of professor Varbanets showed that she should die in a week, which the

doctors were puzzled by, because of according to the medical history, the girl's condition was improved. And a week later, the girl was still alive. This caused the medical world to distrust mathematics even more, that was expressed by the quote "your mathematics is a false science" thrown at Pavel Dmytrovych. But the next day the girl died, which confirmed the effectiveness of the method and the possibility of certain, but insignificant, errors in any calculation. Later, the method of diagnostic tables, the effective techniques for use of polymeric materials in a closed environment were built. Under the leadership of P. D. Varbanets, other employees of his department took part in these developments (such that G. S. Belozyorov, S. V. Fedorovsky, V. K. Bulitko).

In 1995, in the specialized academic council D01.01.01 of Kyiv State University named after Taras Shevchenko P. D. Varbanets defended his doctoral thesis "Asymptotic problems of number theory" (opponents - professors I. Katai (Budapest), I. Bernyk (Minsk) and I. V. Protasov (Kyiv)). A major role in the formation of P. D. Varbanets scientific field was played by the fact of his internship at the E. Lorand University (Budapest), where he had the opportunity to communicate with outstanding mathematicians of the 20th century, P. Turan, A. Rényi, P. Erdős, I. Katai, K. Corradi, J. Mogyoródi (1969-1970).

P. D. Varbanets worked for more than 60 years at the Odessa National University named after I. I. Mechnikov, 46 years of which he was the head of the department. P. D. Varbanets was the leading and the alone specialist in analytical number theory in Ukraine, and the department he headed was the only one in Ukraine that prepared the specialists in analytical number theory.

With suggestion of P. D. Varbanets at the Institute of Mathematics of Odessa State University named after I. I. Mechnikov, the Faculty of Information Technologies was created at the junction of mathematics and computer specialities. In the same period, he modernized the Department of Algebra

and Number Theory and change its name to Computer Algebra and Discrete Mathematics (2004). Under this name, the department worked fruitfully for more than 20 years, until the fall of 2023, when it was merged with another department under the general name of the Department of Algebra, Geometry and Differential Equations. The word computer was crossed out, although it was Pavlo Dmytrovych who insisted that in the modern world the coexistence of mathematics and information technologies is an integral part of progress. He was the author of many courses that proved this thesis, in particular, such courses as "Computer algebra", "Cryptography", "Cryptology", "Theory of information and coding", "Applied theory of digital automata", "Statistical Linguistics", "Computer Linguistics" and many others. P. D. Varbanets managed to work at this department for his last several months. Until May 2024, P. D. Varbanets was a member of the Specialized Academic Council for the Defense of Doctoral Dissertations (D41.051.04) at the Institute of Mathematics of the National Academy of Sciences of Ukraine and the Specialized Academic Council of I. I. Mechnikov Odessa National University (K41.051.05). He was also a member of the editorial board of the Ukrainian Mathematical Journal, a member of the editorial board of the journal of Annales Universitate Scientiarum Budapest, Sectio Computatorica (Budapest Eötvös Loránd University) (Hungary) and a member of the editorial board of the journal of Research in Mathematics and Mechanics (Odessa National University named after I. I. Mechnikov) until May 2024 inclusive.

P. D. Varbanets spoke Ukrainian, Russian and English, he could communicate in Hungarian and Bulgarian. For many years, he participated in many international and domestic conferences and congresses, and in some of which he was a co-organizer or a member of the program committee. In particular, he took part in mathematical congresses in 1966 and 1978, the 2nd European Mathematical Congress in 1996, two congresses of Bulgarian mathematicians, etc. In the 80s, he even took part in an international medical congress, where, at the request of academician B. Ya. Reznik, he presented their joint work, in particular, the method of diagnostic tables for recognizing the nature of the disease developed by him, for which he received a standing ovation from everyone participants He was a regular participant in the following periodic conferences: International Scientific Conference named after academician M. Kravchuk (Ukraine), International Conference in Honor of professor J. Kubilius (Lithuania), International Conference dedicated to professor A. Laurincikas (Lithuania), International Conference on Analytic Number Theory and Spatial Tessellations (Ukraine), Ukrainian Mathematical Congress (Ukraine), International Algebraic Conference in Ukraine (Ukraine), International Algebraic Conference "At the End of the Year" (Ukraine), Numbers, Functions, Equations (Hungary), International Conference "Chaotic Modeling and Simulation" (Greece, Turkey, Portugal, Great Britain, France), International Conference

dedicated to the anniversaries of Stefan Banach (Ukraine) Vilnius International Conference on Probababilistic Theory (Lithuania), International Algebraic Conference dedicated to the anniversaries of L. A. Kaluzhnin (Ukraine), International Conference on Computer Algebra and Information Technologies (Ukraine), Belarusian Mathematical Conference (Belarus), International Conference Groups and Actions: Geometry and Dynamics (Ukraine). In Odessa National University, he was the head of the scientific seminars he created. In particular, "Odessa City Seminar on Graph Theory", "Seminar on Analytical Number Theory of Odessa National University named after I. I. Mechnikov".

