TECHNOLOGY HISTORY STUDIES

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SCIENTIFIC AND TEACHING ACTIVITIES OF PROFESSOR V. V. SKOPETSKYI (1944-2010) IN CYBERNETIC SCIENCE

The article is dedicated to the little-known pages of life and work of an outstanding person, cybernetic scientist, mathematician, professor, associate member Vasyl Vasyliovych Skopetskyi. The scientist was working intensively within the following scientific areas: mathematical modeling and study of processes in heterogeneous environments, automated calculation of complex problems in physics and engineering, development of numerical and analytical methods for applied mathematics.

However, the scientific contribution of V.V. Skopetskyi in cybernetic science is not sufficiently highlighted in the literature and there is an urgent need to study V.V. Skopetskyi personality in the context of the Ukrainian cybernetic science.

Key words: V.V. Skopetskyi, cybernetics, ecological processes, Institute of Cybernetics of V.M. Glushkov National Academy of Sciences of Ukraine, mathematical and computer modeling.

In recent years, the interest in the history of science and technology has increased, favouring further studies highlighting the history of different areas and fields of cybernetics as well as the study of the contribution of domestic scientists in development of science and technology both in Ukraine and worldwide.

A detailed and comprehensive study of individuals in the context of the era in which they lived, in other words – a biographical historiography – is an important area of research in historical science.

Historical and biographical studies play a significant role in the development of history of science and technology. They allow us to personalize the history of specific areas, to assess the contribution of a person in their development, to trace their evolution. Today, biographies of famous cybernetic scientists contain significant amounts of understudied pages that does not allow to form complete objective vision of the development process of the cybernetics. This predetermines the relevance of studying biographies of Ukrainian scientists and engineers to determine their personal contribution to the process of formation and development of national science[1].

An individual person or group of people whose ideas and activities lead to radical changes in any field of science usually serve as the key factor of any development. Therefore, it is appropriate to study an outstanding personality of the Ukrainian cybernetic scientist – V.V. Skopetskyi.

The origin of cybernetics as a scientific field was a logical and natural result of the development of a scientific thought in the last decade. Cybernetics gradually penetrates into many spheres of life. The fact that it gives a new vision of the world based on communication, control, organization and information plays not the least role. The significance of cybernetics is that it gives a general scientific knowledge which can be applied in various fields of science[2].

The development of cybernetics in Ukraine is inextricably related to the Institute of Cybernetics of the NAS of Ukraine and the Faculty of Cybernetics of Taras Shevchenko National University of Kyiv. Also

[1] Демуз, І.О. (2009). Петро Януарович Стебницький: штрихи до біографії (1862-1923). <http://base.dnsgb.com.ua/INB/2009-4/09demuz.pdf />.

[2] Іваницька, Л.В. (2003). *Суспільно-політичні та науково-організаційні аспекти кібернетики та інформанти (етапи накопичення наукової спадщини та досвіду інформатизатизації суспільства):* автореф. дис.. на здобуття наук. ступеня канд. іст. наук: спец. 07.00.01 « історія України». Київ, 3-4.

V. Skopetskyi is a significant figure in the context of the Institute of Cybernetics of the NAS of Ukraine and the Faculty of Cybernetics of Taras Shevchenko National University of Kyiv[1].

Having analyzed his activities within the walls of the Institute of Cybernetics of the NAS of Ukraine and Taras Shevchenko National University of Kyiv we can make a conclusion about his high qualification as a scientist, the practical significance of his scientific developments and rich contribution into the development of modern cybernetics in Ukraine.

During the lifetime of a scientist his scientific works were the subject of reviews and short characteristics, references in the scientific papers of leading cybernetics.

Despite the unquestionable importance of scientific and pedagogical contribution of the scientist into the development of cybernetic science in Ukraine, yet in some works on the history of cybernetics the name of V.V. Skopetskyi is not even mentioned.

