THE SCIENTIFIC AND SOCIAL ACTIVITY OF PROFESSOR N. N. SALTYKOV IN RUSSIA IN 1894–1919

UDC 501: 531

D. V. Breslavsky, A. A. Larin, V. B. Konovalova

NTU "KPI", Kharkov, Ukraine. e-mail: brdmkhpi@gmail.com

Abstract. *The scientific and social activity of Professor N. N. Saltykov in Russia in period 1894–1919 is presented.*

Key words: *Nikola Saltikov, scientific activity, university, Serbian academy of Science and Art, Russia, Serbia.*

Fig.1 Nikola N.Saltykov (May 24, 1872-2961)

The name of N. N. Saltykov, who was the Academician of the Serbian Academy of Sciences and Arts, is widely known in Serbia. He was one of the founders of the Serbian

Mathematics. His scientific activity in Serbia is reflected in the sixth volume of the ten-volume edition, dedicated to Serbian scientists [1, p. 43–71]. However, the information about his pre-revolutionary activity in Russia is almost absent. The objective of this article is to fill this gap and provide a Serbian reader with the information about the life and scientific research of Academician Nikolai Saltykov. The sources of our research: few publications about N. N. Saltykov, mostly from the Kharkov National University [2–4], and the National Technical University "Kharkov Polytechnic Institute" [5; 6], where he worked, as well as the materials of regional archives of Kharkov (Ukraine) and Tomsk (Russia) [7; 8].

N. N. Saltykov was born in May 24, 1872 in Vishny Volochyok of Tver province in a family of an engineer-technologist. In 1891 he graduated from the Kharkov high school and entered the Mathematics Department of Physics and Mathematics Faculty of Kharkov University. It was one of the first universities of Russian Empire that later became famous for its high level of teaching of Mathematics and Mechanics. It got the most success in Mathematics and Mechanics at the end of XIX and early XX centuries. The world-famous academicians of Kharkov University are: V. G Imshenetsky, A. M. Lyapunov, V. A. Steklov, K. A. Andreev, S. N. Bernstein, D. M. Sintsov, professors I. D. Sokolov, D. M. Delarue, V. P. Alekseev, M. A. Tihomandritsky, A. B. P. Psheborsky and many other scientists [2, p. 280–282; 6, p. 38–56]. They were the teachers and colleagues of N. N. Saltykov at the university. Two outstanding scientists influenced him greatly: Aleksandr Mikhailovich Lyapunov (1857–1918) – a graduate of St. Petersburg University, a student of P. L. Chebyshev. He was a great mathematician and engineer, the founder of the Stability of Motion theory, the Academician of the Petersburg Academy of Sciences (since 1902). The Lyapunov's sense of life was his devotion to science. He was the first who outlined a specification for Mechanics tasks in their mathematical formulation to be solved with accuracy, or the evaluation of the accuracy of approximate solutions to be defined constantly. Lyapunov delivered Mechanics courses at the Kharkov University (1885–1902) and the Technological Institute (1887–1893).

Vladimir Andreevich Steklov (1863–1926) – a Kharkov University graduate, a student of Lyapunov. He delivered Mechanics at the Kharkov University (1891–1906) and at the Institute of Technology (1893–1906). In 1912 he was elected as an Academician of the Petersburg Academy of Sciences (corresponding member since 1902). In 1919–1926 – he is a Vice-President of the Academy of Sciences of the USSR. In 1921, Steklov organized and managed the Institute of Physics and Mathematics, on the base of which the Mathematical Institute was created in 1934. Now the Mathematical Institute of the Russian Academy of Sciences got the name of Steklov.

While a student, Nikolai Saltykov published his first scientific paper on the integration of the Lauserbracht's equation in Paris in 1894 («Integration de l'equation de Lauserbracht», L'intermedieur de mathematicians. – Paris, 1894, t. II) [1, p. 50, 60]. This gifted young man attracted the attention of teachers and was invited to work at the university to accomplish professorship. Since January 1896 Saltykov was awarded with

the scholarship of the Ministry of Education in the Department of Abstract Mathematics of the Kharkov University, and the training period for him was elongated to three years. Nicholai Saltykov successfully defended the dissertation "On the Integration of Equation with Partial First Derivatives of One Unknown Function" at the Academic Council of the Kharkov University in December 5, 1899 and was awarded with a Master's degree in Abstract Mathematics.

