Vladimir Ivanovich Krylov
ON THE 120TH ANNIVERSARY OF THE BIRTHDAY
(14.12.1902─31.08.1994)

Vladimir Ivanovich Krylov was born on December 14, 1902. In 1923 he entered the Saratov University, and in 1926 he transferred to the Leningrad University to the Faculty of Physics and Mathematics, from which he graduated in 1928. Almost simultaneously with him studied and graduated from the faculty I.P. Natanson, D.K. Faddeev, V.N. Faddeeva, S.G. Mikhlin, S.L. Sobolev, L.V. Kantorovich, G.M. Goluzin, S.A. Khristianovich, N.P.Erugin.

Scientific and pedagogical activity of V.I. Krylov began at the Leningrad State University, where he worked until 1957, having gone from assistant to professor, head of the department. Since 1945, for more than 10 years, V.I. Krylov also worked at the Leningrad Branch of the Mathematical Institute of the USSR Academy of Sciences.

The main scientific directions of Vladimir Ivanovich were formed under the influence of the scientific school of V.I. Smirnov, one of the successors of the traditions of the St. Petersburg mathematical school, whose representatives were characterized by a skillful combination of fundamental and applied research. At that time, many other well-known mathematicians and mechanics also worked at the university.

The first scientific work of V.I. Krylov was published in 1929 and is devoted to the study of solutions to ordinary differential equations whose coefficients have a polar singularity. Several of Vladimir Ivanovich's early works were connected with the study of analytic and, later, summable functions. He became one of the founders of extensive research in computational mathematics in the Soviet Union. Back in the thirties, he constructed methods for the conformal mapping of simply connected and multiply connected regions, which in a number of practically important cases allow one to effectively find an approximate function that conformally maps one given region of the complex plane onto another. The construction of such methods was especially relevant at that time due to the need to solve a number of applied problems of aerodynamics, hydrodynamics and other plane problems of mechanics, one of the important mathematical methods for solving which is based on the use of the apparatus of functions of a complex variable. The book by L.V. Kantorovich and V.I. Krylov "Methods for the approximate solution of partial differential equations" was, apparently, the first manual devoted to this subject. Subsequently, it was repeatedly reprinted under a different title "Approximate Methods of Higher Analysis" (the last 5th edition in 1962, circulation 16,000 copies) more appropriate to its content, since, along with differential equations in partial derivatives, a significant place in the book devoted to integral equations and approximate conformal mapping.

In 1948 L.V. Kantorovich and M.K. Gavurin created a specialization in computational mathematics at the Department of Mathematical Analysis of Leningrad State University, on the basis of which the Department of Computational Mathematics was formed in 1951. Professor V.I. Krylov became the first head of the Department. The first members of the Department were L.V. Kantorovich, M.K. Gavurin, I.P. Mysovskikh, A.N. Baluev. An important place in the work of the department in the initial period of its existence was occupied by the organization of the educational process. General courses of lectures were delivered: "Methods of calculation, part I" (V. I. Krylov), "Methods of calculation, part II" (M. K. Gavurin), "Computers and programming" (M. K. Gavurin), a mathematical computational workshop was organized, and a number of special courses were started. Of these, we note the one-year course in functional analysis given by L.V. Kantorovich, the one-year course "Theory of approximation of functions" by I.P. Natanson, and two one-year courses by V.I. Krylov "Approximate calculation of integrals" and

"Special functions". In 1956 V.I. Krylov was elected an academician of the Academy of Sciences of the BSSR, and in fact from that time began the second period of his scientific and pedagogical work, until the last days of his life associated with Belarus.