During his scientific activity, P. D. Varbanets managed to prepare a large number of graduate students. Under his leadership, 25 candidates of physical and mathematical sciences were graduated from both Ukraine and other countries, including Poland, Iraq, Vietnam, Uzbekistan and Germany. He cooperated with many universities and research institutes of the world, in particular with Budapest University named after Eötvös Loránd, the Institute of Mathematics of Hungary, Vilnius and Siauliai Universities, with many Soviet ones. He was a very effective members of the Editorial Board of Annales Univ. Sci. Sect. Computatorica during several years. He closely cooperated with many of Ukrainian research institutes and universities, in particular, with the Institute of Mathematics of the National Academy of Sciences of Ukraine, Kyiv National University named after Taras Shevchenko, National Pedagogical University named after M. P. Drahomanov, Luhansk National University named after Taras Shevchenko, Kharkiv National University named after V. N. Karazin, Donetsk National University named after Vasyl Stus, Lviv National University named after Ivan Franko, Prykarpatian National University named after Vasyl Stefanyk, Institute of Cybernetics named after V. M. Hlushkov NAS of Ukraine, National Technical University of Ukraine "KPI", Vinnytsia National Technical University, Sumy State University, Kyiv National Aviation University, Izmail State Humanitarian University, Odessa National Polytechnic University, Odessa National Pedagogical University named after K. D. Ushinsky, Odessa National Medical University.

The following results of professor P. D. Varbanets was being essential to algebra and number theory: that is the distribution of integer points on various surfaces, in particular, his study of the circle problem in arithmetic progression and the distribution of integer points on a circular cone. He studied the problem of divisors in arithmetic progression. The results of studying the exponential sums and the application of the method of exponential sums in various applied problems were being significant as well. In particular, he devoted the last 15 years of his life to the problem of constructing the sequences of pseudorandom numbers, developing the appropriate generators, and applying the method of exponential sums to evaluate the quality of constructed sequences with improving the existing results, obtaining the new results and even getting

some of unimprovable results. These results have a direct application in information security problem, for the theory of coding and also have a significant impact on cryptographic applications.

B. Pavel the man

Pavlo Dmytrovych was a bright and erudite person with a rather subtle, sparkling sense of humour. It is known that he was one of the first team captains in the Odessa club of the cheerful and clever, which in the territory of the former Soviet Union, and even after the collapse of the latter, historically became the prototype of the famous association of students, teachers and scientists who demonstrated their talents in competitions quick creation of humorous performances for any unexpected request of the spectators of these competitions. Many of his philosophical, interesting and often humorous sayings, which he issued during classes, are known far beyond the borders of Odessa University and to this day. One of such sayings, when Pavlo Dmytrovich explained something quite simple and obvious, was "it is clear to a hedgehog." Female students repeatedly demonstrated their attitude to their favourite teacher, secretly writing on the walls of the university the words "Varbanets, I love you!". Everyone who managed to communicate with Pavel Dmytrovych at least once in their life always remembers these conversations and meetings with him only with kind words.

Special hobbies of Pavel Dmytrovych Varbanets were the chess, the soccer and the basketball. Even as a child, he carved his first chess pieces and made a chessboard with his own hands. His love for chess have led him to the Odessa chess club "Burevisnyk", where he later received the title of candidate for

master of sports in chess. This love remained with Pavel Dmytrovych until the last days. Exactly the game of chess was being that made it possible to relax between scientific and teaching work. He is known as that who played chess even on the phone without chess and there are known the facts that in his entire life he never lost a game to any grandmasters he played with (either winning games or drawing them), and the only one game that he lose in his life was the game with one of his childhood friends when he was scholar.

Moscow, USSR (1980)

NFE'08, Noszvaj, Hungary, 2008

P. D. Varbanets still had many ideas that he did not have time to implement. On May 11, as a result of a heart attack, as well as the lack of professionalism of local doctors and the impossibility due to the state of health of transportation to the city hospital of Odessa or Kyiv, in the intensive care ward of the radiology department of the Danube regional hospital in the city of Izmail, Odessa region, next to the son and wife, his heart stopped beating. Until the last minutes of his life, Pavlo Dmytrovych worked in full consciousness, thinking about new results that he planned to publish after his recovery. Dying, he asked his son, Serhiy Pavlovich Varbanets, to read his last two lectures, issued orders regarding students and graduate students, and also took a promise to continue his scientific and pedagogical activities, to which Pavlo Dmytrovych devoted his life, that is the number theory, as well as its applications in cryptography and computer algebra, and never stop looking for the applications of mathematical theories.

