



Vladimir Mikhailovich Millionshchikov

(1939–2009)

On March 19, 2009 professor Vladimir Mikhailovich Millionshchikov, doctor of physical and mathematical sciences, an outstanding mathematician, an unusually charming and originally thinking man of exceptional abilities, passed away.

V. M. Millionshchikov was born in Moscow on October 22, 1939. His father, academician Mikhail Dmitrievich Millionshchikov, was widely known in the Soviet Union as an outstanding scientist and a public figure, who made a valuable contribution to mechanics and physics. He was Vice-president of the Academy of Sciences of the USSR and Chairman of the Supreme Soviet of the RSFSR. From his father, A. N. Kolmogorov's pupil, Vladimir Mikhailovich inherited his deep love and keenness to mathematics.

In 1956, V. M. Millionshchikov became a student of the Faculty of Mechanics and Mathematics of M. V. Lomonosov Moscow State University majoring in ordinary differential equations. His scientific supervisor was professor V. V. Nemytskiĭ, an outstanding specialist in the qualitative theory of differential equations. As a student, V. M. Millionshchikov wrote one of his first works concerning so-called nonautonomous topological dynamics

in which he applied the methods of topological dynamics to the study of nonautonomous equations.

In 1961, V. M. Millionshchikov graduated with honors from the university and continued his post-graduate studies under the supervision of V. V. Nemytskiĭ. Thus has begun the way of formation of a great scientist, boldly tackling most difficult problems and finding their nontrivial solutions. In 1966, he defended his Candidate's thesis "To the Spectral Theory of Systems of Nonautonomous Linear Differential Equations", and in 1968 he defended his Doctor's thesis "To the Theory of Systems of Linear Ordinary Differential Equations". During his lifetime V. M. Millionshchikov published about 400 scientific works devoted to ordinary differential equations, dynamical systems and related problems. Among his scientific works there is none published jointly with anybody; V. M. Millionshchikov had a rule that all results obtained under his supervision by his pupils had to be published only by themselves.

Systems of linear ordinary differential equations were the first great, long-lasting and enduring scientific love of Vladimir Millionshchikov. After the appearance of the fundamental studies due to A. M. Lyapunov, the founder of the theory of linear systems, and basic works of his followers, the impression was created that this theory had reached "a point of saturation", when all the achievable was achieved and further advancements were practically impossible. But this only urged V. M. Millionshchikov's research excitement and he started to investigate the most difficult topic, the theory of Lyapunov's exponents.

To achieve a success and overcome serious technical obstacles, nontrivial ideas and titanic efforts were needed. V. M. Millionshchikov knew how to generate such ideas; it suffices to recall one of his methods which has become classical, "the method of Millionshchikov's rotations", allowing one to find approaches to many problems. He also possessed in abundance a masterly analytic skill. This is brilliantly demonstrated by numerous fine examples of linear systems constructed by him, which show surprising interconnection and mutual exclusiveness of different properties of such systems; say, an example of linear system elucidating such sides of the phenomenon of instability of Lyapunov's exponents which had not been revealed by the classical Perron's example and its subsequent modifications.

Moreover, V. M. Millionshchikov constructed the metric theory of linear systems of differential equations based on the metric theory of dynamic systems (the ergodic theory). He discovered the phenomenon of the so-called stochastic stability of Lyapunov's exponents for a definite class of linear systems; he derived a formula for the entropy of a smooth dynamic system (of the class C) on a compact smooth manifold with a normalized invariant measure generated by some Riemann metric, and obtained a great deal of excellent original results.

Scientific results obtained by V. M. Millionshchikov in the first period of his creative activity were presented to the International Congress of Mathematicians in Nice where he was an invited speaker.

The second period of V. M. Millionshchikov's creative activity was devoted to the investigation of typical (according to Baire) properties of Lyapunov's exponents (and related values). Before him, this range of questions had remained practically unexplored, and the statement of the problem on "typicalness according to Baire" had not been considered as being of much interest and prospective. V. M. Millionshchikov disproved this opinion and showed what nontrivial and substantial results could be obtained in the course of studying typical (according to Baire) properties of different objects of the theory of differential equations.

The basic results obtained by V. M. Millionshchikov in this area can be characterized as theorems on the typicalness (according to Baire) of coincidence of Lyapunov's exponents with central ones and exponential remoteness of the corresponding subspaces of solutions (trajectories of the derivative of the diffeomorphism) from their algebraic complements. V. M. Millionshchikov defined and studied a great deal of new exponents of differential systems and characteristics of trajectories of dynamical systems. In particular, he investigated in detail the influence of small perturbations on various properties of solutions and Lyapunov's exponents of a typical (according to Baire) Cauchy problem for the linear system.