In January 1900 the Ministry of Education assigned Saltykov with a scientific mission to study the methods of teaching of Theoretical Mechanics at the Western Europe famous universities. He interned in France and Germany. After return he was invited by the Council of the Tomsk Technological Institute (TTI) to occupy a position of the chief of the Theoretical Mechanics Department. In August 1, 1901 Nicholai Saltykov was appointed as an extraordinary professor of that department. In Tomsk, he delivered lectures in Theoretical Mechanics to the 1st year students of all departments (2 hours per week) and students of the 2nd year of Mechanical and Civil Engineering departments (3 hours per week), conducted practical skill classes. In the first half of 1903/04, during the Professor Nekrasov's assignment, Saltykov also delivered a course of lectures and practical classes in infinitesimal calculus to the students of the 1st course of the Mining and Chemistry Departments. In 1901–1902 he occupied a position of a Secretary (Deputy Dean) of the TTI Mining Department.

Despite the hard academic assignment, N. N. Saltykov constantly improved upon his scientific level. So during the summer vacation from May 15 to September 1, 1902, when he was abroad, he aimed to continue his research in the field of the theory of integration of canonical differential equations as well as equations in partial derivatives. During this trip he worked at the libraries of Paris (Sorbonne) and Leipzig universities and the Paris Academy of Sciences. The results of the study were performed at the Paris Mathematical Society as well as at the Paris Academy of Sciences (partially). At the University of Paris a young scientist attended lectures of professors G. Hadamard and E. Picard, studied their works on the theory of differential equations, function theory, number theory and astronomy. He performed scientific reports about the current development of the celestial mechanics at the Kassel Congress in Germany. He also attended Leipzig and Göttingen Universities, perceived the courses of lectures in Theoretical Mechanics of F. Klein as well as the research of the Norwegian mathematician Sophus Lie, established professional contacts with professors A. Mayer and F. Engel. He took part in the congress of German naturalists and physicians [7, p. 126, Op. 2. u Mts. 1921, 1553, 1842, p. 194, Op. 6a, ed. Mts. 11, 113].

In March, 1904 N. N. Saltykov was transferred to Kiev Polytechnic Institute (KPI) as extraordinary professor. There he continued his scientific research with differential equations with partial derivatives. The professor of the Kiev University and the KPI, corresponding member of the St. Peterburg Academy of Sciences V. P. Ermakov (1845–1922) influenced his scientific research greatly. He mainly focused on the differential equations with partial derivatives. His both dissertations were devoted to the above mentioned subject [9]. In 1906, Nikolai Saltykov defended his doctoral thesis for the

Doctor of Abstract Mathematics Degree: "The Research on the Theory of Partial Derivative Equations of the First Order of an Unknown Function." After the defense, Saltykov became a professor in ordinary of the Applied Mathematics Department of the KPI.

Saltykov hadn't to work long in Kiev. In 1906, his teacher Steklov moved to St. Petersburg, and Saltykov returned to his alma mater. It was in February 5, 1907, when he was appointed as a professor in ordinary of Mechanics at the Kharkov University. To maintain a high level of teaching Mechanics at the university, that had been developed by Lyapunov and Steklov before, Nikolai Saltykov payed much attention to methodological issues. In addition to obligatory courses, he delivered an optional course "Mechanical Principles of Airplane Flight", conducted the scientific seminars on differential equations of Mechanics and the History of Mechanics. Within the study of Theoretical Mechanics, students were offered more complicated problems on the dynamics of gyroscopes and systems of points, three-body problem, variational problems, the problem of small oscillations, problems of the stability of the elastic rod systems and stability of the motion [2, p. 281]. Among the issues Saltykov was interested in at that period was the question of mathematical education in secondary schools. He conducted seminars at the University in order to harmonize teaching in secondary and high schools. Understanding the importance of the Theoretical Mechanics course for secondary school teachers, N. N. Saltykov did his best to perform it at the University.

In 1906–1908 Saltykov also delivered lectures at the Kharkov Practical Institute of Technology (now the National Technical University "Kharkov Polytechnic Institute"), where the courses in Theoretical and Analytical Mechanics were delivered by Lyapunov and Steklov before. Here he and P. V. Shepelev have developed new courses on these subjects on the basis of the generalized experience of A. M Lyapunov and V. A. Steklov. These courses have been agreed with the teaching of other disciplines of mechanical course and Mathematics. Statics and basis of Kinematics and Dynamics were delivered to the first course. The main attention was focused on the elucidation of the mechanical and geometrical issues of the concepts, phenomena and laws introduced. This course comprised three hours a week during a year. It was developed as a complete object and fully satisfied the requirements of the Chemical Department. After sufficient knowledge in Mathematical Analysis on the second course (two hours per week) were obtained, the Dynamics of points system and the basis of Analytical Mechanics were delivered. This program was focused on the students of Mechanical Department [6, p. 48–49]. At the beginning of XX century, the name Saltykov acquired fame. 53 of his works were published before 1918, 27 were published in Paris, 14 in Kharkov, four in Moscow and Kiev, two in St. Petersburg and one in Rome and Cambridge. He was a member of the Mathematical Societies of Kharkov, Kiev, Moscow, Paris, Berlin and Palermo [1, p. 60–63].

