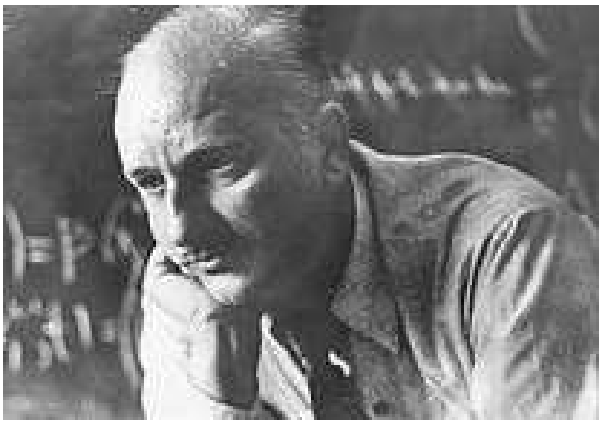
BULETINUL ACADEMIEI DE ŞTIINŢE
A REPUBLICII MOLDOVA. MATEMATICA
Number 1(80), 2016, Pages 3–6
ISSN 1024–7696

Valentin Belousov (20.02.1925 – 23.07.1988)



The present issue of the journal "Buletinul Academiei de Stiinte a Republicii Moldova, Matematica" is devoted to the 90th anniversary of Valentin D. Belousov.

In 2015 the mathematical community celebrated the 90th anniversary of Valentin Belousov. Since the late 70s of XX century V. Belousov became one of the world's leading specialists in the theory of quasigroups and loops. He created a successful school in this direction in the former Soviet Union. Belousov's major contribution in mathematics refers as well to the theory of functional equations, algebraic nets and combinatorial analysis.

Valentin Belousov was born on February 20, 1925, in Balti, a town in the north of the Republic of Moldova. His father, Daniil A. Belousov graduated from a military school in Tiflis and, before the October Revolution in Russia, was an officer in the Russian tsarist army. After the revolution he immigrated to Moldova, which returned to Romania during 1918–1944. In Balti Belousov parents worked at a post office, but his father worked also, for a period, at an oil factory. Valentin Belousov spent his early childhood with his grandparents in Soroca town. He graduated from primary and secondary schools and from "Ion Creanga" Lyceum (1944) in Balti. On March 1944, during the Second World War, the Balti Oil Factory and its workers were evacuated to another district of Romania, where Belousov family lived till November 1944. Valentin Belousov applied for studies (passed examinations) at the Polytechnical University of Bucharest, being the second in the list of admitted students. After Bessarabia retrocession in August 1944, Belousov family returned to Balti, that time part of the Soviet Union, and in December 1944 he started his studies at the Pedagogical Institute in Chisinau (1944-1947). Still a student, Belousov was involved in teaching at the preparatory department of this institute (1947–1948). In

1948, for personal reasons, he leaved Chisinau for the village Sofia, near Balti, where he worked as a teacher and a manager, responsible for studies, at the secondary school. Here he began his research on functional equations on quasigroups. As Belousov mentioned, he has chosen quasigroups as his area of research due to the book "The theory of Generalized Groups"(Harkov-Kiev, 1937), by Sushkevich, which he found accidentally, in a second-hand market. In 1950 he began his work at the Pedagogical Institute of Balti. During 1954–1955 V. Belousov was delegated for an internship, for qualification courses, at "M. V. Lomonosov" State University in Moscow, where he became later a PhD student (1955–1956), under the supervision of Prof. Alexandr Kurosh. In 1958 Belousov defended his PhD dissertation "Research in the theory of quasigroups and loops" at "M. V. Lomonosov" State University. After doctoral studies he continued his activity at Balti Pedagogical Institute, in the position of a lecturer (1957–1960), and head of the Chair of Mathematics (1961–1962). During October 1960 – July 1961 he was delegated for an internship to the University of Wisconsin, Madison State, USA, to Prof. R. H. Bruck. In 1966 he successfully defended his second doctoral thesis "Systems of quasigroups with identities" at "M. V. Lomonosov" State University in Moscow.

In 1962 V. Belousov began his activity at the Institute of Mathematics of the Academy of Sciences of Moldova. Since 1963 he led the Department of algebra and mathematical logics and after, the Department of theory of quasigroups and combinatorial analysis (until 1986), the first and the only research department in this area in the former Soviet Union. The last two years of life he worked as a principal researcher at the same institute.

A considerable part of his scientific results, obtained until 1979, was included in the monographs: Foundations of the theory of quasigroups and loops (Moscow, 1967), Algebraic nets and quasigroups (Chisinau, 1971), n-Ary Quasigroups (Chisinau, 1972), Configurations in the algebraic nets (Chisinau, 1979).

He has drawn much attention to different classes of binary quasigroups and loops, significantly developed the theory of distributive quasigroups, described the transitive distributive quasigroups (1969), and established connections between the left distributive quasigroups and Bol loops. In particular, he proved the famous theorem (Belousov Theorem, 1960): any distributive quasigroup is isotopic to a Moufang loop. This theorem plays an important role in the theory of distributive quasigroups.

V. Belousov developed the theory of quasigroups with inverse properties: F-quasigroups (1961, 1966), CI-quasigroups (1969), I-quasigroups (1987), IP-quasigroups, Bol loops and generalized Bol loops, and others. Some classes of quasigroups and loops have been introduced by him: P-quasigroups, S-loops, M-loops, linear quasigroups over groups. Many of these results are included in his monograph "Foundations of the theory of quasigroups and loops".