V.V. Skopetskyi is one of the most famous Ukrainian cybernetic scientists, who worked all his life for the benefit of cybernetic science of Ukraine. The investigation of his scientific and organizational activities gives an idea of the major trends in the national cybernetics from mid 20th till the 21st century. In this paper we made an attempt to recreate the lifeway of one of the most outstanding Ukrainian cybernetic scientists, whose scientific heritage is still not studied, for the contemporaries. Analysis of the life and scientific heritage of the scientist will help to understand his train of thought, show the cultural and scientific life environment, the direct participant of which he was, explore the individual pages of the scientist's past and cultural life of Ukraine[2].

Vasyl Vasyliovych had a high moral and professional qualities; his fundamental works in the field of cybernetics proofed that he was a talented and gifted scientist.

The analysis of his scientific activity, which lasted more than 40 years, allows us to conclude that V.V. Skopetskyi was a highly skilled and talented scientist, an excellent teacher and a good person. He demonstrated an exceptional capacity for work, intelligence and humanity. His scientific heritage had and continues to have great influence on the development of the cybernetic science of Ukraine.

An issue of mathematical modeling of environmental processes took a special place in his scientific researches. The scope of his research included the issues of contaminants migration in water, air, underground, forecasting pollution of air, water and underground environments due to accidents in the manufacturing facilities. "Methods of numerical modeling of environmental processes" and "Fundamentals of mathematical modeling in ecology" are the a landmark works of the scientist, aimed at training specialists for work in the field of ecology the environment by formulating and solving applied problems with a help of computer means[3]. These books contain information on how to develop mathematical models for migration of pollutants in air, soil and underground waters. In particular, they provide physical and mathematical foundations of fluid flow in porous media and discuss principles of mathematical models development for geofiltration regimes taking into account hydrophysical characteristics. The issue of mathematical models development for migration of contaminants in the groundwater and the atmosphere holds a prominent place in the works due to the relevance and novelty of this kind of research[4].

The field of V. Skopetskyi's research interests was not limited to issues of mathematical modeling of environmental processes. This was only one of many issues explored by the scientist.

Scientific and educational activities of the scientist were characterized by the high professionalism and qualification. The scientific research studies of V.V. Skopetskyi are reflected in the more than three hundred publications, including a number of monographs that have an extraordinary value for the cybernetics in general.

V.V. Skopetskyi was born on June 16, 1944 in the village Kuhayivtsi of Chemerovetskyi district, Khmelnitskyi region. At this moment his father – Vasyl Onufriyovych – was at the front within the Soviet troops. Vasyl Onufriyovych Skopetskyi was a teacher of history by profession, he graduated from Kamianets-Podilskyi Pedagogical University. After returning from the front, where he was seriously

[1] Сергієнко І. В. (голов. ред.) (2010). *Стан та перспективи розвитку інформатики в Україні.* Київ: Наукова думка, 3-10.

[2] Скопецький, В.В. (2010). *Математичне та комп'ютерне моделювання. Серія: Технічні науки: зб. наук. пр.* Кам'янець-Подільський: Кам'янець-Подільськ. нац. ун-т, вип. 4, 270.

[3] Гладкий, А.В. (2005). *Методи числового моделювання екологічних процесів*. Київ: Видавництво «Політехніка».

[4] *Сайт відділу математичних систем моделювання проблем екології та енергетики*. <http://users.i.kiev.ua/~norkin/ICYB/MAINMENU/About/DEPARTMENTS/FROM_OLD_SITE/Web_175.htm /> .

injured, Vasyl Onufriyovych Skopetskyi worked as a teacher at schools of Ternopil and Khmelnytskyi region. In the number of schools he held a position of a director. A wife of Vasyl Onufriyovych Skopetskyi and a mother of Vasyl Vasyliovych Skopetskyi – Zina Tikhonivna – was also a teacher, i.e. a teacher of primary school[1].

Vasyl Skopetskyi was not an only child; he grew up with his younger brother – Oleg. Since childhood a young Vasyl Skopetskyi demonstrated an outstanding intelligence. When he was six years old he mastered the game of chess. Parents noticed that their son had an increased interest in reading and the ability to think logically. At school the future scientist liked natural science subjects most of all.

