



GEORGIO FILIO VLADIMIRI LINNIK
in memoriam

Yu. Linnik

Yuri V. Linnik (1915–1972) A biographical note

by

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Academician Yuri V. Linnik, one of the most prominent mathematicians of our time, died on 30th of June, 1972. He was born on January 8th, 1915, in Bielaya Tserkov (Ukraine) the son of two school teachers, his father, V. P. Linnik, being also now an Academician.

In 1932 Yuri V. Linnik entered the physics faculty of Leningrad University, then, three years later, he transferred to the faculty of mathematics and mechanics, feeling "an irresistible bent for higher arithmetics" (as was written in his autobiography). He graduated in 1938 and began his postgraduate studies at the same university. Since being a student he had begun deep research work on the arithmetics of quadratic forms, and brilliantly continued the elaboration of that problem in 1938–1939. In the winter of 1939–1940 Yuri V. Linnik was called up for military service in the Soviet Army, where he served as a platoon leader. After his demobilisation, in the spring of 1940, he defended his thesis, for which he directly got D. Sc. degree in Mathematics, surpassing Ph. D. degree. Since the time of the founding the Leningrad Department of the Steklov Mathematical Institute of the Academy of Sciences of the USSR (LOMI), Yuri V. Linnik was its research fellow (lately — chief of the Statistical Methods Laboratory).

In June 1941 Yuri V. Linnik joined the People's Volunteer Corps and took part in fighting Nazi troops at Pulkovo Hills. In the Autumn of 1941, being inside the besieged Leningrad, he suffered from dystrophia, was demobilised and evacuated to Kazan, where for the time being his Mathematical Institute was situated.

Having returned to Leningrad, Yuri V. Linnik worked, from 1944 until his death, at LOMI, at the same time being Professor of Mathematics at Leningrad University.

Originally Yuri V. Linnik's investigations were related to number theory. Later he became interested in the theory of probability and mathematical statistics (as well as continuing his studies in number theory). Many times Yuri V. Linnik said that wielding methods and ideas of num-

ber theory helped him when he was working in the field of the theory of probability. The very titles of Linnik's papers (the ergodic method in number theory; the dispersion method) indicated the influence of the theory of probability upon his research in number theory. Of course, the point is not that any ready results were transferred from one field to another, but only that there was some influence of ideas from the theory of probability upon the creation of new, original methods in number theory.

Yuri V. Linnik possessed a lucky ability to attract talented disciples. He skilfully directed them to the study of problems which were both difficult and important for the development of science. As a director of studies, Yuri V. Linnik was generous in giving both ideas and advice, always having time for working discussions with his disciples and colleagues. At the same time he was exigent, awaiting with interest those results, which, in his opinion, were bound to be a success. In relations with his disciples, Yuri V. Linnik was solicitous not only as a teacher, but also as a senior colleague, trying to be helpful also in everyday life, when necessary.

Among Linnik's disciples of different periods, there were: the prematurely deceased Hungarian Academician A. Renyi, Academician of the Lithuanian SSR J. Kubilius, A. V. Malyshev, A. I. Vinogradov, B. F. Skubenko, B. M. Bredikhin, A. N. Andrianov and others — in the field of number theory, and V. V. Petrov, I. A. Ibragimov, Academician of the Lithuanian SSR V. Statulavicius, O. V. Shalayevsky and many others — in the field of the theory of probability and mathematical statistics.

The scientific merits of Yuri V. Linnik were generally recognized. In 1947 he was awarded a State Prize, in 1970 he became the Lenin Prize Winner. In 1953 he was elected a Corresponding Member, and in 1964 a Full Member of the Academy of Sciences of the USSR. In 1970 he was given the rank of Hero of Socialist Labour. Since the year of its founding, 1959, until 1965 he was the President of the Leningrad Mathematical Society. Yuri V. Linnik was elected a Fellow of the International Statistical Institute, a Foreign Member of the Swedish Academy of Sciences, and obtained the title of Doctor honoris causa of Paris University. He was a member of the editorial boards of several scientific periodicals, including "Acta Arithmetica". Linnik's "Selected Writings" are planned to be published.

Yuri V. Linnik combined the extraordinary intensity of scientific creative work with a vast scope of interests. His many-sided endowments were astonishing: he was greatly interested in belle-lettres, especially poetry and memoirs, as well as in history, especially military history. He spoke seven languages fluently and wrote witty poetry in Russian, English, German and French.

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Yu. V. Linnik's works in number theory

by

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I. Ergodic method in number theory. Yu. V. Linnik's first works were related to the analytic theory of quadratic forms. He investigated there the problem of representation of numbers m by positive ternary quadratic forms f , i.e. the problem of solution of Diophantine equation

$$(1) \quad f(x, y, z) = m$$

in integers x, y, z . It dealt with the conditions of solvability of the equation (1) and the number of its solutions $R(f, m)$ (or, in other words, with the number of integral points on the ellipsoid (1), the problem of distribution of these points over the surface of the ellipsoid naturally arising). Analogous problems for quadratic forms of $n \geq 4$ variables were successfully solved by the traditional analytic methods. Nevertheless in the case of $n = 3$, connected with the important problem of determining a crystalline lattice by its distances, those methods ceased to work, and the problem did not permit any solution in spite of the efforts of many scholars.

Having used as a tool the arithmetics of quaternions and hermitians for the purpose of investigating the problem, Linnik created an original analytic-algebraic method, which, in further development substantially expanding the sphere of its applications, was named the ergodic method in number theory. The method was described in articles [2]–[6], [62], [63], [69], [71], [76]–[79], [81], [84], [86], [88], [89], [102], [113], [148], [168], [224], partially in [46], [115], [152], and also in monograph [VII] basically summing up the whole field of investigation (several problems were treated with more detail in A.V. Malyshev's monograph *On the representations of integers by positive quadratic forms*, Steklov Mathematical Institute works, LXV, 1962).

The fundamentals of the method were given by Linnik in paper [6], outstanding in its depth and sophistication, and making a summit of his creative work. In that very complicated article he succeeded in estimating $R(f, m)$ from below (and, in particular, in finding conditions for