

Vladimir Petrovich Shunkov and his school

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ABSTRACT. July 29, 2012 was the 80th anniversary of V. P. Shunkov. Unfortunately, he did not live up to the anniversary. V. P. Shunkov is a classic of group theory, the founder of the Krasnoyarsk school in the theory of infinite groups with finiteness conditions. This article is about his life, his studies and his disciples.

Introduction

Vladimir Petrovich Shunkov was born on July 29, 1932 in the village of Bura (Chita region) in the peasants' family of Shunkov Peter Alexandrovich and Evdokia Semyonovna.

When a schoolboy he was lucky with the teachers: he learned the definition of the group from his school teacher, who encouraged him to read a textbook on the higher algebra by L. A. Okunev.

The supervisor of his first work “The description of finite groups with the normalizer of every subgroup normal in the group” was Mikhail Ivanovich Kargapolov, a young assistant professor of Perm State University.

The supervisor of his diploma paper (1959) in Perm State University was Sergei Nicolaevich Chernikov, the Head of the Department of Algebra. He was satisfied with a good student and invited him to enter a post-graduate's course. In the same year, Vladimir Petrovich entered a post-graduate's course of Perm State University, but his supervisor immediately moved to Sverdlovsk and two years later Vladimir Petrovich graduated from the post-graduate's course at Ural State University. He wrote his PhD thesis “The groups decomposable into a uniform product of p -subgroups”.

During two years V. P. Shunkov worked as an assistant professor of Chelyabinsk Polytechnical Institute, and later as a senior lecturer of Chelyabinsk Higher Aviation School.

The first work of Vladimir Petrovich was published in 1964 in the “Proceedings of the USSR Academy of Sciences” [1]. During next four years a series of his works [2, 3, 4, 6, 8, 9] were published in that journal.

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In 1965, in Krasnoyarsk, the Krasnoyarsk Branch of Novosibirsk State University was founded. He was invited to work in the University as a senior lecturer. In 1967, thanks to Anatoly Ivanovich Maltsev, he was invited to the Institute of Physics of the USSR Academy of Sciences. There he began his work as a senior researcher of algebra laboratory headed by Yuri Mikhailovich Gorchakov. At the same time he was teaching at the Krasnoyarsk Branch of Novosibirsk State University which had already been transformed into Krasnoyarsk State University.

During those years V. P. Shunkov was actively working. In ten years he wrote a doctorate thesis “On the theory of locally finite groups”. In 1973, Vladimir Petrovich defended his Doctoral degree. In those days it was a great honor.

In 1974, an academic Institution, the Computing Center of Siberian Division of the USSR Academy of Sciences was established in Krasnoyarsk. Due to Gury Ivanovich Marchuk, the first director Victor G. Dulov invited Vladimir Petrovich Shunkov. He worked as a senior researcher, then chief researcher of the same Institution (in 1998 it was renamed as the Institute of Computational Modelling of Siberian Division of Russian Academy of Sciences).

In 1994, he was awarded the A. I. Maltsev Prize of Russian Academy of Sciences for outstanding achievements in the field of locally finite groups. He was awarded the state grant for outstanding Russian scientists. In 1999, V. P. Shunkov was awarded with the Medal of the Order “Za zaslugi pered otechestvom”.

For many years V. P. Shunkov was a member of the American Mathematical Society and the reviewer of “Mathematical reviews” of the American Mathematical Society.

His main research area was the theory of infinite groups with various finiteness conditions. In this area, he was one of the leading experts in the world. V. P. Shunkov chaired a group which was constantly supported with the grants of Krasnoyarsk Regional Science Foundation and grants of the Russian Foundation of Fundamental Research.

For ten years he was heading the Department of Algebra and Mathematical Logic of Krasnoyarsk State University and was a professor of the department. Since 1974 the meetings of Krasnoyarsk city algebraic seminar were regularly conducted under the supervision of V. P. Shunkov. He was a member of the Scientific counsel D 064.61.02 for doctoral dissertations at Krasnoyarsk State University.

V. P. Shunkov was the author of over 100 scientific papers (see list of major publications [1–71]) and five books on the group theory (1990, 1992, 2000, 2001, 2004).