Krylov was in charge of the laboratory for 30 years, starting from 1957, for 15 years he was deputy director for scientific work of the Institute of Mathematics of the Academy of Sciences of the BSSR, and from November 1987 he was an adviser to the directorate of the institute. Krylov conducted deep research in the field of numerical methods for solving integral equations. A number of his works are devoted to mechanical quadratures and the theory of approximation of functions. In this area, the necessary and sufficient conditions for the convergence of quadrature and cubature processes are obtained, the conditions for the convergence of algebraic interpolation for a number of classes of functions are clarified, the asymptotic behavior of the remainders of approximate methods of interpolation type in classes of periodic analytic functions is investigated, the impossibility of constructing the Chebyshev quadrature formula for the Laguerre and Hermite weight functions is proved, methods for increasing the accuracy of mechanical quadratures are indicated, methods for the approximate Fourier transform and the inversion of the Laplace transform are developed. Vladimir Ivanovich's monograph "Approximate calculation of integrals", 1959, is widely known. The second supplemented edition was published in 1967, for which the chapter on the approximate calculation of multiple integrals was written by Mysovskikh I.P. This book, like his other four books, was published in English. In 1966, the book by V.I. Krylov, L.T. Shulgina "Handbook on numerical integration", in 1968 the book by V.I. Krylov, N.S. Skoblya "Handbook on the numerical inversion of the Laplace transform". The book by V.I. Krylov, N.S. Skoblya "Methods for the approximate Fourier Transform and inversion of the Laplace transform", 1974.

We note some results of V.I. Krylov related to problems of interpolation on the complex plane and conformal mappings: let F,B,G be closed bounded sets of the complex plane, and it is said that the condition {F,B,G} is satisfied if for any function regular on the set G, for any choice of interpolation nodes from the set F, the interpolation process uniformly converges over these nodes on the set B. Three problems are interesting - two of the sets are known and it is required to find the optimal third (largest or smallest) that satisfies the condition {F,B,G}.

Their beautiful geometric solutions are given in the book by V.I. Smirnov, N.A. Lebedev "Constructive theory of functions of a complex variable", 1964. There are known principles for choosing interpolation nodes on sets of the complex plane, which ensure uniform convergence of the interpolation polynomial on this set. In their description and application, conformal mappings of standard domains onto the sets under study are widely used, which was also done by Vladimir Ivanovich.

Important results were obtained by V.I. Krylov together with his students on the study of methods for solving ordinary differential equations and equations of mathematical physics. For a number of boundary value problems in the case of ordinary differential equations, an improved version of the sweep method was developed, and for classical problems associated with partial differential equations, dimensionality reduction methods with corresponding a priori error estimates were developed. The result of many years of work of the team of authors Krylov V.I., Bobkov V.V., Monastyrny P.I. was a fundamental two-volume work "Computational methods of higher mathematics". Volume I, Minsk, Science and Technology, 1972. Volume II, 1975. Then an abridged version was published. Krylov V.I., Bobkov V.V., Monastyrny P.I. "Computational methods". T. 1, 1976. T. 2, 1977. Later, the same team of authors published a five-volume version of "The beginnings of the theory of computational methods": Volume 1. Differential equations. 1982. Volume 2. Beginnings of the theory of computational methods. Interpolation and integration. 1983. Volume 3. Integral equations, ill-posed problems and convergence improvement. 1984. Volume 4. Beginnings of the theory of computational methods. Linear algebra and nonlinear equations. 1985. Volume 5. Partial differential equations. 1986. V.I. Krylov devoted the last years of his life to studying the problem of improving the convergence of series and sequences. The result of these studies was the construction of the theory of interpolation methods for this class of problems, set out in the book by V.I. Krylov "Mathematical analysis. Acceleration of convergence", 1988. This was the last scientific work of Vladimir Ivanovich. Krylov is the author or co-author of more than 100 scientific papers, including 24 books - monographs, reference books, textbooks for higher educational institutions and tables of auxiliary quantities used in the numerical solution of certain classes of problems. Vladimir Ivanovich Krylov paid great attention to pedagogical activity. For more than 25 years he worked as a teacher at Leningrad University. And since 1957, since the move of V.I. Krylov to Minsk, his pedagogi-

cal activity was connected with the Belarusian State University. He attached great importance not only to research, but also to the training of specialists in computational mathematics, which was especially important in the initial period of the emergence and widespread introduction of electronic computing technology in science, technology, economics, medicine, etc. At the Department of Computational Mathematics of the Belarusian State University, created by Vladimir Ivanovich in 1957, and later at other departments of a similar profile, also created on his initiative, a large number of mathematicians-calculators were trained.