P. D. Varbanets (left), J.-M. De Koninck (center), I. Kátai (right), NFE'13, Visegrad, Hungary (2013)

I. Kátai (left), A. Ivic (center), P. D. Varbanets (right), NFE'13, Visegrad, Hungary (2013)

P. D. Varbanets (left), A. Laurincikas (center), G. Misevicius (right), Vilnius, Lithuania (2013)

A number of his colleagues spoke at the farewell to Pavel Dmytrovych, who noted the importance of his scientific results for the development of domestic and world mathematics and those areas where he left his scientific trace. The former rector of the International Humanitarian University (Odessa), professor Mykola Pavlovych Kovalenko, the one of the best friends of Pavlo Dmytrovych, made a moving speech, noting that Pavlo Dmytrovych occupies an honourable place among outstanding mathematicians who worked at the Odessa National University named after I. I. Mechnykov, therefore it would be expedient to take care of the opening of a memorial plaque in memory of Pavel Dmytrovych Varbanets at the university.

C. List of publications

P.D. Varbanets has published more than 200 scientific articles both in leading International publications and in scientific specialized publications of Ukraine.

Among his publications, it can be noted the following:

[1] On the representation of large numbers by forms with many variables (in Russian), Ed. Academy of Sciences of the USSR, Kyiv, 1964, Republic Conference of young scientists, 1964.

[2] On Waring theorem (in Russian), Ed. Academy of Sciences of the USSR, Kyiv, 1965, First Republic Math. conf., 1965.

[3] On a certain exponential sum and its applications (in Russian), Odessa regional edition, 1965. Scientific conference dedicated to the century of Odessa State University named after I. I. Mechnikov, 1965.

[4] On the certain problem of incomplete residue system (in Russian), Odessa regional edition, 1965. Scientific conference dedicated to the century of Odessa State University named after I. I. Mechnikov, 1965.

[5] Rationality of Poincaré series on algebraic varieties (in Russian), Ed. Naukova Duma, 1965. 2nd Scientific conference of young mathematicians of Ukraine, 1965.

[6] Constructing the typical random processes (in Russian), Ed. Naukova Duma, 1965. 2nd Scientific conference of young mathematicians of Ukraine, 1965. (with I.A. Gaiduchenko)

[7] Construction the one of group codes (in Russian), Ed. Naukova Duma, 1966. 3nd Scientific conference of young mathematicians of Ukraine, 1966. (with G.N. Serdyuk)

[8] On the certain problem of incomplete residue system (in Russian), Ed. Naukova Duma, 1966. 3nd Scientific conference of young mathematicians of Ukraine, 1966. (with S.S. Kuznetsova)

[9] Using the typical random processes for approximate computation (in Russian), Ed. Naukova Duma, 1966. 3nd Scientific conference of young mathematicians of Ukraine, 1966. (with S.R. Melamed)

[10] p-adic theory on characters in the field of Gaussian numbers (in Russian), Ed. Naukova Duma, 1966. Proceedings of 3rd Scientific conference of young mathematicians of Ukraine, 1966.

[11] The structure of reduced residue system in the field of Gaussian numbers (in Russian), Odessa regional edition, 1966. XXI Scientific conference of the young mathematicians, 1966.

[12] Distribution of solutions of the one congruence (in Russian), Ed. of Kyiv university, 1967. XXII reported conference of Odessa State University named after I. I. Mechnikov, 1967.

[13] Distribution of solutions of the one congruence (in Russian), Ed. of Acad. of Sci. of Bulgaria, Sofia, 1967, 2nd Second Congress of Bulgarian Mathematicians, 1967.

[14] Combinatorial analysis of complex classifications (in Russian), Ed. *Higher School*, 1968, Moscow, The digest of *Problems of philosophical analysis of systems*, 1968. (with G.Ya. Portnov and F.I. Uemov)

[15] On the sum of divisors of Gaussian numbers on the non-arithmetical progression (in Russian), Ed. Naukova Duma, 1968. 4th Scientific conference of young mathematicians of Ukraine, 1968. (with F.B. Kovalchick)

[16] Distribution of solutions of the congruence, *Ukr. Math. J.*, **21** (1969), 77–78.

