



## Semën Samsonovich Kutateladze

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On January 15, 2025, Semën Samsonovich Kutateladze passed away. He was a Russian and Soviet mathematician, Doctor of Physical and Mathematical Sciences, professor, Honored Veteran of the Siberian Branch of the USSR Academy of Sciences, chief researcher at the Laboratory of Functional Analysis of the Sobolev Institute of Mathematics of the Siberian Branch of the Russian Academy of Sciences.

Semën Samsonovich was born in Leningrad into the family of the prominent Soviet thermophysicist, Academician Samson Semënovich Kutateladze. In 1962, he moved with his father to the Novosibirsk Akademgorodok, where he graduated from Secondary School No. 125. In 1968, he graduated with honors from the Faculty of Mechanics and Mathematics of Novosibirsk State University; in 1970, he defended his Candidate of Sciences thesis “Adjacent Problems of Geometry and Mathematical Programming” (supervised by G. Sh. Rubinshtein), and in 1978, his Doctor of Sciences thesis “Linear Problems of Convex Analysis.” From 1968 until the end of his

Extended author information available on the last page of the article

life, he worked at the Sobolev Institute of Mathematics of the Siberian Branch of the Academy of Sciences of the USSR (now the Russian Academy of Sciences); from 1987 to 2006, he headed the Laboratory of Functional Analysis. He authored more than 400 research works and over 20 monographs and textbooks, as well as more than 100 studies on the history of national and international science.

S. S. Kutateladze considered it his duty to counteract centrifugal tendencies and to strengthen the unity of mathematics; many of his results belong to the border areas of various traditionally established branches of mathematics.

In his early works, S. S. Kutateladze solved extremal geometric problems with general inequalities on arbitrary mixed volumes under constraints on the location of the desired convex surface. An example is the Urysohn internal problem, which consists in finding the body of the maximum volume among those included in a given body and having a prescribed integral width. In these works, he singled out a new class of extremal problems of convex geometry, in which it is required to achieve the best outcome in the presence of conflicting objectives. Interpreting these problems in the spirit of multicriteria decision theory, he described Pareto optimal solutions to vector isoperimetric-type problems.

Based on a new approach to abstract convexity, developing Minkowski's idea of duality, S. S. Kutateladze constructed the theory of supremal generators and Choquet boundaries in Kantorovich spaces.

In another series of works, S. S. Kutateladze found the most comprehensive rules of subdifferentiation for convex operators in the form of formulas for transforming the values and solutions to extremal problems under variable changes that preserve convexity, and proposed a method for the scalarization of problems in convex analysis based on Boolean valued models of set theory.

S. S. Kutateladze obtained a description, useful in mathematical economics, of modules over rings in which the principles of linear programming hold, and developed the theory of infinitesimal convex programming.

Using the terminology of monadic quantifier prefixes, S. S. Kutateladze provided a classification of tangent cones (Hadamard, Bouligand, Clarke types, etc.), which found applications in nonsmooth analysis.

One of the most significant achievements of Semën Samsonovich was the creation (together with E. I. Gordon and A. G. Kusraev) of a new branch of functional analysis—"Boolean valued analysis." S. S. Kutateladze introduced the Boolean valued technique, which led to the description of an order bounded operator whose kernel at each layer is a sublattice or a Grothendieck subspace. He developed Boolean valued versions of the main areas of functional analysis: the theory of Banach spaces, Banach algebras, and linear operators. In particular, he discovered the first operator forms of the classical Farkas lemma in the theory of linear inequalities and new versions of the Stone–Weierstrass theorem.

The articles by S. S. Kutateladze on the history of national and international mathematics attracted great interest. He thoroughly studied the factual material related to the subject of each of his articles, often turning to original sources and revealing to the wider public essential facts that had long remained little known. For instance, in a series of articles he uncovered the role of Academician S. L. Sobolev in the Soviet nuclear project, and his articles on the so-called "Luzin affair" contributed to the reha-

bilitation of one of the founders of the Moscow mathematical school. Among the legacy of S. S. Kutateladze, there are also works devoted to combating pseudoscience.

The pedagogical activity of S. S. Kutateladze was closely associated with Novosibirsk State University. He was a Professor and Deputy Head of the Department of Mathematical Analysis of the Faculty of Mechanics and Mathematics, and in 2005–2012 he also served as a member of the NSU Board of Trustees. For several decades, he taught the mandatory course in functional analysis for mathematics students. In 1983, based on this course, the textbook “Fundamentals of Functional Analysis” was published, it went through six editions in Russian and was translated into English. This textbook was ahead of its time and has remained relevant for more than forty years. Mathematics students at NSU still study from it.

Among the formal students of S. S. Kutateladze there are about two dozen Candidates and Doctors of Sciences. They work in Russia and abroad. Semën Samsonovich played an active role in the establishment of the Vladikavkaz Scientific Center of the Russian Academy of Sciences.

With the active participation of S. S. Kutateladze, the publication of several mathematical journals in English issued by the Sobolev Institute of Mathematics was organized, and a group of specialists responsible for their translation was formed. He wrote for his colleagues a manual on English grammar and scientific translation, which went through seven editions.

For many years, S. S. Kutateladze was Deputy Editor-in-Chief of the “Siberian Mathematical Journal,” tirelessly delving into a wide range of issues—from organizing the refereeing process and the acceptance of articles to transforming the journal’s model from a Soviet to a market-based one, organizing the translation into English, and computerizing the work of the editorial board. He seemed to be always working, involved in everything, doing far more than could be expected, and never getting tired. Probably, this impression was created because in the project known as the “Siberian Mathematical Journal” three things that he especially loved came together—mathematics, the English language, and digital technologies.

S. S. Kutateladze was also Deputy Editor-in-Chief of two other journals—“Siberian Journal of Industrial Mathematics” and “Siberian Advances in Mathematics,” as well as a member of the editorial boards of “Mathematical Notes,” “Mathematical Proceedings,” “Vladikavkaz Mathematical Journal,” “Bulletin of the Vladikavkaz Scientific Center,” “Positivity,” “Scientiae Mathematicae Japonicae,” “Asian-European Journal of Mathematics,” “Mathematics Open,” and others. This was probably due to his exceptionally broad mathematical outlook, which enabled him to discuss mathematics on an equal footing with representatives of many theoretical and applied fields, and his opinion carried significant weight among his colleagues.

S. S. Kutateladze was a member of the American Mathematical Society and the European Mathematical Society.

Remembering Semën Samsonovich, we would first like to call him a true Leningrad intellectual and professor. He possessed a holistic worldview and great common sense, was always energetic, purposeful, and full of unconventional ideas, able to be fascinated himself and to inspire and fascinate others, creating around him an intellectual field of great attractive force. Until his last day, he retained clarity of mind and creative potential.

He passed away in Novosibirsk in his sleep due to a sudden cardiac arrest. He was buried at the Southern Cemetery of Novosibirsk next to his father's grave. He is survived by his wife, two daughters, a grandson, and a granddaughter.

With the passing of Semën Samsonovich Kutateladze, Russian science has suffered an irreparable loss.

His bright and noble image will forever remain in the hearts of his friends, colleagues, and students.

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**Author Contributions** All authors contributed equally to the preparation of this obituary, based on the information they had about the biographical, scientific and research details of life of Professor Kutateladze.

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## Declarations

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