He dedicated a series of papers to the theory of quasigroups with balanced identities. In particular, he proved that quasigroups with irreducible balanced identities and quasigroups with partly irreducible balanced identities are isotopic to some groups (1966, 1985). In 1966 Belousov found identities, in the e-quasigroup, which

represent the necessary and sufficient conditions when a quasigroup is isotopic to a group, and respectively, to an abelian group.

Belousov studied systems of quasigroups with different generalized identities (generalized lows of associativity, mediality, transitivity, distributivity and generalized Stein identity (S-systems)). The main part of his second doctoral dissertation is devoted to systems of quasigroups with generalized identities.

A special contribution was brought to the theory of functional equations on quasigroups, such as functional equations of generalized associativity, distributivity, mediality, the functional Moufang equation, etc. Connected with the functional equation of generalized associativity, Belousov proved a theorem that bears his name (Belousov's theorem "about four quasigroups"): if four quasigroup operations satisfy the generalized associative law, then they are isotopic to the same group (1958–1961). This theorem has many applications. In 1960 he published the solution of the functional equation of generalized mediality on binary quasigroups and in 1976 on quasigroups of arity greater than two. In 1970–1973 Belousov gave the general solution of the functional equation of generalized associativity on quasigroup operations of arity not less than two. In 1976 he gave a complete solution for the balanced functional equation of genus 2 for quasigroups of any arity. At present, balanced equations with a special condition on subwords, are called Belousov equations.

V. Belousov investigated connections between the functional equation of generalized associativity and some special partial algebras, which were called positional algebras of quasigroups. These algebras are called today Belousov's algebras. The identities in positional algebras are functional equations of genus 1 (in positional algebras on quasigroup operations) or of genus 2 (in the positional algebras on quasigroups with substitutions). In 1971 Belousov proved that any positional algebra can be imbedded in a positional algebra with substitutions, and in 1972 the functional equation of generalized associativity of genus 2 was reduced to a functional equation of genus 1. The theory of positional algebras is included in the monograph "n-Ary quasigroups".

A large number of papers are devoted to the study of n-ary and infinite-ary quasigroups. In fact, V. Belousov created the theory of n-quasigroups, which generalizes many results that occur in binary case, but it does also reflect the specific properties of n-ary quasigroups. The monograph "n-Ary quasigroups" includes the study of a series of classes of n-ary quasigroups, such as IP-quasigroups, TS-quasigroups, Menger quasigroups, Dicker quasigroups, (i, j)-associative quasigroups.

V. Belousov granted special attention to the geometrical aspects of the theory of binary and n-ary quasigroups. He developed the general theory of algebraic nets, studied many closing conditions and configurations in algebraic nets, developed methods of investigation of the algebraic configurations (1959–1979). Its main results on algebraic nets are contained in the monographs "Algebraic nets and quasigroups" and "Configurations in the algebraic nets".

The research related to the combinatorial aspects of the theory of quasigroups is devoted to the problem of extending finite quasigroups, orthogonal binary and n-ary operations, orthogonal systems of operations (quasigroups), and the orthogonality

of parastrophes of quasigroups (1968–1983). In particular, V. Belousov obtained a classification of identities of length 5 with two variables (minimal identities) in 1983.

Valentin Belousov created a successful school in the theory of quasigroups and loops in the former Soviet Union. Many of his results, ideas and techniques have been developed and generalized by his disciples and many specialists in the theory of quasigroups and loops. Twenty three PhD theses have been defended under Belousov's supervision by: I. Florya (1966), M. Sandic (1966), A. Basarab (1968), E. Sokolov (1969), G. Belyavskaya (1970), A. Ceban (1972), V. Dementieva (1972), M. Chitoroaga (1972), B. Turcan (1972), V. Onoi (1973), Iu. Movsisyan (1974), T. Yakubov (1975), N. Sandu (1979), Iu. Sharkov (1981), V. Beglaryan (1982), S. Murathudjaev (1982), P. Gorinchioi (1982), F. Sohatskii (1986), I. Leah (1986), W. Dudek (1990), V. Shcherbakov (1991), V. Izbash (1992), L. Ursu (1993).

V. Belousov was a member of editorial boards of the mathematical journals "Aecuationes Mathematicae" and "Buletinul Academiei de Stiinte a Moldovei". He also was one of the editors of the known series of collected works "Matematiceskie issledovanija" published by the Academy of Sciences of Moldova.

During his life V. Belousov was actively involved in teaching: in 1964–1966 as an associate professor and a head of the Chair of Mathematics at the Polytechnical Institute in Chisinau (he initiated the foundation of this chair), also as a professor (1966-1988) and a head of the Department of Higher Algebra (until 1977) at the Chisinau State University (at present Moldova State University). In 1968 he was elected a corresponding member of the Academy of Pedagogical Sciences of the former Soviet Union. He participated in various community activities as a deputy of Supreme Council of the republic, member of Balti City Council, led the Student Scientific Society "Viitorul", and was one of the main organizers of the national mathematical Olympiads. During the life for his important scientific achievements and active social life Professor Belousov was awarded the State Prize of MSSR (1982) and many honorary titles and state awards. He died on July 23 1988, of cirrhosis, at the State Chancellery hospital in Chisinau.

His wife, Elizaveta (1925–1991) was a philologist and a teacher at Moldova State University. His son Alexander (1948–1998) was a physicist (PhD in Physics) and his daughter Tatiana is a doctor neuropathologist.

Those who knew Valentin Belousov, characterize him as a brilliant mathematician with an excellent mathematical intuition, having an extensive knowledge in different areas, very generous, positive and friendly, a scientist who devoted his life to mathematics.

M. Choban, V. Izbash, V. Shcherbacov, P. Syrbu