

In Memory of Professor Valerian Pavlovich Bulatov

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Professor Valerian Pavlovich Bulatov, a prominent mathematician, Merited Scientist of the Russian Federation, doctor of physics and mathematics, and principal researcher at the Melentev Institute of Power Engineering Systems of the Siberian Branch of the Russian Academy of Sciences passed away on October 6, 2010, at the age of 75.

Bulatov was born on February 14, 1935, in Yaroslavl. After leaving school, he served in the army. Then he taught mathematics in Bratsk; worked at the Irkutsk astronomical observatory; and, in 1961, joined the Siberian Power Institute (SPI, now the Melentev Institute of Power Engineering Systems). He published about 200 scientific papers and 6 monographs.

Bulatov was a well-known expert in the theory and methods of mathematical programming and computational mathematics. His research interests focused primarily on global optimization. He was one of the first in this country to study concave and inverse convex programming problems, for which he developed various versions of the cuttings plane, internal approximation, and local search methods based on the linearization of concave constraint functions. His theorem on the embedding of the objective function

epigraph underlies the proof of the convergence of many iterative approximation schemes in global optimization.

Much of Bulatov's effort was focused on convex programming methods based on the ideas of outer polyhedral approximation of convex sets and centered cuts. The first results in this area were associated with the proof of the convergence of outer approximation methods without embedding. Concerning centered cuts, Bulatov developed Chebyshev point methods, but, perhaps, the most popular is the simplex embedding method, which was developed together with E.G. Antsiferov.

Ideas originally applied in convex programming and global optimization were successfully used by Bulatov to develop new approaches to solving problems in integer programming, game theory, inverse optimization problems, optimal control, and root finding for systems of nonlinear algebraic equations. At present, Bulatov's methods are used to solve various optimization problems related to the simulation of engineering systems and economic-mathematical modeling.

Bulatov established an SPI mathematical division consisting of the Laboratory of Optimization Methods and the Department of Applied Mathematics, which long stayed the center of mathematical life at the Irkutsk Division of the Siberian Branch of the USSR Academy of Sciences. Bulatov was a longtime leader of the SPI mathematical seminar, where many skilled researchers and young scientists from Irkutsk and other cities gave their talks. For many years, the department ran *Applied Mathematics* (with some variations in the title), a periodical collection of papers that had a high rating in the USSR. People frequently called it Bulatov's, although he was only deputy editor-in-chief. Its editorial board included leading mathematicians from Irkutsk and other cities. Its editor-in-chief was B.A. Bel'tyukov, a veteran mathematician and department head at Irkutsk Pedagogical Institute. Note that Bulatov sought to unite his colleagues, including mathematicians from the city, which was his wonderful quality as a science manager.

In the mid-1990s, Bulatov became the major initiator of creating the first Irkutsk mathematical journal "Optimization, Control, and Intelligence," where he served as deputy editor-in-chief. Additionally, he was a long-time (1985–1998) editorial board member of the international journal *Global Optimization*.

Together with I.I. Eremin, Bulatov was the most active organizer of the Russian Association for Mathematical Programming, which was founded in the late 1980s. This organization has played and continues to play a large role in uniting the efforts of Russian scientists, especially in the Ural and Siberian regions, who develop the theoretical foundations of optimization and its methods.

Over more than 40 years, Bulatov gave many plenary and sectional talks at tens of international and local conferences in this country (Novosibirsk, Omsk, Yekaterinburg, Moscow, Minsk, Kiev, Vilnius, Tallinn, Crimea, etc.) and abroad (Austria, England, Hungary, Vietnam, Germanium, Indium, China, Mongolia, USA, Czechoslovakia, Switzerland). He was also a member of the program and organizing committees of various conferences.

Headed by Bulatov, the International Baikal school—seminar "Optimization Methods and Their Applications," which was founded by N.N. Moiseev and L.D. Melentev on the basis of SPI in the 1960s, became worldwide popular. Due to his huge efforts, its sessions have taken place every three years for more than 40 years in different parts of Lake Baikal. It plays a large role in the coordination of research on applied mathematics, in the training of high-skilled young mathematicians across Eastern Siberia, in the development of new directions in optimization theory, and in facilitating communications between Russian and international researchers. At the first meetings, young scientists listened to lectures given by accomplished researchers, such as Yu.B. Germeier, Moiseev, A.A. Pervozvanskii, B.N. Pshenichniy, G.S. Pospelov, N.Z. Shor, T.M. Eneev, V.G. Karmanov, A.P. Merenkov, and O.V. Vasil'ev. Numerous international scientists from Germany, Switzerland, the US, the UK, Austria, Czechoslovakia, the Netherlands, Canada, Vietnam, China, and Mongolia took an active part in Baikal sessions. In 1978, the school was attended by G.B. Dantzig, a founder of linear programming.

Bulatov was a talented teacher. His students include 10 candidates and 4 doctors of sciences, including international students. In 1985 at Irkutsk State University (ISU), Bulatov founded the Department of Mathematical Modeling and Operations Research, which formed the basis for an SPI/ISU research and training center. In 1993 Bulatov initiated the foundation and became the scientific head of the Department of Computer Science and Mathematical Simulation at the Irkutsk State Agricultural Academy. In 2001 a research and training center was created at the Melentev Institute of Power Engineering Systems of the Siberian Branch of the Russian Academy of Sciences (SB RAS) and several new departments were open at the Irkutsk State Agricultural Academy.

Bulatov was a member of the specialized doctoral dissertational councils at the SPI of the SB RAS, the Institute for System Dynamics and Control Theory of the SB RAS, and Irkutsk State University. For his fruitful scientific and educational activities, Bulatov was awarded honorary diplomas from the Russian Academy of Sciences, the SB RAS, Irkutsk Scientific Center of the SB RAS, and Mongolia.

Thanks to Bulatov, the Baikal schools formed a uniting platform for a wide range of experts in optimization theory and its applications in Russia and the former Soviet republics. With his passing, the institute and the world scientific community have lost a prominent scientist who made large contributions to theoretical mathematics and its applications.

Bulatov was an energetic creative person with diverse interests. He had good knowledge of the country's history and openly expressed his opinion on current political issues, which sometimes led to complications. He was always an outspoken and forgiving man, for whom business interests were more important than his hurts. Bulatov was a kind and responsive person who easily felt compassion for other people or his country when they were in trouble. He always encouraged other scientists in their research.

Bulatov was keen on fishing and mushroom picking. In summer, his boat could often be seen in fish-rich bays of the Small Sea Strait of Lake Baikal. He was a strong chess player, who started the long tradition of the SPI and world mathematical team's victories in chess tournaments during international Baikal schools. While a young man, he practiced gymnastics and boxing and later always liked sports and was a devoted fan of the hockey and football CSKA club.

Bulatov's life was bright and active and contributed to the union of his friends and colleagues! Everyone who knew Bulatov will long cherish the memory of this outstanding man. His employees and colleagues from the Department of Applied Mathematics at the Melentev Institute of Power Engineering Systems of the SB RAS are grieving over his death.

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