NIKOLA OBRESHKOFF
(1896 – 1963)
Biographical data

This year marks the centennial of the birth of Academician Nikola Obreshkoff, a distinguished Bulgarian mathematician of world recognition.

He was born on March 6, 1896, in a family of a military officer. He received his primary education in his native town of Varna and in 1915 finished the Second Boys' High school in Sofia. In 1920 Obreshkoff graduated from Sofia University and became Assistant Professor at the Department of Mathematical Analysis (then headed by Professor Kyril Popoff) in the Faculty of Physics and Mathematics. In 1922 Nikola Obreshkoff was elected Associate Professor at the Department of Algebra. Three years later he became Adjunct Professor and in 1928 was elected to the position of Full Professor and Head of the Department of Algebra. He held this position until his death in 1963.

Nikola Obreshkoff demonstrated brilliant mathematical abilities as early as in his school years. As a high school student he devised an algebraic method of solving fourth degree equations suggested earlier by Ampère. During his university studies he took an active part in Professor Popoff's seminar and it was there that he presented his first research paper entitled "On a New Criterion of Series Convergence".

Nikola Obreshkoff gained high international prestige. On October 13, 1932, he received the degree of Doctor of Mathematics from the University of Palermo, Italy, and on June 20, 1933, a second doctoral degree, this time from the Sorbonne in Paris. Before he reached forty, Obreshkoff was an internationally known figure: a welcome guest in major scientific centers of mathematical thought and an active participant in international scientific events. His prestige grew steadily and his achievements became widely recognized. His name topped the list of the best known experts in his field and his works were frequently quoted and referred to.

Nikola Obreshkoff lectured at the Universities of Hamburg, Berlin, Geneva, Rome, Palermo, Leipzig, Dresden, etc. He presented papers at the world congresses in mathematics in Oslo (1936) and Edinburgh (1958), at the First Congress of Slavic mathematicians in Warsaw (1929), at the Congress of Balkan mathematicians in Athens (1935), at the First Congress of Hungarian mathematicians (1950), at the Congress on

probability theory and mathematical statistics in Berlin (1954), at the International Colloquium in mathematics in Dresden (1955) and at many other similar forums at home and abroad.

Obreshkoff's international prestige was further attested to by the fact that he served as a reviewer of research monographs and as a referee in awarding academic and scientific titles and degrees. In 1945 he was elected a member of the Bulgarian Academy of Sciences.

Nikola Obreshkoff left a rich heritage of over 250 publications in Bulgarian and international scientific journals and editions, including four monographs and several textbooks. The impressive scope and depth of his works will remain as a great example in the mathematical sciences: classical algebra, number theory, mathematical analysis, probability theory and mathematical statistics, integral geometry, topology, equations of mathematical physics and mechanics. Some of his achievements in these fields have remained unsurpassed in world science.

Obreshkoff's favorite research area was the distribution of roots of algebraic equations. His first remarkable success was the generalization of the classical theorems of Budan-Fourier and Descartes. It laid the foundations of a very productive interest in this field which lasted to his death. Obreshkoff was recognized as a major world expert on the distribution of zeroes of polynomials. His numerous important results in this area became a starting point for the research of many mathematicians all over the world, e.g. J. Schoenberg, S. Lipka, and M. Marden, just to mention a few. Obreshkoff had a number of followers in Bulgaria as well. There was a time when it was believed that the distribution of zeroes of polynomials was an outdated field and Obreshkoff was among its last ardent adepts. Recently, however, there has been a revival of interest in the "localization" and calculation of complex roots of the polynomial, especially in the context of the contemporary applications of mathematics.

About one third of Obreshkoff's publications are in the theory of series. His research on the summation of divergent series demonstrates brilliant skills and invention acknowledged by his peers all over the world. In 1928 he managed to solve the problem of summation of the differentiated Fourier series by arithmetic means. Later he introduced a method of summation which he called "absolute summation by typical means". Some of his results are connected with Borel's and Mitag-Leffler's methods of summation. His publication on the summation of Dirichlet's series, fractional series and Newton's series using Euler's transformations (*Ann. Univ. Sofia, Phys.-Math. Fac.*, **35**,

No 1 (1939), 1–156) could have been published as a separate monograph. Obreshkoff's papers on the summation of divergent series provoked great interest abroad and were further developed in the works of a number of mathematicians from Britain, India and Germany.

