NIKOLA OBRESHKOFF
(1896 – 1963)

100 years had passed since the birth of academician N. Obreshkoff, an eminent world-known Bulgarian mathematician.

N. Obreshkoff was born in the city of Varna on March 6th 1896. His father was a military man. He got his primary and secondary education in his place of birth. He graduated from the Second High School of Sofia in 1915 and from the University of Sofia five years later. Then he started working as an assistant at the Department of Mathematical Analysis, headed by professor Cyril Popov at that time. In 1922 he was elected as full-time associate professor at the Department of Algebra. Three years later he became a part-time professor at that Department and he had been a full-time professor and its Head since 1928 up to his death in 1963.

In his school years he was a very gifted pupil in Mathematis. Then he discovered an algebraic method of solving the equations of forth degree that had been suggested earlier by Amper. As a student in the University he took part in the Seminar of Cyril Popov at which he reported his first original research paper "On a New Criterion for Convergence of Series".

N. Obreshkoff gained great international prestige for a comparatively short period of time. The degree of Doctor of Mathematics was conferred on him by the University of Palermo (Italy) on October 13th 1932. The degree of Doctor of Sciences was given to him on June 20th 1933 by the Sorbonne, Paris.

N. Obreshkoff in his forties was well-known throughout the world – and had been invited by famous world mathematical research centres to visit them and to participate in international scientific events. His achievements grew and he gained prestige, popularity, fame as time went by. He was recognized to be one of the most eminent experts in the fields he worked on and his papers were cited quite often.

Nikola Obreshkoff had been invited as a visiting professor by the Universities of Hamburg, Berlin, Geneve, Rome, Palermo, Leipzig, Dresden, etc. He had delivered a number of lectures at the World Congresses in Mathematics held in Oslo (1936) and in Edinburgh (1958) respectively. Also he took part in the First Congress of Slav Mathematicians held in Warsow (1929), in the Congress of Balkan Mathematicians held in Athens (1935), in the First Congress of the Hungarian Mathematicians (1950), in a Conference on Probability and Mathematical Statistics in Berlin (1954), in the International Mathematical Colloquium on Numerical Methods held in Dresden (1955) as well as in a number of other conferences and scientific events organized in our country and abroad.

In addition, the fact that N. Obreshkoff had been invited to be a reviewer of many scientific monographs and other works of people applying for confernment of some titles or scientific degrees undoubtedly was an evidence of his international prestige and authority as a scientist. To this end could be mentioned also

the fact that N. Obreshkoff was elected as a regular member of the Bulgarian Academy of Siences in January 1945.

Nikola Obreshkoff had left an enormous scientific inheritance of more than 250 scientific papers published in national and international journals and periodicals, including also four monographs and several textbooks. His creative works were and are still remarkable for their variety and deepness and they would henceforth continue to be a unique pattern of creativity not only in Bulgarian Mathematics. Even a passing glance on the topics in which the author had focused his works on could reveal the wide scope of his research interests and capabilities, namely: classical algebra, theory of numbers, mathematical analysis, theory of probability and mathematical statistics, integral geometry, topology, equations of mathematical physics, mechanics. Nikola Obreshkoff had left many profound and complete results in all these fields, some of them being not surpassed yet.

One of the topics he was keen on and liked to work on was the problem of distribution of the roots of algebraic equations. His first remarkable success – the generalization of the classical theorems of Budan-Fourier and Decartes – provoked his life-lasting fruitful interest in that field. He was recognized to be one of the most famous world experts on the distribution of the zeros of polynomials. His great achievements and results in that field promoted the investigations of many mathematicians, such as: J. J. Schoenberg, S. Lipka, and M. Marden. N. Obreshkoff had some followers who worked in this field in our country too. It was believed, though, that the distribution of the zeros of polynomials had already become an "old-fashioned" field and that probably N. Obreshkoff had been one of the last scientists who had dealt with it so ardently. But, the problem of "localization" and that of calculating the complex roots of polynomials had again become actual in connection with the contemporary applications of mathematics.

About one third of the publications of Nikola Obreshkoff are in the theory of series. His investigations on the summation of divergent series had been and still are remarkable. He was an eminent expert in this field and had worked in it very successfully and skilfully. He managed to solve the problem about the summation of a differentiated series of Fourier series by arithmetic means. Later he introduced a method of summation called "absolute summation by typical means". Some of his results were connected with Borel and Mittag-Leffler methods of summation. His publication on the summation of Dirichlet series, fractional series and Newton series by Euler's transformations (Ann. Univ. Sofia, Phys.-Math. Fac., **35** 1939, No 1, 1-156) deserved being published as a monograph. The papers of Nikola Obreshkoff on the summation of divergent series roused interest for them and a number of foreign mathematicians in England, India and Germany devoted some of their works on its further study and development.

