

## MEN OF SOVIET SCIENCE

## ON THE SIXTIETH BIRTHDAY OF NIKOLAI PAVLOVICH ERUGIN

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14 May 1967 was the sixtieth birthday of the well-known Soviet mathematician Academician of the AS BSSR, Nikolai Pavlovich Erugin.

After completing two courses at the Novocherkassk Industrial Technical School in 1928, N. P. Erugin moved to Leningrad, where he entered the Physics-Mathematics Department of Leningrad University. In 1931 he was already working as an assistant in the higher mathematics department of the Leningrad Polytechnic Institute; from 1934 he was employed in Leningrad University, first in the departments of mathematical analysis and theory of functions, then in the department of differential equations.

As a graduate student he worked under Academician V. I. Smirnov. His first paper was published in 1935, and in 1937 he solved Poincaré's well-known problem in the analytic theory of linear differential systems. The results of this study were incorporated in his candidate's dissertation.

From 1939, while continuing to teach at Leningrad University, Erugin also worked as a senior scientist at the Mathematics Institute of the Academy of Sciences of the USSR.

The war interrupted this activity. Erugin volunteered for the army and from September 1941 to February 1942 he served on the Leningrad front commanding a battery of antitank guns. His recollections of the heroic defense of Leningrad are contained in "Those Who Held Out," a book he published in 1961.

In February 1942 Erugin was seriously wounded and discharged for reasons of health. He resumed his scientific work even before he left the hospital. There he prepared his doctoral dissertation on "Reducible Systems," which he defended in 1943 at Leningrad University. In the same year he was made a professor. From 1943 to 1957 Erugin headed the department of differential equations at Leningrad University, at the same time (from 1953 to 1957) serving as deputy director of the Leningrad branch of the Steklov Mathematical Institute.

In 1956 Erugin was made an Academician of the Academy of Sciences of the Belorussian SSR and moved to Minsk, where he entered upon a new creative phase of activity. He directed the department of differential equations at the Belorussian State University and organized the differential equations laboratory of the AS BSSR, and after the creation of the Institute of Mathematics of the AS BSSR in 1959, he became its permanent director.

Erugin was one of the organizers of the journal "Differential Equations" and has been its editor-in-chief from the outset.

Erugin has published 60 scientific papers (including four monographs), and more than 30 candidate's and 6 doctoral dissertations have been defended under his supervision.

His scientific interests are very broad, but relate particularly to the theory of ordinary differential equations and include explorations of the following areas: analytic theory, qualitative theory, theory of stability, and general theory.

During the prewar period he worked mainly on the analytic theory of systems of linear differential equations, extending the well-known research of I. A. Lappo-Danilevskii. Erugin was the first to give a general representation of the elements of exponential substitutions in terms of the parameters of differential substitutions for systems with irregular singularities. On the basis of this representation he showed that an exponential substitution is an infinite-valued function of the parameters of differential substitutions. In this way he solved the above-mentioned Poincaré problem for the irregular singularities of systems. Erugin also solved the problem of the isolation of the multivalences of solutions on the whole plane. Moreover, he obtained certain results connected with the solution of the Riemann problem in the case of three singular points.

To Erugin we owe the development of the theory of reducible systems; in particular he was the first to give a detailed account of the structure of the solutions of these systems, to establish the necessary and sufficient conditions of reducibility, to propose methods of constructing reducible systems, and to solve a number of other problems associated with reducibility theory. These results formed the basis of much subsequent research and still occupy a leading place in the theory of reducible systems and related problems.

After the war Erugin returned to the study of linear systems, perfecting known methods and ideas as well as creating new ones. In particular, he was much occupied with developing the theory of linear systems with periodic and quasi-periodic coefficients, extending the ideas and methods of I. A. Lappo-Danilevskii, A. M. Lyapunov, and N. N. Bogolyubov. On these problems he published three monographs, two in 1956 and one in 1963. The last monograph was the most illuminating, solving many problems for the first time.

Apart from developing the theory of linear systems of differential equations, Erugin made an extensive study of nonlinear systems, with particular emphasis on the theory of stability "in the large." Previously, the theory of stability and qualitative theory had been mainly concerned with the behavior of solutions "in the small," i. e., in small regions surrounding equi-

brium points; only a small number of studies, based on the direct construction of the Lyapunov function, dealt with problems of stability "in the large." Erugin initiated the systematic development of the theory of the qualitative behavior of the solutions of differential equations in all phase space. He proved a series of theorems and offered methods of investigation that made it possible to solve various problems in the theory of oscillations and automatic control.

For his work on "Some problems of stability and the qualitative theory of differential equations in the large" and "A qualitative study of the integral curves of systems of differential equations" Erugin was awarded a State Prize.

Erugin has also made a big contribution to the analytic theory of nonlinear systems of differential equations, especially in relation to the nature and configuration of moving singular points. In this area analytic theory developed rapidly during the late nineteenth and early twentieth centuries. Erugin was able to formulate essentially new problems and develop new methods of investigation. He first formulated the problem of the isolation of systems of differential equations without essential singular points and proposed a new method of asymptotic investigation of the nature of moving singularities.

Erugin's work was responsible for the renewal and intense development of research into the analytic theory of nonlinear differential systems among his students and followers.

Erugin has also obtained original results in the theory of partial differential equations in connection with functionally invariant solutions of the wave equation. Functionally invariant solutions of the wave equation with two coordinates and constant coefficients were constructed by Academicians V. I. Smirnov and S. L. Sobolev, but the problem remained unsolved for more than two variables. Erugin investigated the same problem in three-dimensional space. However, he also completed the investigation of the problem of functionally invariant solutions for two independent variables but for equations with variable coefficients.

For a number of years Erugin has been the center of a group of colleagues and students working fruitfully in various branches of the theory of differential equations.

Erugin's research, teaching, and organizational activity are indications of his inexhaustible creative resources and great energy.

The editorial board of the "Journal of Engineering Physics" wishes him good health and continued scientific success.