

REMEMBRANCES OF SERGEI L'VOVICH SOBOLEV

January 3, 1989, in the 81st year of life, after a grave illness, one of the most outstanding mathematicians of modern times, a remarkable organizer of science, Hero of Socialist Labor, laureate of State Prizes of the USSR, Sergei L'vovich Sobolev, passed away.

S. L. Sobolev made a basic contribution to the development of contemporary mathematics, in the formation of the most prominent mathematical schools in our country and abroad, and in the establishment and development of new directions of applied mathematics, having important state significance.

Along with Academicians M. A. Lavrent'ev and S. A. Khristianovich, S. L. Sobolev initiated the creation of the Siberian Section of the Academy of the Sciences of the USSR, and founded the Mathematics Institute of this section, establishing one of the world's leading mathematical centers.

S. L. Sobolev was born in October, 1908 in St. Petersburg in the family of the barrister L'ev Aleksandrovich and the instructress of Literature and History of a private high school, Natal'ya Georgievna. Relatives of S. L. Sobolev took part in the revolutionary movement in Russia. Sergei L'vovich lost his father early, and the mother was entirely occupied with his education.

In 1925, S. L. Sobolev entered the Mathematics and Physics Faculty of Leningrad University, which came to an end in 1929. His teachers at LGU were N. M. Gyunter, V. I. Smirnov and G. M. Fikhtengol'd. Possessing exceptional mathematical abilities and diligence, Sergei L'vovich, already in his student years, actively took part in scientific work. In 1929, S. L. Sobolev started to work in the Leningrad Seismological Institute, where he was occupied with problems of the propagation of waves in nonhomogeneous elastic media. In 1934, S. L. Sobolev moved to Moscow, where he headed the Partial Differential Equations Section of the V. A. Steklov Institute of the USSR Academy of Sciences. In the sixties, when Sergei L'vovich was already working in Siberia, he managed this section on social principles.

Already at the very initial period of scientific activity - in the thirties, S. L. Sobolev accomplished work determining the features of many directions of contemporary mathematics. A basic contribution was made by him to the most important areas of functional analysis, the theory of differential equations, and computational mathematics. In the history of science, the name of Sergei L'vovich will always be connected with one of the most fundamental mathematical conceptions of the 20th Century - the idea of a generalized function, permeating theoretical physics, mechanics and the mathematics of our day. The apparatus of generalized functions proved to be most adequate to the nature of differential equations, and removed many difficulties that previously seemed insurmountable. S. L. Sobolev created the theory of spaces of functions with generalized derivatives which bear his name, and proposed, in essence, a new conception of the generalized solution of a differential equation. On this basis, he and his followers succeeded in systematizing and solving many difficult problems of the theory of partial differential equations and variational calculus. A review of the series of the most important papers of S. L. Sobolev on the theory of generalized functions is his celebrated monograph, "Some Applications of Functional Analysis in Mathematical Physics," translated into many foreign languages.

The pioneering papers of S. L. Sobolev remain topical even today, and his results are widely used by mathematicians of younger generations. The theory of functional Sobolev spaces has been especially intensively developed, and various modifications of them and interconnections between them, establishable by embedding theorems, have been introduced and studied.

In 1943, side-by-side with the continuation of his work in the V. A. Steklov Mathematical Institute, Sergei L'vovich, at the invitation of I. V. Kurchatov, began to work in the first atomic scientific center of the Soviet Union - now the I. V. Kurchatov Institute of

Translated from *Sibirskii Matematicheskii Zhurnal*, Vol. 30, No. 3, pp. 214-216, May-June, 1989.

Atomic Energy - in the position of Principal Deputy Director, and Chairman of the Academic Council. S. L. Sobolev took a most active part in solving practical problems, combining theoretical analysis with a broad use of numerical methods. In this institute, Sergei L'vovich worked to the end of the fifties, right up to his move to Novosibirsk.

In the post-war years, Sergei L'vovich continued to study the problems of propagation of waves of different nature. His analyses of the qualitative theory of vibrations in a rotating liquid pertain to this period. The series of papers of S. L. Sobolev set the start of the theory of nonstationary problems for systems of partial differential equations not allowed higher order derivatives with respect to time.

In the applied works of S. L. Sobolev, the spirit of innovation characteristic in his theoretical analyses was maintained. S. L. Sobolev was one of the first mathematicians of the Soviet Union to understand the special importance and necessity of rapidly developing computational mathematics and computational technology in our country. In 1952-1960 he headed the first department in our nation of computational mathematics in the Faculty of Mechanics and Mathematics of Moscow State University. In these years, the characteristic scientific interest of S. L. Sobolev switched over to computational mathematics to a significant degree.

One of the labor-consuming and complicated problems in computational theory and practice is the approximate integration of a function. The theory of integration and the quadratic formulas for the one-dimensional case was well elaborated in the works of such prominent mathematicians as L. Euler, K. F. Gauss, and P. L. Chebyshev. Papers of S. L. Sobolev were dedicated to describing the best cubic formulas for computing multidimensional integrals, and were implemented by him in the sixties and seventies in Siberia. In these analyses, Sergei L'vovich used the broad arsenal of means created by him connected with the theory of generalized functions. The functional monograph, "An Introduction to the Theory of Cubic Formulas," summarizes this almost twenty-year series of analyses.