When N. Obreshkoff was about 50 years old he began dealing with the difficult but challenging field of arithmetics, now called diophantine analysis. For a short period of time he created some new and interesting theorems related to the approximation of the linear forms. Undoubtedly one of the summits of

his creative works had been that in 1957 when he succeded to find the exact value of Borel's constant (1871-1956). N. Obreshkoff proved that it was equal to 1 – and that happened fifty years after its formulation, i.e. it had remained unsolved for so many years.

Some other beautiful and profound results in mathematics are due to N. Obreshkoff too. In 1933 – 1934 he found the general form of meromorphic functions being limits of rational functions under appropriate assumptions for the distribution of their poles. These results appeared to be a natural continuation of the investigations of Laguerre, Lindvardt, Polya, Schur and had been published in Obreshkoff's monograph *Quelques classes de fonctions entieres limites de polynomes et de fonctions meromorphes limites de fractions rationneles.* Paris, Hermann & Cie, 1941, 49 p.

In 1958 N. Obreshkoff published a generalization of the classical integral transformation of Laplace, but no one had noticed it for a long period of time and it didn't get the deserved recognition. Probably one of the reasons for that had been that it was published only in Bulgarian and only in the *Proceedings of the Institute of Mathematics* at the Bulgarian Academy of Sciences. Later some other authors began publishing integral transformations, but all of them were special cases of those of N. Obreshkoff. His undoubtable priority in this field had already been restored but no one knows what other results of such importance might have remained hidden and unrevealed in his enormous scientific heritage.

N. Obreshkoff started dealing with the asymptotic properties of the derivatives of functions defined on a ray of the real axis and on the regularly-monotone functions, influenced by some papers of H. G. Hardy, Littlewood and especially by those of S. N. Bernstein. Also he was interested in the theory of probability and his investigations in that field had later been cited in the monograph of the great french mathematician M. Freschet. The fact that N. Obreshkoff's monograph *La statistique mathematiques.* Paris, Herman & Cie, 1938, 66 p. had been published in Paris in 1938 undoubtably was a certain evidence about his notable contributions to the field of mathematical statistics.

Moreover Nikola Obreshkoff had a number of works devoted to quadrature formulae, integral geometry in the non-Euclidean plane of Lobachevski, the boundary value problems for the heat equation. His generalization of Taylor's formula was also very significant. A number of his papers dealt with the numerical calulation of the roots of algebraic equations.

The Bulgarian Academy of Sciences began publishing the collected works of Nikola Obreshkoff twenty years ago and the first two volumes were printed in 1977 and in 1981. The publication of the whole collection would enable our scientists to get acquainted with and to get impression about the scope of his scientific inheritance. Nikola Obreshkoff himself could not see all of them published, though, some of his monographs, namely: *Zeros of Polynomials* (Bulgarian) Publishing House of the Bulgarian Academy of Sciences, Sofia, 1963, 290 p.) and *Verteilung und Berechnung der Nullstellen reeler Polynome*, Berlin, 1963, 298 p. were printed several months before he passed away. Probably he had had some other plans, ideas and intensions but unfortunately they remained unfeasable.

Nikola Obreshkoff had been teaching Bulgarian mathematicians as an assistant, associate professor, full professor, head of the Department of Algebra at the Faculty of Mathematics of Sofia University for more than 40 years. He had delivered lectures on Algebra (for students in Mathematics and Physics), on Theory of Probability and Mathematical Statistics, Theory of Numbers and a special course on Summation of Divergent Series. He was an author of a number of textbooks in Algebra, Theory of Numbers as well as of a Collection of Problems and Yheorems in Algebra with a Supplement on Continued Fractions.

N. Obreshkoff dealt with education in our country too. He had been an author and a co-author of some textbooks in Mathematics for High School Students as well as of some papers published in the *Physical Mathematical Journal* of the Bulgarian Academy of Sciences. Some problems of Number Theory, some geometric constructions and the four colours problem, the inequalities for the differences of seguences, the derivatives of functions, etc. had been dealt with in a popular form in those papers.

In 1951 N. Obreshkoff was appointed as a Director of the Institute of Mathematics at the Bulgarian Academy of Sciences which had been founded three years ago. A new generation of researchers had been brought up under his guidance. His flair at making the best choice of appointing the first collaborators and research fellows of the Institute had been supported by the fact that all these people had become excellent experts with great prestige and authority. Now, seven of them are professors, one – is an associate professor and five – are doctors of Mathematics.

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By publishing the present issue No 4 of volume 22 (1996) of Serdica, Mathematical Journal, its Editorial Office has the honour of rendering its homage and high appreciation of the deed of Nikola Obreshkoff on the occasion of the 100 anniversary of his birth.

The Editorial Board would like to thank once more all the authors who had presented their research papers on this occasion. Except them, the world mathematical community will have the opportunity to find on the pages of this commemorial issue a brief biography of academician N. Obreshkoff and a complete list of his publications.