

ACADEMICIAN V. L. MAKAROV IS 70 !



In 2011 the well-known Ukrainian scientist in the field of numerical mathematics, Academician of National Academy of Science of Ukraine (NASU), Doctor of Physical and Mathematical Sciences, Professor Volodymyr Leonidovych Makarov turned 70.

In 1963 V. L. Makarov graduated from mechanics and mathematics faculty of Kyiv State University. In 1967 he received a Ph. D. in Physics and Mathematics from the Kyiv State University. In 1974 he was being granted a Doctor of science degree in Physics, Mathematics and Computer Sciences and became a Professor of Applied and Computational Mathematics. In the period between 1981 and 1998 V. L. Makarov was the head of the Department of Numerical Methods of Mathematical Physics at the Kyiv National University of Ukraine. In October 1998 – he has become the chief of Department of Numerical Mathematics at the Institute of Mathematics (NASU). Since 2001 V. L. Makarov is the head of the Department of Applied Mathematics at the National Aviation University (Kyiv).

Numerous achievements of modern numerical mathematics are connected with the name of Professor V. L. Makarov. He has developed many algorithms for solving different problems of the mathematical physics; many other ones were developed and used for practical calculations under his supervision and with his direct participation. V. L. Makarov has also carried out a wide range of theoretical investigations in numerical mathematics. His works include the vast majority of problems which appear during numerical solution of mathematical problems. These works have opened new directions in the theory of difference schemes, in automatic design of complex radio engineering systems etc. Professor Makarov developed the base of common theory of polynomial interpolation of non-linear operators in abstract spaces and recently obtained new important results in constructive representation of the solution operators for differential equations with operator coefficients in Hilbert and Banach spaces. The latter ones allow the construction of efficient

numerical algorithms without accuracy saturation or exponential convergent algorithms for solving partial differential equations, integral equations etc.

He published more than 310 papers, 11 monographs and 8 textbooks. Since 1963 until 1974 the main direction of V. L. Makarov's scientific activities was the theory of difference schemes. In this period he was the first who introduced and studied the new class of difference schemes – so-called difference scheme with exact and explicit spectrum. Studying the mathematical apparatus of these schemes, special functions of discrete argument, V. L. Makarov achieved some important results in the theory of associated orthogonal polynomials. Difference schemes with exact spectrums are widely used in practice, especially when solving hyperbolic equations with non-smooth solutions.

V. L. Makarov made an important contribution to the development of the theory of exact and truncated differences scheme, the base of which was established in 1959-1968 by academicians A. N. Tikhonov and A. A. Samarskiy. They and their followers proved the existence and uniqueness theorems for exact differences scheme for vectorial systems of ordinary differential equations of the second order, of ordinary differential equations of the fourth order, differential equations with degeneration on the boundary and in unbounded domains. Sufficient conditions for conservatism of differences scheme for dynamics of gases equation were pointed out.

In 1979-1980 in their common works, V. L. Makarov and academician A. A. Samarskiy suggested a new direction in numerical mathematics, namely difference schemes which rate of convergence is adjusted to the smoothness of the solution of the primary differential problem. These investigations were continued by V. L. Makarov and his followers. In particular, differences scheme with adjusted convergence rate for quasi-linear problems of mathematical physics in Sobolev spaces were derived and studied. Now these models are widely used in mechanics, elasticity theory, theory of operating systems with distributed parameters etc.

Since 1975 V. L. Makarov engaged in active research on the development of theoretical base for automatic projection of difficult radio engineering systems. This research, under his supervision and with his direct participation, created the mathematical concept of systems of embedded models, methods of verification of mathematical models, the statistical approach to the problem of verification. Important attention was paid to the algorithmic realization of mathematical models, where the results by V. L. Makarov in the field of numerical methods were used.

During the last years V. L. Makarov laid the foundation of the general theory of the polynomial interpolating of the non-linear operators in abstract spaces. The necessary and sufficient existence and uniqueness conditions for polynomial interpolants in Hilbert and vector spaces were proven and procedures to construct these polynomials were proposed. Generalizations for the case of interpolation conditions containing Gato derivatives in all directions and others were received.

In 1990 Prof. Makarov, while working in an international team at the University of Leipzig, began a new line of research. He studied differential equations with operator coefficients, their solution operators and various operator equations in Hilbert and Banach spaces. A series of results of fundamental importance were obtained by Professor V. L. Makarov in this. These results were the base for the new efficient parallel approximations without accuracy saturation or with an exponential convergence rate to solutions of various partial differential equations. The exponentially convergent methods for various mathematical and applied problems stay at the focus of Prof. Makarov's research activities of the last decade since they lead to algorithms of optimal complexity.

An important field of Prof. Makarov's scientific activities is mathematical modeling of sloshing of fluids in moving containers with various marine applications. These phenomena are described by complex systems of nonlinear partial differential equations in domains

with moving boundary. The investigations of Prof. Makarov were granted since 1997 by the German Research Council (DFG) and by the German Academic Council (DAAD).

Professor V. L. Makarov has been teaching for 35 years in the Kyiv University, giving cardinal normative and special courses in numerical mathematics. He created a school of numerical mathematics which includes, beside others, 45 candidates and 13 doctors of physical-mathematical sciences that have prepared their theses under his supervision. Results published by V. L. Makarov are widely known in the scientific world and make an important contribution to mathematics.

Under the guidance of Academician Makarov a constantly acting seminar on numerical mathematics takes place. He also directs a problem board of numerical mathematics. For 10 years V. L. Makarov belonged to the editorial board of the journal "Differential equations" he is a member of editorial boards of the journals CMAM, AMI, a deputy editor-in-chief of the Journal of Numerical and Applied Mathematics. And he repeatedly belonged to specialized boards of the doctoral and Ph.D. thesis defends. Academician Makarov was invited speaker at a number of International conferences and schools of applied mathematics; he is the head of the International Coordinating Board of the Numerical Mathematics, the member of the American Mathematical Society.

In 1995 V. L. Makarov won the grant and was given an honorary title "Soros professor". In 1997, being a member of a scientific association, he won grant DFG (German research association), several times he won DAAD grants. For the gained success in his work he was awarded with the order of the Labor Red Flag and with medals. In 2000 V. L. Makarov was elected as a Corresponding Member of the NASU and in 2009 as an Academician of the NASU.

Volodymyr Leonidovych Makarov is full of new scientific ideas and concepts. His active work promotes development of numerical mathematics in Ukraine and recognition of the achievements of Ukrainian mathematicians by the international scientific society.

We cordially congratulate the jubilee celebrator and wish Volodymyr Leonidovych creative successes and scientific longevity.

June 3, 2011.

*R. Chapko, M. Dryja, I. Gavrilyuk, A. Gulin, V. Khlobystov,
M. Kutniv, R. Lazarov, I. Lukovsky, P. Matus, L. Shlepakov,
H. Shynkarenko, A. Timokha, V. Vasylyk, N. Voitovich, L. Yanovich.*