The scientific activity of S. L. Sobolev was inseparable from his organizational work in science. At the end of the fifties, Academicians M. A. Lavrent'ev, S. L. Sobolev, and S. A. Khristianovich advanced the initiative of organizing a new large scientific center - the Siberian Section of the USSR Academy of Sciences. For many scholars of this section, a weighty argument of first appeal in taking the decision to move to work in Novosibirsk was the example of Sergei L'vovich and the attractiveness of his scientific authority.

It is impossible to overestimate the role of Sergei L'vovich in forming the Siberian mathematical school. The founder of the Mathematics Institute of the Siberian Section of the USSR Academy of Sciences and its Director over the course of forty years, S. L. Sobolev decisively contributed determining the scientific destiny of the Institute.

He always considered as improper the division of mathematics into pure and applied. His conception was realized by him in creating the Mathematics Institute of the Siberian Section of the USSR Academy of Sciences. Through these years at the Institute, there occurred the establishment and formation of large scientific collectives in many directions of contemporary mathematics. The work of the Institute in the areas of algebra and logic, analysis and geometry, differential equations and mathematical physics, probability theory and mathematical statistics, mathematical economics and theoretical cybernetics received world renown. It is necessary to especially speak about the development of the two last directions. As is known, at the end of the forties and the beginning of the fifties, such analyses encountered incompetent interference and were even persecuted. The published speeches of S. L. Sobolev defending these new directions required genuine scientific and civic courage. With the support of S. L. Sobolev in the Mathematics Institute, these directions received the necessary development.

S. L. Sobolev was a brilliant pedagogue. He taught at Leningrad, Moscow and Novosibirsk Universities, becoming one of the organizers of the last one. His textbook, "Equations of Mathematical Physics," was repeatedly republished in various languages. S. L. Sobolev was the founder of a number of scientific schools, and among his immediate students are a large number of doctors and candidates of science directing scientific collectives and departments.

S. L. Sobolev devoted much attention to scientific-organizational activity. He actively worked in the Bureau of the Mathematics Section of the USSR Academy of Sciences, and was a member of the Presidium of the Siberian Section of the USSR Academy of Sciences from the very founding of the section, and was the Chairman of the Section of Mathematics and Mechanics of

the Committee on the Lenin and State prizes of the USSR, and was the Chairman of the National Committee of Soviet Mathematicians. A member of the Communist Party of the Soviet Union from 1940, he was elected a deputy of the Supreme Soviet of the RSFSR, and of the Moscow and Novosibirsk City Councils.

The outstanding scientific achievements of S. L. Sobolev received recognition early. In 1933 at the age of 24, he was elected a correspondent-member of the USSR Academy of Sciences, and in 1939 a member of it. For a long time, S. L. Sobolev was the youngest Academician in our country. In 1941, for his work in the mathematical theory of elasticity, S. L. Sobolev was awarded a State Prize of the USSR. In 1951 and 1952 Sergei L'vovich was awarded State Prizes of the USSR for the mathematical work conducted at the Institute of Atomic Energy. In January 1952, for participating in the solution of important applied problems having state significance, Sergei L'vovich was conferred the title Hero of Socialist Labor. In 1986, Sergei L'vovich, jointly with his students and co-workers, was awarded a State Prize of the USSR for the series of papers "Mathematical analyses on the qualitative theory of a rotating liquid." S. L. Sobolev was decorated with seven Orders of Lenin and other orders and medals.

The brilliant scientific activity of Sergei L'vovich received wide international recognition. He was elected a member of the French Academy of Sciences; a foreign member of the National Academy de Lincei in Italy, of the GDR Academy of Sciences and the Edinburgh Royal Society; an honorary doctor of Charles University in Prague, the Humboldt University in Berlin and the Advanced School of Architecture and Construction in Weimar; a member of the American Mathematical Society, and the Italian Society for "The Progress of Science." In 1977 and 1986, he was decorated by the Academy of Sciences of the Czechoslovakian Socialist Republic with gold and silver medals "For service to science and humanity," and in 1981 with the B. Bolzano gold medal.

Sergei L'vovich was an unusually attractive person. His talent as a mathematician and pedagogue, appeared very strikingly while working with scientists, in creative scientific seminars, consultations, and in lectures and reports.

In analyzing his scientific works, the impression is created that he did not know impediments, overcoming insurmountable technical difficulties to realize his deep mathematical ideas. His creative work in scientific seminars captivated participants, leaving an unforgettable impression even on those who were not constant participants of them. Natural gifts did not prevent Sergei L'vovich from being a patient teacher, knowing how to overlook much, and not sparing of time and effort for his students. Practically at any time, one could approach him and ask for advice.

The multifaceted giftedness of Sergei L'vovich appeared in his enthusiasm for music, literature, and poetry. Wide erudition, original ideas, the ability to find obscure but essential details in discussion, fine logic, light humor, and human charm made him an excellent interlocutor and polemicist, knowing, nonetheless, how to listen when in the center of attention of a gathering of people, sometimes with different persuasions, cast of mind, and temperament.

Sergei L'vovich was distinguished by an unusual generosity of spirit, optimism, kindness, and confidence in people, profundity and clarity of mind, modesty and sympathy.

The scientific ideas of Academician Sobolev will be the property of many generations of mathematicians. All who knew him, at least somewhat, will preserve a bright memory of this remarkable person and citizen — Sergei L'vovich Sobolev.

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