In 1951-1958 Vasyl was studding at Kuhayivtsi secondary school of Chemerovetskyi district, Khmelnitsky region. In 1958-1961 he was attending a secondary school in Husyatyn. In 1961 he decided to enter the Mechanics and Mathematics Faculty of Taras Shevchenko Kyiv State University. However, his first attempt to become a student of the Mechanics and Mathematics Faculty failed and he had to return back to home. A year later, the young man decides to essay his powers again and this second attempt was crowned with success[2].

The Mechanics and Mathematics Faculty became an independent unit of Taras Shevchenko Kyiv State University in a result of the division of the Physics and Mathematics Faculty into two independent units in 1940. Natural sciences have been developing in the walls of the Kiev University since its founding. The separate Physics and Mathematics Faculty was established in the University in 1849. After the revival of the university in 1933 the subject of research has expanded and the areas of scientific research related to applications have been developing intensively[3]. At that time, the world famous and recognized scientists and scholars – D.O. Grave, M.P. Kravchuk, N.M. Krylov, G.V. Pfeiffer, M.M. Bogolyubov, M.O. Kilchevskyy, etc. – were caring out their scientific and educational activities in the walls of Physics and Mathematics Faculty. After University's return from evacuation, in 1945-1946 several new departments were created within the Mechanics and Mathematics Faculty, namely: department of mathematical analysis, department of mathematical physics, department of integral and differential equations, department of algebra and probability theory, department of the theory of elasticity[4].

Training in the leading national university had a decisive influence on the formation of the personality of the young researcher and his choice of life. Lectures of leading domestic scientists and future academicians Yu.A. Mitropolskyi, O.S. Parasiuk, A.V. Skorokhod, I.I. Liashko, I.Z. Shtokalo, professors H.M. Polozhiy, L.A. Kaluzhnin, V.S. Koroliuk, N.A. Pakharyeva and many others who were considered to be the best experts in the fields of mathematical analysis, probability theory, differential equations, the theory of functions of a complex variable, and other classical and special courses laid a strong scientific foundation, on which the future scientist operated later[5].

During his study Vasyl Skopetskyi choosed the Department of Mathematical Physics. In 1958-1964 this department was headed by Nadiia Oleksiyivna Pakhareva, Candidate of Physical and Mathematical Sciences (Ph.D), associate professor. In 1964-1969 the head of this department was Ivan Ivanovych Liashko – one of the gifted students of H.M. Polozhiy, a distinguished mathematician, Doctor of Physical and Mathematical Sciences, professor. During this period Ivan Ivanovych Liashko also held a position of a dean of Mechanics and Mathematics Faculty of Taras Shevchenko State Kyiv Order of Lenin University. Under the strict guidance of I.I. Liashko Vasyl Skopetskyi started the profound study of scientific issues related to the theory of filtration.

After graduation in 1967, Vasyl Skopetskyi, as a young and promising scientist, received a job offer for a position of an engineer of the newly established Institute of Cybernetics of the Academy of Sciences of the Ukrainian SSR.

During 1968-1970 Vasyl Skopetskyi was on basic military service in the Soviet Army. The young scientist served in the missile defense troops in a military unit No. 25278 in Pervomaysk town of Mykolaiv region.

After military service, Vasyl entered the postgraduate program at the Department of Computational

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[2] Поточний архів НАН України, Київ. *Особова справа В.В. Скопецького № 251 р*, 13.
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Mathematics within the Faculty of Cybernetics of Kyiv University.

The Faculty of Cybernetics of Kyiv University was founded in 1967. After the establishment of the Institute of Cybernetics of the Academy of Sciences of the Ukrainian SSR the need for scientific personnel for research institutions and for the economy enterprises has increased. Therefore, upon the initiative of V.M. Glushkov and a dean of the Faculty of Mechanics and Mathematics Professor I.I. Liashko and by the order of the Minister of Higher and Secondary Special Education of the Ukrainian SSR Yurii Dadenkov No.258 dated May 6, 1969 the Faculty of Cybernetics was established in Taras Shevchenko Kyiv University on a basis of four departments. Departments of Computational Mathematics and Theoretical Cybernetics were transferred from Mechanics and Mathematics Faculty. The Department of Economic Cybernetics was transferred from the Faculty of Economics. The Department of Mathematical Linguistics, which was a part of the Faculty of Philology, also was transferred to the Faculty of Cybernetics and renamed into the Department of Applied Linguistics. I.I. Liashko, professor, Doctor of Physical and Mathematical Sciences, was appointed for a position of a dean of the newly formed faculty[1].