[17] On the sum of number of divisors in arithmetical progression (in Russian), Ed. Academy of Sciences of the Kazakh SSR, 1969. The All-Union Symposium on Number Theory, 1969.

[18] Lattice points in a circle whose distances from the center arein an arithmetic progression (in Russian), *Mat. Zametki*, **8(6)** (1970), 787–798.

[19] Lattice points in the oval in arithmetic progression (in Russian), *Litovskii matematicheskii sbornik*, **XII(2)** (1972).

[20] Divisibility property of the one class of multiplicative functions (in Russian), Izd. Samar. un., 1972, All-Union Conference on the current problems in number theory, 1972.

[21] Asymmetric problems in arithmetic progression (in Russian), Ed. of Acad. of Sci. of Bulgaria, 1972, 3rd Congress of Bulgarian Mathematicians, 1972.

[22] The distribution of the norms of integer divisors in arithmetic progression (in Russian), *Annales Univ. Sci., Budapest., Sect. Math.*, **15** (1972), 45–51. (with F.B. Kovalchick)

[23] On the consistency of Bayesian estimates in a classification problem, International Conference on Probability Theory and Mathematical Statistics (in Russian), Vilnius: VSU, v. 2, 1973. pp, 169-172. (with G.V. Voddubny)

[24] Optimal load distribution between parallel operating diesel generators (in Russian), Organization and mechanization of engineering and management work, Moscow, v.2, 1974. (with V.N. Grebenkin)

[25] Rational loading of diesel generators (in Russian), Organization and mechanization of engineering and management work, Moscow, v.2, 1974. (with V.N. Grebenkin)

[26] Iterations of divisor functions for smooth sequences (in Russian), Ed. Tajik University. Dushanbe, 1977. Abstracts of the All-Union School of Number Theory, 1977.

[27] Review of the book by Gavrilov, Chukanov *Basic algebraic structures*, New books abroad v. 7, 1975.

[28] Review of the book by Smith G. Boltan *Algebra* N-Y. 1974. New books abroad, v. 10, 1975.

[29] Method of statistical analysis in phonetic research (in Russian), Odessa: Odessa State University named after I. I. Mechnikov, 1976, 100 p. (with T.A. Brovchenko and V.G. Taranec)

[30] Iterations of the divisor function on "smooth" sequences (in Russian), Proceedings of the All-Union Conference on Number Theory, Dushanbe, 1978.

[31] Multiplicative functions of special type in short intervals, *Coll. Math. Soc. J. Rolyai*, **34** (1981), 1577–1584.

[32] Multiplicative functions in short intervals (in Russian), Dep. at All-Russian Institute of Scientific and Technical Information, 1986. (with N.A. Fugelo)

[33] Mathematical modeling for forecasting from vibrating materials (in Russian), in the book *New Control Methods*, Kiev, 1981. (with L.V. Basalaev and L.M. Shafran)

[34] Diffusion processes in vibrating materials (in Russian), in the book *Current Problems of Toxicological Research*, Leningrad, 1981. (with L.V. Basalaev and L.M. Shafran)

[35] Generalized Hecke Z-function (in Russian), Abstract of the Republican Conference dedicated to the 125th anniversary of A.M. Lyapunov, Odessa, 1982. (with U. Zhanbyrbaeva)

[36] On certain model of the diffusion process in powder mixtures (in Russian), in: *Proceedings of the Scientific and Technical Conference*, Kiev, 1981. (with Yu.V. Kashirskii)

[37] On the number of divisors of Gaussian numbers in an arithmetic progression (in Russian), *Izv. AN Kazah. SSR*, **3** (1981). (with U. Zhanbyrbaeva)

[38] Method of sequential decoding in scientific search (in Russian), Monograph. Odessa, 1981.

[39] On the divisors of Gaussian numbers (in Russian), Abstracts of All-Union Conference *Theory of trans. numbers and its applications*, Moscow , 1983. (with U. Zhanbyrbaeva)

[40] The problem of divisors of Gaussian numbers in arithmetic progression (in Russian), *Izv. AN Kazah. SSR, ser. Phys. and Math.*, **5** (1984), 18–21. (with U.B. Zhanbyrbaeva)

[41] Sequential Wald analysis method for speech recognition (in Russian), in: *Proceeding of Conference APCO*, Novosibirsk, 1984.

[42] Guidance paper on the classification of polymer materials (in Russian), *Izd. Minsudprom*, 1984. (with L.V. Basalaev and L.M. Shafran)

[43] Arithmetical functions in short intervals (in Russian), in: *Proceedings of All-Union Conference Number Theory and its applications*, Tbilisi, 1985.