V. M. Millionshchikov realized a certain revision of the basic principles of the classical theory, proposing an extended definition for Lyapunov's exponents, where the main idea was to include into consideration Lyapunov's infinite exponents.

In a series of V. M. Millionshchikov's publications the reader can find statements of original problems which he offered to young researches; many of those problems still wait for their solutions.

V. M. Millionshchikov was very exigent to his scientific publications, always striving to achieve maximal exactness, simplicity and at the same time generality of the results. He never hurried to publish his works considering that every paper should preliminarily be "put aside" for some time in order to be able "to take a glance at it from far away".

In the course of many years, V. M. Millionshchikov jointly with Profs. V. A. Kondratiev and N. Kh. Rozov has held a regular scientific seminar on the qualitative theory of differential equations. Starting from 1978, on the initiative of V. M. Millionshchikov and with his direct participation, the abstracts of all reports delivered at the seminar were published in the journal "Differentsyal'nye Uravneniya". Within the framework of the seminar, active fruitful work was carried out with the colleagues from various regions of Russia: everybody could get the needed help and advice, approval or constructive criticism, as well as good wishes for the future. Along with the well-known scientists, young researchers also participated in the seminar, thus getting a start into scientific life.

Under V. M. Millionshchikov's supervision over 25 Candidate of Science dissertations have been prepared and defended, while several of his pupils themselves became bearers of the Doctor of Science title. He was highly attentive to his scientific "grandchildren" — this is how he used to call the pupils of his pupils. He found much time on debating with his students, and always made sure that each student got problem that perfectly suited his or her interests and potentials. That was why after seminar sessions there was always a queue of those wishing to talk with him and he always managed to give his full attention to everybody.

The whole life of V. M. Millionshchikov was inseparably connected with M. V. Lomonosov Moscow State University, while his research activity was inalienable from his teaching work. As early as a post-graduate student, V. M. Millionshchikov began his teaching career at the Department of Differential Equations of the Faculty of Mechanics and Mathematics of M. V. Lomonosov Moscow State University, where he passed through all career stages — from an assistant professor to a full professor (since 1970). For 30 years V. M. Millionshchikov taught the course of ordinary differential equations. Numerous yearly and degree projects were prepared by students under his supervision. He was a brilliant lecturer — the deep and masterly manner in which he delivered his lectures evoked admiration of students. We may now only regret that his lectures have remained unpublished.

From 1973 V. M. Millionshchikov worked also as a researcher at the V. A. Steklov Mathematical Institute of the Russian Academy of Sciences.

V. M. Millionshchikov took an active part in the solution of difficult problems concerning the organization and development of science and education. His contribution to many doings and undertakings of the Faculty of Mechanics and Mathematics of M. V. Lomonosov Moscow State University is invaluable.

V. M. Millionshchikov was a valuable member to numerous professional organizations, such as the expert commission and expert council on mathematics and mechanics of the USSR Higher Certifying Committee, editorial board of the journals "Differentsial'nye Uravneniya", "Matematicheskie Zametki" (where he held the position of the deputy editor-in-chief), and "Rossiiskaya Akademia Nauk. Izvestia. Seria Matematicheskaya". In addition, for many years he participated in the work of the doctoral dissertation council at the Faculty of Mechanics and Mathematics of Moscow State University first as a member of the council and then as its vice-chairman.

V. M. Millionshchikov had always been notable for his attentive attitude to people regardless to their age and position, benevolence, tactfulness and delicacy in contacting them, readiness to help and support them at difficult times. Everybody who knew V. M. Millionshchikov, or met him, or dealt with him on business or scientific matters, was invariably charmed by his personality, noted his erudition and an amazing range of his interests. It was always simple, easy and interesting to be in his company. He was really

a true intellectual, comprehensively educated, and, at the same time, very modest.

We can't help mentioning V. M. Millionshchikov's amazing hobby - collecting ... languages. Not only would he learn them, he would excel at pronunciation, showing genuine interest and diligence. His range of interests included not only European, but also many oriental and even such exotic as Chukchi and Malagasy languages. Nobody knows how many languages he had managed to master. Most likely, he himself would not have been able to count them. In the home of V. M. Millionshchikov his friends and pupils always found a cordial welcome, were surrounded by warmth emanated by the host and his wonderful wife Larisa Nikolayevna. The children of Vladimir Millionshchikov followed their father's footsteps, having chosen the scientific path.

We have lost a wonderful scientist, highly respected colleague, and a kind friend. The memory of his outstanding works, versatile activities and his remarkable personality will forever remain in the hearts of all those who knew this wonderful man.

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