In politics Nikolai Saltykov was a liberal. In 1905–1906, in Kiev he was a member of the "Union of Professors." From 1917 he was a member of the Constitutional Democratic Party (Party of National Freedom), and joined the department of the Russian

national center when it was organized in July, 1919 in Kharkov. Moreover he was elected to the board of this department. He got in the city council on the list of the national-democratic union, headed by cadets during the local elections in Kharkov in October 1919, and later he was elected as a mayor. Heading the municipal government in such a critical moment, Saltykov demonstrated remarkable personal qualities – optimism, responsibility, commitment to a difficult and thankless work for the good of the city. During the Revolution and the Civil War N. N. Saltykov didn't keep out of the events. When in summer 1919 Volunteer Army came to Kharkov, he was elected as a mayor of the city. As the head of the city government, Saltykov demonstrated his personal qualities – optimism, responsibility, did his best for the city. In this difficult time Nikolai represented the sample of honesty and integrity. In particular, he didn't obey the decision of the National Center about the alliance with the Black Hundreds, the Russian nationalist organization [4]. At the end of June 1919 the Chief of the Armed Forces of South Russia, Lieutenant-General Anton Denikin visited Kharkov. The reception ceremony was organized by Mayor of Kharkov, N. N. Saltykov [10]. Denikin attended the special prayer service dedicated to the city liberation which took place in the square in front of St. Nicholas Cathedral. He was presented with bread and salt on a special dish. Later this dish was captured (looted) by the Red Army during the Denikin's army retreat, and now it is kept in the Central Museum of the Armed Forces of Russia [11].

Fig.2 The meeting of general A.I.Denikin in Kharkov

12.02.1934, N. N. Saltykov was elected as a corresponding member of the Serbian Royal Academy of Natural Sciences department. In accord with the Ministerial Council decision of 22.11.1941, N. N. Saltykov was sent into retirement. During the war, the septuagenarian scientist was imprisoned in a concentration camp Banjica near Belgrade. After the camp liberation he was reinstated as a full-time professor of the Philosophical Department of the Belgrade University by decision of 22. 11. 1945. 02.03.1946 N. N. Saltykov was elected as an active member on the Natural-Mathematical department by the Serbian Academy of Sciences and Arts. In April 1946 the Mathematical Institute of the Serbian Academy of Sciences in Belgrade was founded and here Nikolai Saltykov became a research assistant. In 1955, being already a retiree, he continued his work there as an honorary researcher. The scientific research to which N. N. Saltykov devoted almost 70 years, (taking into account his first publication in 1894), became the main devotion of his life. His bibliography includes 181 scientific papers, comprising several monographs. A complete list of publications is given in [1, p. 60–71].

Харьковскій городской голова

объявляетъ гражданамъ, что сегодня въ 8 час. утра прибываетъ въ Харьковъ Главнокомандующій всѣми вооруженными силами юга Россіи генералъ-лейтенантъ А. И. Деникинъ.

Образованный для встрѣчи генералъ-лейтенанта А. И. Деникина Общественный Комитетъ приглашаетъ гражданъ къ торжественной встрѣчѣ дорогого высокого гостя и сообщаетъ порядокъ встрѣчи:

1. Встрѣча на Харьковскомъ вокзалѣ прибывающаго генералъ-лейтенанта А. И. Деникина.

2. Отбытіе генералъ-лейтенанта А. И. Деникина по Екатеринославской улицѣ и Павловской площади къ мѣсту торжественнаго молебна на Соборной площ., послѣ какового состоится парадъ войскамъ.

3. Отбытіе генералъ-лейтенанта А. И. Деникина въ зданіе городской думы, гдѣ состоится пріемъ общественныхъ депутацій.

Полученіе удостовѣреній для депутацій для входа въ городскую думу и указаній о порядкѣ привѣтствій производится сегодня отъ 9 до 10 час. утра уполномоченнымъ Общественнымъ Комитетомъ инженеромъ Д. Ф. Булацелемъ и членомъ управы М. И. Печковскимъ.

4. Отбытіе генералъ-лейтенанта А. И. Деникина на вокзалъ.