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[45] The predictable method of permitted saturation of the decorative materials (in Russian), *Rational Proposition*, pp.100–194, 1985. (with L.V. Basalaev and L.M. Shafran)

[46] Hygienic assessment of sorption properties of decorative and finishing materials (in Russian), Ministry of Health of the USSR, 1986. (with L.V. Basalaev and L.M. Shafran)

[47] Acoustic realization and hierarchy: Merism and hypomerism emotional, in the book *Merisms and Hypomerisms*, Moscow, 1986. (with Z.A. Nushikyan)

[48] On the number of prime divisors of Gaussian numbers (in Russian), Dep. in Ukrainian Institute of Scientific and Technical Expertise and Information, 1986, n. 2151-Uk86, 1986. (with U. Zhanbyrbaeva)

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[50] On a trigonometric sum and its application, *Acta Math. Hung.*, **49(3-4)** (1987), 339–348. (with N. Fugelo)

[51] Sums of the Kloosterman with characters, in: *Proc. of Colloq. of Number Theory*, Budapest, 1987. (with P. Zarzycki)

[52] On numbers representable by the sum of three squares in an arithmetic progression (in Russian), Dep. in Ukrainian Institute of Scientific and Technical Expertise and Information, 1988. (with S.V. Fedorovskii)

[53] Shortened equations, (in Russian), Dep. in Ukrainian Institute of Scientific and Technical Expertise and Information, 1989. (with S.V. Fedorovskii)

[54] On the neighboring Gaussian square-free numbers (in Russian), Dep. in Ukrainian Institute of Scientific and Technical Expertise and Information, 1989. (with N.N. Balandina and N.A. Fugelo)

[55] Divisors of the Gaussian integers in an arithmetic progression, *J. Number Theory*, **33** (1989), 152–169. (with P. Zarzycki)

[56] Natural numbers in residue classes (in Russian), in book *Constructive Methods and Algorithms in Number Theory*, Minsk, 1989.

[57] On certain exponential sum and its application in statistical number theory (in Russian), in book *Constructive Methods and Algorithms in Number Theory*, Minsk, 1989. (with Yu.V. Kashirskii)

[58] Divisors of integers in arithmetic progression, *Canad. Math. Bull.*, **33(2)** (1990), 129–134. (with P. Zarzycki)

[59] On the distribution of natural numbers with divisors from an arithmetic progression, *Acta Arith.*, **57** (1991), 245–256.

[60] Multiplicative functions of special type in short intervals, *New Trends in Probability and Statistics Vol. 2, Analytic and Probabilistic Methods in Number Theory, TEV*, Vilnius, 1992, 181–188.

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[62] Exponential sums with divisor function in $Z[i]$ (in Ukrainian), in: *Proc. of VI Int. Conf. Named After Acad. M.I. Kravchyuk*, Kyiv, 1996. (with O.V. Sinyavski)

[63] Statistical estimates of the structural-syntagmatic division of an English scientific text (in Russian), *Transnistrian Scientific Journal*, **9** (1998), 9–19. (with I.I. Rusanova)

[64] Congruences and dynamic system (in Russian), Bulletin of the State University "Lviv Polytechnic", *Applied Mathematics*, **33(7)**, 1998. (with N.S. Prosyanyuk)

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[69] An additive divisor problem in $Z[i]$, *Algebra and Discrete Math.*, 2003. No. 1., pp. 103–110. (with O.V. Savastru)

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[74] On the number of primitive integer points on elliptic cones in arithmetic progression, *Annales Univ. Sci. Budapest., Sect. Comp.*, **26** (2006), 25–42.

[75] On divisor function over $Z[i]$, *Annales Univ. Sci. Budapest., Sect. Comp.*, **27** (2007), 75–90. (with S. Varbanets)

[76] Exponential sum on algebraic variety, *Annales Univ. Sci. Budapest., Sect. Comp.*, **28** (2008), 283–301. (with O. Gunyavy)

[77] Exponential sums on the sequences of inversive congruential pseudorandom numbers with prime-power modulus, *Voronol's Impact on modern science, Proceedings of the 4th International Conference on Analytic Number Theory and Spatial Tessellations*, Book 4, Volume 1, Kyiv, Ukraine.- September 22–28, 2008, pp. 112–130. (with S. Varbanets)

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[79] On inversive congruential generator with a variable shift for pseudorandom numbers with prime power modulus, *Annales Univ. Sci. Budapest., Sect. Comp.*, **32** (2010), 151–176. (with S. Varbanets)

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