At the same time, the scientist continues his research activities at the Institute of Cybernetics within the Academy of Sciences of the Ukrainian SSR as a junior researcher. Later, by the decision of the Presidium of the Academy of Sciences of the USSR of June 4, 1981 (minites No. 821), the Higher Attestation Commission of the USSR Council of Ministers awarded Vasyl Skopetskyi with an academic title of a Senior Researcher majoring in "Mathematical Software of Computing Devices and Systems." It should be noted that the academic title of a senior researcher is assigned to individuals who have completed higher education, possess deep professional knowledge and demonstrate significant achievements in a particular field of science[2].

In 1974 Vasyl Skopetskyi successfully defends his candidate thesis on the topic "The solving of filtration problems in heterogeneous environments" at the Institute of Fluid Mechanics under the guidance of I.I. Liashko.

The research is devoted to development of methods for solving of filtration problems in heterogeneous environments with complex hydraulic structures, development of software for specialized automated system for solving of filtration theory problems by method of R-transformations.

In 1992 the Institute of Mathematical Machines and Systems of the National Academy of Sciences of Ukraine (NASU IMMSP) was merged into the Special Design Bureau of Mathematical Machines and Systems of the Institute of Cybernetics of the NAS of Ukraine. At the same time Vasyl Skopetskyi initiates creation of the department "Mathematical Modeling of Environment and Energy" at the Institute of Cybernetics named after V.M. Glushkov of the NAS of Ukraine. He has been the head of this department since the date of its establishment till 2010. The research studies of the Department "Mathematical Modeling of Environment and Energy" were dedicated to the identification of the dynamics of distributed space-time processes, mathematical modeling and optimization of wave processes in heterogeneous environments, development of mathematical models appropriate for various physical and mathematical processes in ecology, hydro and nuclear power energy, information technologies of physical and mathematical processes in heterogeneous environments[3].

Thanks to their hard work, the employees of the Department of Mathematical Modeling of Environment and Energy managed to achieve fundamental results, including the development of mathematical models and computational algorithms for finite element method of calculation of physical and mechanical processes in heterogeneous environments with inclusions; development and study of wide class of mathematical models of wave propagation processes in heterogeneous environments in a form of boundary value problems (initial boundary value problems) for elliptic (parabolic Schrödinger type) wave equations with complex non-self-adjoint operator; development of automation and optimization systems of the design work for the construction of main gas pipelines; they proposed and developed a systematic approach to the modeling of dynamic consolidation processes based on new mathematical models that take into account array saturation with binary salt solutions, relaxation of filtration and diffusion processes, non-isometry of process components[4].

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[4] Там само.

In addition to his main job, since 1982 Vasyl Skopetskyi also has been holding a position of a senior lecturer of the Computational Mathematics Department at the Faculty of Cybernetics of Taras Shevchenko Kyiv State University. Students listened to his courses of lectures in a fields of numerical and analytical methods, mathematical modeling, automation of calculations for processes and fields, information technology in ecology, hydrotehchnologies, energy with special attentiveness. He also was a deputy head of the branch of the Computational Mathematics Department, lectured and organised seminars for senior students[1].

In 1990 Vasyl Skopetskyi successfully defended his doctoral thesis "Automation of calculation of physical fields in heterogeneous environments." The thesis defense at a viva voce was held at the Institute of Cybernetics named after V.N. Glushkov. His academic adviser was an academician I.V. Sergiyenko[2].

The main goal of Vasyl Skopetskyi's thesis research was development, study and implementation of software models and methods of calculation of mathematical physics problems in heterogeneous environments with thin inclusions, efficient organization and conduct of experiment with computing research of power, filtration, heat, moisture, mass transfer and other processes for designed, planned, and actual objects. The work was highly appreciated by the scholars who were invited to examine the thesis defense and they noted the practical feasibility of the research results.