Городской голова приглашаетъ гражданъ украсить дома національными флагами и коврами по пути слѣдованія генералъ-лейтенанта А. И. Деникина. Кромѣ того городской голова проситъ администрацію всѣхъ правительственныхъ, общественныхъ учрежденій, торговыхъ, промышленныхъ заведеній, фабрикъ и заводовъ прекратить занятія и работы съ 9 часовъ утра, дабы дать возможность всѣмъ гражданамъ принять участіе во встрѣчѣ генералъ-лейтенанта А. И. Деникина.

Городской голова Н. Н. Салтыковъ.

Fig.3 The 'New Russia' newspaper with N.N.Saltykov's announcement about visit of general Denikin

The fundamental direction of Professor Saltykov's scientific activity was the study of partial differential equations of the first order. Lagrange suggested the beginning of general studies of the mentioned above equations. Later, they were developed by I. Pfaff, C. Jacobi, A. Cauchy, J. Bertrand, J. Liouville, A. N. Korkin and many others. In 1870s the scientific papers of Adolf Meyer and Sophus Lie appeared. These studies became the starting point for further research of V. P. Ermakov in this field [9, p. 35–45]. Undoubtedly, the Ermakov's research influenced greatly the N. N. Saltykov's work. The basic tenets of the theory of partial differential equations of the first order and Lee's simplified summary of this study were considered in Saltykov's master thesis from a classical point of view. He critically analyzes and develops the theory of Lee in his doctoral thesis. His official opponent D. M. Sintsov in a review denotes the connection between Liouville's and Lee's scientific papers that was proved by Saltykov. The correlation of the Lee's theory with the classical research of Liouville and Jacobi and other mathematicians is considered to be one of the major Saltykov's merits. More details about the content of the theses of Nikolai Saltykov can be found in the essay of I. A. Naumov "Mechanics in Kharkov" [2, p. 280–282]. Saltykov was dealing with the problem of partial differential equations of the first order during his entire life. The most important of his works, that were published between the World Wars were the works published in Paris [1, p. 64, 65] – "On the theory of partial differential equations of the first order with one unknown function» («Sur la theore des equations aux derivees partielles du premier ordre d'une seule fonction inconnue», Bui. Des Sc. Math. 2 ser. T. XLIX , Juillet – Paris, 1925);

– "Classical methods for the integration of equations in partial derivatives of the first order» («Methodes classique d'integration des equations aux derivees partielles du premier ordre», Memoriales des Sciences Mathematiques, 1931, fasc. L. – Paris);
– "Modern methods for the integration of differential equations with partial derivatives of the first order for one unknown function" («Methodes modernes d'integration des equations aux derivees partielles du premier ordre a une fonction inconnue», Memoriales des Sciences Mathematiques, 1933, fasc. LXX. – Paris).

The last two papers were published in one of the most prestigious collections of monographs, where the works of the most famous French and foreign mathematicians of the time were published. Apart from Saltykov, among Yugoslav mathematicians, only professor of the Belgrad University, Academician Mikhail Petrovich (1868–1943) was awarded with this honor [1, 50–51]. A detailed analysis of N. N. Saltykov's contribution to the theory of differential equations development was performed in monograph [1, 50–57]. The result of his research activities was a monograph "Methods of integrating the differential equations of the first order with one unknown function", published in Belgrade by Serbian Academy of Sciences and Arts in Serbian [12]. It is an encyclopedia of this branch of Mathematics.

Working in Belgrade, Saltykov devoted part of his publications to the reform of the mathematics education in high school and wrote a textbook on Analytical Geometry [13]. A special place in the scientific work of N. N. Saltykov belongs to the history of mathematics. Historical research goes through all his work that distinguishes his works

from of other scientists. But apart from this he has many works of historical direction. First of all, the works dedicated to the study of differential equations of Jacobi, Jean d'Alembert, and other mathematicians of the past. Saltykov studied unpublished memoirs on differential equations of the mathematician of XVIII century Charpy as well as revealed its scientific value. He wrote essays about life and activities of the French mathematicians Poincaré and Cartan, Yugoslav mathematicians M. Petrovic and M. Getaldi, Russian mathematician, expat D. F. Selivanov, as well as articles about Archimedes and Descartes as creators of mathematical methods. Among his achievements is the Russian mathematics history to Western auditory. His last papers were published in 1962–1963, after the author's death.

