

This issue contains of the proceedings of an international conference dedicated to the 115th anniversary of the birth of Academician Sergey Alekseevich Khristianovich (1908—2000)



When S. A. Khristianovich passed away in the year 2000, one of the obituaries stated: “A genius is dead”. As the years pass, these words increasingly ring true, and the results of his work are not forgotten but are actively utilized in practice.

Orphaned at an early age, S. A. Khristianovich, fortunately, encountered his maternal aunt, Maria Nikolaevna Bek, amidst the chaos of 1918. Through her, he became acquainted with D. I. Ilovaisky, who knew his parents well and played a significant role in S. A. Khristianovich’s destiny. Thus, with a recommendation from D. I. Ilovaisky, S. A. Khristianovich enrolled in Leningrad University in 1925 and successfully completed his studies.

It is noteworthy that among his classmates were the future youngest Academician S. L. Sobolev, S. G. Mikhlin, B. B. Davidson, and others. After graduating from the university, S. A. Khristianovich was assigned to work at the State Hydrological Institute, where he tackled the immense task of compiling a water cadastre — a description of all the waters of the Soviet Union, river flows, groundwater, and other related issues. These works were not only descriptive but also practical, perhaps contributing to the prevention of major floods in the country by taking necessary measures before a potential catastrophe.

S. A. Khristianovich’s exceptional talent for working with large teams became evident during his tenure at TsAGI, where he served as a scientific leader. These were challenging years for our country, amidst the bloodshed of the Great Patriotic War, where successes in aerial combat held great significance in the overall victory over fascism.

TsAGI was established during the Civil War, amid complete devastation. However, the government highly appreciated the role of science and understood the necessity of creating an experimental and scientific-technical base for aviation

development. Despite financial, material, and resource constraints, a grand construction of TsAGI took place. Virtually, an entire city with uniquely advanced aerodynamic facilities was built. Thus, by the start of the war, the USSR had an experimental base that was unparalleled worldwide. However, creating an experimental base is one thing, making it function is another. It was necessary to assemble a team while personally learning about aerogasdynamics issues at high supersonic speeds. This activity is well-documented in books about S. A. Khristianovich released by TsAGI (2008) and ITPM SB RAS (2008). Its results can be formulated as the creation of a theory, based on which our designers overcame the sound barrier, allowing the country to have aircraft capable of moving at high subsonic and low supersonic speeds. As specialists in this field note, a scientific feat was accomplished in theory and experiments that is unlikely to be repeated by anyone in the world.

After the war, there was a significant shortage of personnel, not only in aviation but also in the newly emerging fields of radar, electronics, and nuclear industries. The country faced a simultaneous need for skilled professionals in all these sectors. A group of academicians, including S. A. Khristianovich, after extensive discussions, approached the government with a request to establish a new type of higher education institution that would train engineers with strong scientific backgrounds. With considerable effort, such an institute was created, now known as MIPT (Moscow Institute of Physics and Technology). It is worth noting that academicians P. L. Kapitsa, N. N. Semenov, M. A. Lavrentiev, A. I. Alikhanov, I. V. Kurchatov, and others actively participated in its creation, delivering fundamental courses in its initial years. As a result, a viable community was established, anticipating the idea of integrating education with practical work. This approach, now known as the “Phystech system”, has been successfully adopted by many universities in our country, including its implementation in the creation of Novosibirsk University, where the university and research institutes form a practically unified entity. This approach has become ingrained and should not be dismantled but rather refined to meet the modern conditions of societal development.

From 1953 to 1957, S. A. Khristianovich worked at the Presidium of the USSR Academy of Sciences, heading the technical department. The exploration of new technologies raised numerous scientific questions that demanded responsible solutions. The country began developing new oil and gas fields in Western Siberia. During this time, S.A. Khristianovich authored several works on oil field development, with notable contributions to the theory of hydraulic fracturing and crack theory. This work significantly anticipated the challenges of oil and gas field development, and for over half a century, virtually all oil and gas fields worldwide have been developed using the ideas of S. A. Khristianovich.

However, the time came to develop the eastern regions to successfully harness the riches of Siberia. At that time, the vast natural resources in the eastern part of the country were supported by only small scientific units. The Soviet government

recognized that without establishing a scientific foundation and nurturing local talent, it was impossible to foster industrial development in Siberia. This led three academicians — M. A. Lavrentiev, S. L. Sobolev, and S. A. Khristianovich — to propose the splendid idea of creating a major scientific center in Siberia. The idea was approved by the Central Committee of the CPSU, supported by the Presidium of the USSR Academy of Sciences, and began implementation in 1957 in Novosibirsk with the establishment of the Siberian Branch of the USSR Academy of Sciences. The ideology embedded in the statute of the Siberian Branch allowed the realization of this idea in a short time, and subsequently, the Far Eastern and Ural Branches of the USSR Academy of Sciences were created on a similar basis. The idea of establishing major scientific centers proved constructive and has been used in various Western countries. It would be disheartening if, as a result of the restructuring of science in Russia, the well-conceived idea of the three academicians of the USSR is lost, although the institutes created currently operate excellently and are recognized worldwide for their achievements. One such institute, the ITPM SB RAS, established by Academician S. A. Khristianovich, boasts one of the world's best aerodynamic facilities and proudly bears the name of Academician S. A. Khristianovich.

Upon relocating from Siberia to Moscow, S. A. Khristianovich continued to actively work in various fields of continuum mechanics. Much has been written about these works, and young researchers should familiarize themselves with them as they can impart valuable lessons and help understand the depth of their results. As we are currently discussing issues related to numerical modeling of problems in the theory of elasticity and plasticity under various loading conditions, it is worth highlighting some of S. A. Khristianovich's works on the general theory of plasticity under complex stress states. His work, published as early as 1974, undoubtedly holds great promise for the future, although it is written in a manner that may pose challenges in grasping its essence. The remarkable alignment of theoretical predictions from the proposed model with experimental data under complex loading conditions should attract young researchers in the future and encourage the generalization of these original ideas.

Sergey Alexeevich is a mechanic, mathematician, physicist, and engineering researcher with a broad range of scientific interests, and his work decisively influences the development of scientific and technical progress not only in our country but globally. His contributions have earned due recognition from the Communist Party and the government of our state: he has been awarded the highest honors of the country, including the title of Hero of Socialist Labor, six Orders of Lenin, three State Prizes of the USSR, and more. The life of S. A. Khristianovich serves as an example of dedicated service to science and the homeland, from which young researchers should draw inspiration.

Academician Vasily M. Fomin