The award of academic title is an important event in the life of every scientist. On March 6, 1992 by the decision of the Higher Attestation Commission (minutes No. 10ps/2) Vasyl Skopetskyi was awarded the title of professor majoring in "the Use of Computer Technology, Mathematical Modeling and Mathematical Methods in Scientific Research"[3].

Research works of V.V. Skopetskyi in the field of cybernetics amount to more than three hundred publications, including a number of monographs and textbooks. For his fruitful work the scientist was awarded the Republican prize for young scientists in 1976, the State Prize of Ukraine in Science and Technology (1991, 1999, 2005), prizes named after S.O. Lebedev (1997), named after V.M. Glushkov of the NAS of Ukraine (2004), in 2007 he received the title of Honored Scientist of Ukraine. V.V.Skopetskyi received five patents for inventions. His contribution to the national cybernetic science is hard to overestimate[4].

His fruitful scientific work in the field of cybernetics of Ukraine is reflected in a series of books published by him on the issues of mathematical modeling in ecology and in eighteen years of employment as a head of the Department of Mathematical Modeling of Ecology and Energy at the Institute of Cybernetics named after V.M. Glushkov within the NAS of Ukraine. The research studies of the scientist and the department headed by him are not limited to the theory – they had an important practical results that are still relevant today.

V.V. Skopetskyi was not only highly skilled specialist but a good family man and a sensitive husband for his wife, Nina Petrivna Skopetska, who also worked at the Institute of Cybernetics of the Academy of Sciences of Ukraine, and a good father to his two daughters – Liliia and Olena. Today his daughter Liliia is a candidate of historical sciences, associate professor of the Ukrainian History and Ethnic Policy Department of Taras Shevchenko National University of Kyiv, Deputy Dean of the Faculty of History. His another daughter Olena has become a candidate of Biological sciences, Associate Professor of Plant Physiology and Ecology Department of the Institute of Biology.

On September 4, 2010 Vasyl Vasyliovych Skopetskyi – an associate member of the National Academy of Sciences of Ukraine, Doctor of Physics and Mathematics, Professor, Head of the Institute of Cybernetics named after V.M. Glushkov of the NAS of Ukraine, expert in automated calculation of complex problems of physics and engineering, mathematical modeling and research study of processes in heterogeneous environments – passed away at the age of 67. The scientific heritage of V.V. Skopetskyi is of practical importance, his scientific researches were always distinguished with progressiveness and novelty[5].

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[3] Поточний архів НАН України, Київ. *Особова справа В.В. Скопецького № 251р*, 17.

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We should also note the extraordinary wisdom, prudence and a sense of humor of V.V. Skopetskyi. Many times his colleagues turned to him for the kind words and the wise advice and he could always listen to someone's problems and give a support.

He successfully combined scientific research with teaching and training at the Faculty of Cybernetics of Taras Shevchenko National University of Kyiv. Vasyl Skopetskyi passed all stages on the path to steady growth and establishing himself as a highly qualified scientist and teacher – at first when he was a student and later when he was combining his post graduate study with work at the Institute of Cybernetics of the NAS of Ukraine.

V.V. Skopetskyi's textbooks and manuals are still relevant and widely used by scientists whose scientific research is similar to the range of scientific interests that he explored in his works.

A scientist has made a significant contribution to the teaching and training of the teaching staff in the field of cybernetic science of Ukraine. He had a good fame among the students, they loved him as a talented teacher, scientist, researcher, mentor[1].

By analyzing major scientific interests of V.V. Skopetskyi we can make important conclusions about the priorities of research in cybernetic science in the second half of the 20th century, because his works reflect the main directions of the Ukrainian cybernetics of the time.

Prospects for further research in this area are: the historical analytic-psychological analysis of formation and development of scientific outlook of an outstanding cybernetic scientist V.V. Skopetskyi, creating a periodization of his scientific work, outlining and a more detailed analysis of his life milestones in the context of the era in which he lived and worked as a scientist.

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