Being a person with active citizenship, N. N. Saltykov took an active part in the Russian academic team in Belgrade and in the Russian Scientific Institute, which brought together Russian scientists – emigrants of different scientific fields. He published his works in the "Notes" of the Institute. Saltykov participated in various activities related to the Russian emigration: 4th Congress of the Russian academic organizations abroad (Belgrade, 1929), the International Congress of Mathematicians (Zurich, 1932), as a delegate from the Russian academic group in Yugoslavia, during the 1st Congress of Mathematicians of the Slavic countries he represented the Russian Scientific Institute in Belgrade. He delivered lectures on inter-Balkan Mathematical Congress (Athens, 1934). His activity to promote the achievements of Russian scientists was of great importance. During 15 years N. N. Saltykov was invited to deliver a series of lectures on various areas of the theory of differential equations in a number of French (Paris and Strasbourg) and Belgium (Brussels, Liege, Leuven and Ghent) universities before World War II. During the postwar period, he delivered lectures at the University of Brussels and the Poincaré Institute in Paris [1, p. 47]. N. N. Saltykov was awarded with a medal by the University of Brussels. Nikolai Saltykov was an active member of the Society of mathematicians, physicists and astronomers of People's Republic of Serbia, as well as the Union of mathematicians, physicists and astronomers of Yugoslavia. During his scientific career N. N. Saltykov participated in international conferences in Rome, Cambridge, Amsterdam, Nancy, Beche and Belgrade.

Nikolai Saltykov created the scientific school of the theory of differential equations in Yugoslavia. Among his students are Professor D. Mihnevich, L. Shchedrin, K. Orlov and M. Stojadinovic. The name of Saltykov is connected with the establishment and progress of Yugoslavia and, in particular, the Serbian mathematics. His merits were estimated pro vita – by the Decree of the Chairman of the Federal People's Republic of Yugoslavia, Josip Broz Tito on 03.30.1956, N. N. Saltykov was awarded with the Order of the I degree. Nicholai lived a long life. He died in September 28, 1961 in Belgrade. Despite the fact that since that time it's been 50 years, the memory about him is still alive, not only in Serbia but also in Ukraine, and in particular in Kharkov – the town which Nikolai Saltykov devoted his best years to.

References

1. Život i delo srpskih naučnika [Biografije i bibliografije, urednik akademik Miloje Sarić] Beograd: Srpska Akademija Nauka i Umetnosti, knjiga VI. – 2000. – 423 str.
2. The History of Mechanics in Russia. – Kyev: Naukova Dumka, 1987. –392 p. (In Russian).
3. V. A. Zolotarev. On the formation and development of mathematics education at the University of Kharkov / V. A. Zolotarev // Universitates. Science and Education, 2004. – № 1. – P. 68–72 (In Russian)
4. Pavlova T. G. Kharkov Professor emigration 20–30-s of XX cent / T. G. Pavlova // Universitates. Science and education, 2010. – № 1. – P. 30–51. (In Russian)
5. Larin A. A. Life and career of academician N. N. Saltykov/ A. A. Larin // Proc. of Dnipropetrovsk University (Visnik Dnipropetrovskogo universitetu), 2011. – № 1/2. – T. 19. – P. 108–114 (In Russian)
6. Academician Alexander Aleksandr Mikhailovich Lyapunov: the 150th anniversary of the birth: Monograph / [L. L. Tovazhnyansky, D. V. Breslavsky, A. A. Larin and others]. – Kharkov: NTU "KPI", 2007. – 288 p.
7. State Archive of Tomsk region (Russia)
8. State Archives of Kharkov region (Ukraine)
9. Dobrovolsky V. A. Vasiliy Ermakov, 1845–1922 / B. A. Dobrovolsky. – Moscow: Nauka. – 1981. – 88 p. (In Russian)
10. The newspaper "New Russia", Kharkov, June 22, 1919
11. http://ru.wikipedia.org/wiki/Добровольческая_армия_в_Харькове (Volunteer Army in Kharkov, In Russian)
12. 12. Салтиков Н. Методе интегральена парциальних једначина првог реда са једном непознатом функцијом / Н. Салтиков. – Београд.: Српска академја наука и уметности, 1947. – 748 с.
13. Салтиков Н. Аналитичка геометрја, ч. I / Н. Салтиков. – Београд.: Просвета, 1947. – 271 с.

NAUČNA I AKADEMSKA AKTIVNOST PROFESORA NIKOLE N. SALTIKOVA U RUSIJI I PERIODU 1894-1919

D. V. Breslavsky, A. A. Larin, V. B. Konovalova

NTU "KPI", Kharkov, Ukrajin. e-mail: brdmkhpi@gmail.com

Apstrakt. *Prikazana je naučna i akademska aktivnost Profesora Nikole N. Saltykov u Rusiji u period 1894–1919.*

Ključne reči: *Nikola Saltikov, naučna aktivnost, univerzitetski rad, Srpska akademija nauka i umetbđnsti,Rusija, Srbija.*