In 1991, he was a guest-lecturer at the International Mathematical Conference in Mashhad (Iran). In 1997, he participated in the International Conference on the Representation Theory of Finite Groups, Cambridge (England).

V. P. Shunkov participated in the organizing committees: in 1979 he was the chairman of the organizing committee of the All-Union Algebraic Conference, in 1980 the Vice Chairman of the organizing committee of the All-Union Symposium on Group Theory, and a member of the organizing and program committees of several International Conferences.

In 2002 and 2007 International Algebraic Conferences dedicated to the 70th anniversary and the 75th anniversary of V. P. Shunkov were held in Krasnoyarsk. In 2012 International Conference “Maltsev Meeting” dedicated to the 80th anniversary of V. P. Shunkov were held in Novosibirsk.

In 2013 International Algebraic Conference “Algebra, Logic and Applications” dedicated to the 80th anniversary of V. P. Shunkov will be held in Krasnoyarsk.

In 1965 algebraic school under the supervision of professor V. P. Shunkov was founded in Krasnoyarsk. Now this school is well known in our country and abroad.

The school investigates the following subjects: Frobenius groups, the structure of Frobenius groups and some splittable groups, signs of non-simplicity of infinite groups, locally solvable groups, locally finite groups, layer-finite groups, almost layer-finite groups, Chernikov groups, generalized Chernikov groups, groups of finite rank, groups with finite elements, residually finite groups, infinite groups with a strongly embedded subgroup, groups with the minimality condition, with the minimality condition for Abelian subgroups, groups with the primary minimality condition, groups saturated by finite simple non-Abelian groups, Φ -groups, Φ_0 -groups M_p -groups, T_0 -groups.

Scientific and pedagogical work of Vladimir Petrovich started in 1978 at the Institute of Computational Modelling of Siberian Division of Russian Academy of Sciences and Krasnoyarsk State University.

He has supervised 24 PhD dissertations and six of these students defended Doctoral degrees. Since 1978 V. P. Shunkov and his students have developed a new approach, the so-called positive theory of periodic groups. This theory has shown exceptional importance of the examples of groups constructed by P. S. Novikov, S. I. Adian and A. Yu. Olshansky.

Since the late 80's, V. P. Shunkov introduced new classes of infinite groups, with abstract properties of the system subgroups: Φ -groups, Φ_0 -groups, M_p -groups and T_0 -groups.

Class of M_p -groups is a far-reaching generalization of Chernikov groups. This class of groups was studied in detail in his works [33, 36, 37, 44] and in the book

— Shunkov V. P. M_p -group. – Moscow: Nauka, 1990.

Vladimir Petrovich obtained an abstract characterization of the class of T_0 -groups in the class of all the groups. The results related to this class can be found in [56, 57, 62] and in the book

— Shunkov V. P. T_0 -group. – Novosibirsk: Nauka, 2000.

V. P. Shunkov and his students created a theory of conjugately biprimively finite groups (since 2000 they have been named “Shunkov groups”), characterized the group with the minimality condition, layer-finite groups, almost layer finite groups, Chernikov group, generalized Chernikov groups in the class of periodic groups and in the class of all the groups. The results of the studies are summarized in the following monographs:

— Shunkov V. P. Embedding of the primary elements in the group. – Nauka, Novosibirsk, 1992.

— Senashov V.I., Shunkov V. P. Groups with finiteness conditions. – Novosibirsk: Publishing House of SB RAS. 2001.

— Popov A.M., Sozutov A.I., Shunkov V. P. Groups with systems of Frobenius subgroups. Krasnoyarsk: Publishing House of Krasnoyarsk State Technical University, 2004.

In 1967 V. P. Shunkov established the countability of any locally finite group under the assumption that all its proper subgroups are countable [7]. In the same paper he showed that any locally finite group with the minimality condition for subgroups is countable and that any simple locally finite group is countable if the centralizer of any non-identity element is countable. In 1969 V. P. Shunkov proved the countability of any locally finite group satisfying the minimality condition for Abelian subgroups [11].