In the 1950's, when Obreshkoff had reached creative maturity, he directed his interest and talent to the rather challenging area of arithmetic known as Diophantine analysis. Over a short period of time Obreshkoff formulated some new and interesting theorems on the approximations of linear forms. His finding, in 1957, the exact value of Borel's constant (a problem that had remained unsolved for over 50 years) marks a peak in his work.

Obreshkoff achieved many other brilliant results: in 1933–34 he found the general form of the meromorphic functions which are limits of rational functions under certain assumptions about the distribution of their poles. These results were a natural continuation of the research of Laguerre, Lindvardt, Polya and Schur. They were included in Obreshkoff's monograph "Quelques classes de fonctions entières limites de polynômes et de fonctions méromorphes limites de fractions rationnelles" published in Paris in 1941 (Paris, Hermann & Cie, 49 p.)

In 1958 Obreshkoff published a generalization of Laplace's classical integral transformation, but for years it remained unnoticed because the work was published in Bulgarian and only in the Proceedings of the Institute of Mathematics at the Bulgarian Academy of Sciences. Later, various authors started publishing integral transformations which proved to be only special cases of Obreshkoff's generalization. His absolute priority in the field has already been restored and one wonders what other treasures lie hidden in his enormous scientific heritage.

Influenced by H. G. Hardy, J. Littlewood and especially by S. N. Bernstein, Obreshkoff began to pay special attention to the asymptotic properties of the derivatives of functions defined on a ray of the real axis as well as to the regularly-monotone functions. Of especial interest are his studies in the probability theory, which were later referred to in a monograph by the distinguished French mathematician M. Fréchet. The importance of Obreshkoff's research in mathematical statistics is evidenced by the fact that his monograph entitled "La statistique mathématique" was published by Hermann & Cie in Paris in 1938.

Nikola Obreshkoff authored significant studies in quadrature formulae, in integral geometry in Lobachevski's non-Euclidean plane and in the boundary value prob-

lems of the heat equation. His generalization of Taylor's formula is worth mentioning. Several publications deal with numerical calculations of the roots of algebraic equations.

About twenty years ago the Bulgarian Academy of Sciences began publishing Obreshkoff's works. The first two volumes were printed in 1977 and 1981. When the remaining volumes see the light, our scientific community will get the full picture of the work of this great Bulgarian mathematician. Few months before his death two of his monographs were published: "Zeroes of Polynomials" (Publishing House of the Bulgarian Academy of Sciences, 1963, 290 p.) and "Verteilung und Berechnung der Nullstellen reeller Polynome" (Berlin, 1963, 298 p.).

Nikola Obreshkoff had an almost forty-year-long academic career as Assistant Professor, Associate Professor, Professor and Head of the Department of Algebra at the Faculty of Mathematics and Physics at Sofia University. He gave lecture courses in algebra to students studying mathematics and physics, in probability theory and mathematical statistics, in number theory as well as a specialized course in summation of divergent series. Obreshkoff authored textbooks in algebra and in number theory as well as a collection of problems and theorems in algebra with a supplement on continued fractions.

Academician Obreshkoff had a substantial contribution to teaching mathematics at all levels of education in Bulgaria. He authored and co-authored textbooks in mathematics for high schools and a large number of popular papers published in the *Physico–Mathematical Journal*. In these he presents problems in number theory, geometrical constructions, four color problem, inequalities for the differences of sequences, derivatives of functions, etc., in a very comprehensive way.

In 1951 Nikola Obreshkoff was appointed Director of the Institute of Mathematics (established 1948) of the Bulgarian Academy of Sciences. A new generation of Bulgarian mathematicians grew under his guidance. He selected excellent young scientists, seven of whom became full professors, one an associate professor and five hold D. Sc. degrees.

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