

# Volodymyr Vasylyovych Sharko

25.09.1949 — 7.10.2014



On 7 October, 2014, at the age of 65, an outstanding mathematician and talented teacher Volodymyr Vasylyovych Sharko passed away.

He was born on September 25, 1949 in the town Ottynia of Kolomuya district of Ivano-Frankivsk region. In 1959 Volodymyr Vasylyovych' parents moved to the city of Stanyslaviv (now Ivano-Frankivsk). His admiration for mathematics was formed since childhood in particular, due to the fact that his father Vasyl Ivanovych Sharko who was a teacher of mathematics in high school in the city of Izyum of Kharkov region before the Second World War.

In 1963 Volodymyr Vasylyovych entered the Faculty of Mechanics and Mathematics of the Taras Shevchenko Kyiv University. Then after graduating in 1973 he became a postgraduate student of the Institute of Mathematics of the Academy of Sciences of the USSR. His scientific adviser was Yu. Yu. Trokhymchuk. Volodymyr Vasylyovych defended his Candidate Dissertation "On exact Morse functions" in 1976 and the Doctor of Science Dissertation "Minimal Morse functions" in 1988.

Since 1976 the Institute of Mathematics has been an inseparable part of Volodymyr Vasylyovych' life. In 2001, he was elected the head of a newly created topology department and in 2007 became a Deputy director in charge of scientific work of the Institute of Mathematics.

Volodymyr Vasylyovych was a leading expert in the field of topology and its applications. He wrote nearly 100 mathematical papers and 2 books, 20 of his students defended Candidate theses, and 3 of them also defended Doctor of Science dissertations. Since 1987 he was also a professor in Taras Shevchenko Kyiv National University.

Volodymyr Vasylyovych greatly developed Morse theory. He invented new invariants of cell complexes which allowed to find exact values of the minimal number of critical points of Morse functions on manifolds.

He developed a new machinery in algebraic K-theory and applied it to the study of algebraic nature of non-simply-connected manifolds. In particular he proved necessary and

sufficient conditions for the existence of minimal chain complexes in a homotopy type, and describe path components of spaces of exact Morse functions on high-dimensional manifolds.

Further V. V. Sharko examined in detail the structure of smooth functions and vector fields with isolated singularities on surfaces and found criteria of their topological equivalence. In a joint work with Academician of RAS A. T. Fomenko Volodymyr Vasylyovych found estimates for the number of closed orbits of Hamiltonian systems on manifolds.

In recent years he paid main attention to the application of methods of noncommutative geometry to algebraic topology and qualitative theory of vector fields on manifolds. V. V. Sharko constructed  $L^2$ -invariants of Hilbert complexes, investigated their properties and applied them in the Morse theory. He fruitfully applied the  $L^2$ -cohomologies to study of the qualitative theory of Morse-Smale vector fields on manifolds. In particular, using the  $L^2$ -cohomologies he found the exact value of the minimal possible number of closed orbits of the corresponding index in this class of vector fields and proved that these numbers are homotopy invariants of a manifold.

For his significant scientific achievements V. V. Sharko was awarded by Mykola Ostrovskiy Prize (1980), Krylov Prize and Lavrentyev Prize of National Academy of Sciences of Ukraine (2005 and 2010, respectively), and State prize of Ukraine in science and technology (2006). In 2006 he was elected Corresponding Member of National Academy of Sciences of Ukraine.

Volodymyr Vasylyovych was very active and enthusiastic, and made a lot of efforts for maintaining mathematics and mathematicians in Ukraine. He had a very attractive and charismatic personality inspiring others to creative work.

He was a Deputy of Academician-Secretary of Mathematical Section of the National Academy of Sciences of Ukraine, Deputy Editor-in-Chief of the Ukrainian Mathematical Journal, a member of Kyiv Mathematical Society and American Mathematical Society, a member of Editorial board of Methods of Functional Analysis, Proceedings of the International Geometry Center, and Mathematical Bulletin of the Shevchenko Scientific Society.

Even at his last day he presided over the defence of two Candidate theses.

The memory of Volodymyr Vasylyovych Sharko will always live with all who knew and loved him.

*Editorial Board  
Kyiv Mathematical Society  
Institute of Mathematics  
of the NAS of Ukraine*