In 1968 V. P. Shunkov proved that in periodic group G either some involution k belongs to an infinite centralizer of some involution in G or G is locally finite [10]. As a corollary to this theorem, one can show that the existence of a second order almost regular automorphism of a periodic group without involutions is a criterion for local finiteness of the group [10].

In the review of Kurosh–Chernikov, in 1947, the minimality problem was raised, is formulated in the following form:

Will an infinite group with the minimality condition be a finite extension of a direct product of a finite number of quasicyclic groups (i.e., Chernikov group)?

Recently, this problem was solved (negatively) by A. Y. Olshansky. V. P. Shunkov with A. N. Ostylovskii proved that every conjugately biprimively finite group with the minimality condition for subgroups is Chernikov one [22]. Thus, the minimality problem in the class of conjugately biprimively finite groups was positively solved.

V. P. Shunkov with N. M. Suchkova have generalized this result for groups with the minimality condition for Abelian subgroups [35].

V. P. Shunkov together with A. M. Popov [38] characterized Chernikov groups in the class of groups without involutions and in the class of all the groups under sufficiently weak finiteness conditions.

Classical direction in the group theory is setting criteria of non-simplicity of groups. A fruitful idea belongs to V. P. Shunkov [25]: to consider an arbitrary, not necessarily finite Frobenius group $L_g = \langle a, a^g \rangle$ with cyclic complement $\langle a \rangle$ in the proof of such criteria.

He has also obtained a number of signs of non-simplicity for infinite groups in [25], and, together with A. I. Sozutov in [28, 30].

V. P. Shunkov characterized infinite Frobenius groups [40, 42, 45]. Based on the examples of free Burnside groups, V. P. Shunkov constructed a group with a Frobenius pair which is not a Frobenius group [26] (finite group with a Frobenius pair by the famous Frobenius theorem is a Frobenius group).

V. P. Shunkov established the conditions under which there is an infinite locally finite subgroup in the group [27].

He also described groups with a strongly embedded infinitely isolated subgroup together with A. N. Izmailov [31].

V. P. Shunkov proved a number of theorems of embedding prime order elements into groups [43, 47, 49, 51]. Therefore, he solved the problem: How the elements of prime order are embedded into the groups, and how they are arranged in them? Thus on the group itself rather weak restrictions are imposed.

The specialists of the highest qualification were supervised by V. P. Shunkov:

1. N. S. Chernikov (PhD in 1978).
2. A. N. Ostylovskii (PhD in 1978).
3. V. G. Vasiliev (PhD in 1980).
4. A. I. Sozutov (PhD 1980).
5. I. I. Pavlyuk (PhD in 1982).
6. A. A. Shafiro (PhD in 1984).
7. A. N. Izmailov (PhD thesis written in 1984).
8. A. K. Shleopkin (PhD in 1985).
9. E. I. Sedova (Chubarova) (PhD in 1985).
10. V. I. Senashov (PhD in 1985).
11. A. M. Popov (PhD 1988).
12. N. G. Suchkova (PhD in 1989).
13. A. V. Timofeenko (PhD in 1991).
14. V. O. Homer (PhD in 1992).
15. G. A. Troyakova (PhD in 1993).
16. M. N. Ivko (PhD in 1993).
17. A. A. Cherep (PhD in 1994).
18. Al. N. Ostylovskii (PhD in 1996).
19. O. V. Pashkovskaya (PhD in 1999).

20. E. N. Yakovleva (PhD in 2002).
21. S. N. Kozulin (PhD in 2005).
22. O. V. Golovanova (PhD in 2006).
23. M. V. Yanchenko (PhD in 2008).
24. In. I. Pavlyuk (PhD in 2011).

Six of these students defended Doctoral degrees:

1. N. S. Chernikov — Doctor of Sciences from 1992.
2. A. I. Sozutov — Doctor of Sciences from 1996.
3. V. I. Senashov — Doctor of Sciences from 1998.
4. A. K. Shleopkin — Doctor of Sciences from 1999.
5. A. M. Popov — Doctor of Sciences from 2006.
6. A. V. Timofeenko — Doctor of Sciences from 2011.

V. P. Shunkov died on October 3, 2011, but he will live forever in the hearts of his disciples.

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