Obituary

Iosif Vladimirovich Ostrovskii
(April 6,1934–November 29, 2020)

On November 29, 2020 an outstanding Kharkiv mathematician, the author of groundbreaking works in function theory and its applications, passed away.

Iosif Ostrovskii was born in the city of Dnepropetrovsk (today Dnipro) on 6th April 1934. After the Second World War the family moved to Kramatorsk (Donetsk region). Ostrovskii's ability for mathematics was awoken in the seventh grade. Left at home due to a long illness, he became interested in reading Kiselev's school textbooks. In a month, he learned the entire program for the next two years. His ninth and tenth grade math teacher Maria Fishkina, herself a student of Mark Krein, greatly supported his desire to become a mathematician.

In 1951, after graduating from high school, Ostrovskii enrolled in the School of Mathematics and Physics at Kharkiv University. This was a time in which the School flourished, with Naum Akhiezer, Gershon Drinfeld, Boris Levin, Vladimir Marchenko, Alexander Povzner, Alexei Pogorelov, and Anton Sushkevich working there then. In 1954 Boris Levin organized "a scientific circle" on the theory of functions for students, and Iosif Ostrovskii became one of its most active participants.

In 1956, Ostrovskii started his PhD studies under Levin's supervision and defended in 1959 his Candidate of Sciences (Soviet equivalent of PhD) thesis. In

1965 he defended his Doctoral (Soviet equivalent of Habilitation) thesis. In 1978 he was elected a corresponding member of the Academy of Sciences of Ukraine.

From 1958 until the beginning of the 1990s Ostrovskii worked at Kharkiv University. From 1969 onwards he held concurrently a position at the Department of Function Theory of the Institute for Low Temperature Physics and Engineering. From 1993 to 2010 Ostrovskii worked at Bilkent University in Ankara, Turkey.

Ostrovskii's early work was mainly centered around investigating the relation between the growth of a meromorphic function and the distribution of its values with respect to the arguments. The results he obtained in this area significantly improved previous results by Bieberbach, Edrei, Nevanlinna, and Krein.

In 1960, the fundamental paper of Levin and Ostrovskii "The dependence of the growth of an entire function on the distribution of zeros of its derivatives" was published. In it they attacked the old conjectures of Wiman (1911) and Pólya (1943) on the zero distribution of higher derivatives of real entire functions. The new method they proposed was based on a generalization of value distribution theory of meromorphic functions to functions defined in a half-plane. In this way, they proved for functions in a half-plane an analog of a deep result in value distribution theory, known as "Hayman's alternative". The method of Levin and Ostrovskii was used in all subsequent work on the Wiman and Pólya conjectures (Hellerstein, Williamson, Sheil-Small, Bergweiler, Eremenko, Langley and others), eventually leading to a complete proof of these conjectures in 2003–2006. The extension of Nevanlinna theory to functions in a half-plane proposed by Levin and Ostrovskii in this work found many other applications as well.

In this period, a long-term collaboration and friendship began between Iosif Ostrovskii and Anatolii Goldberg, lasting until Goldberg's death. In 1970, their book "Distribution of values of meromorphic functions" was published. Reviewing it, Hayman wrote "All function theorists are indebted to the authors for this comprehensive and scholarly work."

In the early 1960s, Ostrovskii published his first works on analytic probability theory. In 1962, he proved a conjecture of Linnik on generalization of the classical theorem of Marcinkiewicz to entire characteristic functions of infinite order. The proof of this work was based on a substantial improvement of Wiman-Valiron theory. Later, the improvement found applications in the analytic theory of differential equations. In the years that followed, Ostrovskii, with his students Kamynin, Ulanovskii, Vishnyakova, repeatedly returned to these questions, proposing new proofs and generalizations.

In the late 1960s, Ostrovskii turned to the arithmetics of probability distributions. The idea of a special analytic continuation allowed him to find a remarkable new proof of Linnik's theorem on decompositions of the convolution of Gauss and Poisson laws, and to make substantial progress in the description of class I_0 consisting of probability laws without indecomposable components. Novel analytical methods developed by Ostrovskii led him and his students to a variety of subtle results. The joint book with Linnik "Decompositions of random variables and vectors" remains the primary monograph in this area.

In the middle of the 70s, the joint work with Vladimir Marchenko on the

characterization of spectra of Hill's operator emerged. The function-theoretic basis of this work was a characterization of entire functions all of whose ± 1-points are real, using conformal mappings onto special "comb regions", the upper half-plane with vertical slits. This led Marchenko and Ostrovskii to an effective and natural parametrisation of the full set of spectral data by the comb regions, which, in turn, led them to a description of the geometry of the spectrum of Hill operators. Since this work, conformal mappings onto comb regions, and more generally geometric function theory, became one of the most efficient tools in the spectral theory of second order differential and difference operators.

In the1980s and 1990s, Ostrovskii published a large cycle of papers dedicated to classes of complex-valued measures which are uniquely defined by their restrictions to a half-axis. He discovered connections from these problems, arising from a question of Kolmogorov, to the Titchmarsh convolution theorem, the Second Main Theorem of Nevanlinna–Cartan for holomorphic curves, and to factorization in Hardy spaces.

In the same period and later, Ostrovskii wrote a cycle of papers providing an exhaustive description of asymptotic properties of entire characteristic functions and distribution of their roots. In particular, jointly with Goldberg, a complete description of the Phragmén–Lindelöf indicators of these functions was obtained.

He also investigated the influence of geometry of zero sets of partial sums and tails of a power series on the growth of the function defined by this series. Among other topics was a study (joint with Ulanovskii) of the dependence of the oscillation of a real function or distribution on the smoothness of its Fourier transform.

For many years, Ostrovskii played a leading role in Kharkiv mathematical life, being the President of the Kharkiv Mathematical Society, one of the editors of the journal "Function theory, functional analysis and their applications", which was published in Kharkiv from 1965 till 1993, and one of the founders and the chief editors of this journal.

Iosif Ostrovskii was the Teacher. He believed that one can only teach and raise another person by being an example, and he always followed this principle. He had raised more than twenty graduate students, many of them becoming well-known mathematicians.

Everyone who had a chance to interact with Iosif Ostrovskii will remember his devotion to the mathematical profession, his highest standards for the level on which all professional-related work must be done, and his outstanding impact on the mathematical life in all places where he worked.

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