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Professor V. L. Makarov — 65

Volodymyr Leonidovych Makarov, prominent Ukrainian mathematician, numerical analyst, Corresponding Member of the National Academy of Science of Ukraine (NASU), turned 65. Many achievements of modern numerical mathematics are due to Professor V. L. Makarov. He has developed algorithms for solving different problems of Mathematical Physics and has carried out a wide range of theoretical investigations in numerical analysis. He created new directions and his research work embraces a wide range of mathematical topics in the theory of difference schemes, exponentially convergent algorithms, automatic design of complex radio engineering systems, polynomial interpolation nonlinear operators in abstract spaces and constructive representation of solution operators for differential equations with operator coefficients in Hilbert and Banach spaces.

In 1963 V. L. Makarov graduated from the Faculty of Mechanics and Mathematics of the Kyiv State University. In 1967 he defended his candidate thesis (Physics and Maths) under the Prof. G. N. Polozhij supervision. In 1974 he received the degree of Doctor of Sciences (Physics and Maths). In the period between 1981 and 1998 V. L. Makarov was a Head of the Department of Numerical Methods in Mathematical Physics of the Kyiv National University. In October of 1998 he was appointed Head of the department of numerical mathematics of the Institute of Mathematics (NASU).

Prof. Makarov contributed to science over 260 works, including Textbook on Numerical Methods and many monographs: Spline-approximation of functions (Moscow, Vysshaya Shkola, 1983); Difference schemes for differential equations with weak solutions (Moscow, Vysshaya Shkola, 1987); Mathematical support of complex experiment (Kyiv, Naukova Dumka, 1982 – 1990 (in 5 volumes)); Introduction to the theory of polynomial operator interpolations (Kyiv, NASU, 1998); Interpolation of operators (Kyiv, Naukova Dumka 2000); Methods of Calculations (Kyiv, Vystsha Shkola, (in 3 volumes)); Strongly Positive Operators and Numerical Algorithms without Accuracy Saturation (Kyiv, NASU, 2004); and Evolution Type Problems of the Contained Fluid (Kyiv, NASU, 2006).

In 1963 – 1974 the main directions of Makarov's research was the theory of the difference schemes. He was the first to introduce and study the new class of difference schemes, the so-called difference schemes with an exact and explicit spectrum — predecessors of the modern spectral methods. In studying the mathematical apparatus of these schemes and special functions of the discrete argument, V. L. Makarov obtained important results in the theory of associated orthogonal polynomials. Exact-spectrum difference schemes are widely used in practice, especially for hyperbolic equations with non-smooth solutions. V. L. Makarov has made an important contribution to the development of the theory of exact and truncated difference schemes, introduced in 1959 – 1968 by academicians A. N. Tikhonov and A. A. Samarskii. V. L. Makarov formulated sufficient conditions for complete conservativity

of the differences scheme for equations of gas dynamics. In 1979 – 1980, in a series of joint works with academician A. A. Samarskij and Professor R. Lazarov a new technique in the theory of finite difference schemes, that allows to derive convergence rates compatible (adjusted) with the smoothness of the solution of the primary differential problem was proposed and developed. Further, these investigations were continued by V. L. Makarov and his students and collaborators. Differences schemes with adjusted convergence rate for quasi-linear problems of mathematical physics in Sobolev spaces were defined and studied. Now these models are being used in mechanics and the theory of elasticity, in the theory of systems with distributed parameters, etc.

In 1975 V. L. Makarov launched a series of theoretical investigations on computer-aided design of complex radio-engineering systems. A new mathematical concept of systems of embedded models, methods of verification, and a statistical approach to their verification were developed with his active participation and further supervision. Serious consideration was given to the algorithmic realization of mathematical models, where the theoretical results obtained by V. L. Makarov in the area of numerical analysis were used.

In the last decade, V. L. Makarov laid foundations of a new general theory of polynomial interpolation of nonlinear operators in abstract spaces. The necessary and sufficient conditions for the existence and uniqueness of polynomial interpolants in Hilbert and vector spaces were proven and constructive procedures of finding these polynomials were proposed. Generalizations to the case of interpolation conditions containing Gâteaux derivatives in given directions and other generalizations were made. A series of results of fundamental importance were obtained by Prof. V. L. Makarov in the field of constructive representation of solution operators for differential equations with operator coefficients in Hilbert and Banach spaces. These results formed the basis for new efficient parallel methods without accuracy saturation or with an exponential convergent rate to the solutions of various partial differential equations.

Professor V. L. Makarov has been lecturing for 35 years at the Kyiv State University, giving regular and special courses in numerical mathematics. He founded a school of numerical mathematics, advised more than 43 PhD students, and mentored 10 doctors of physical-mathematical sciences. The results published by V. L. Makarov are widely known in the scientific world and represent important contributions to mathematics. He is a founder and organizer of regular seminars on numerical mathematics at the Kyiv University. For 10 years V. L. Makarov acted as a member of the editorial board of the journal "Differential equations", currently he is a member of the editorial boards of the journals CMAM, AMI, a deputy editor-in-chief of the Journal of Numerical and Applied Mathematics. He was an invited speaker at many International conferences, Workshops and Summer Schools of applied mathematics, he is Head of the International Coordinating Board of Numerical Mathematics and a member of the American Mathematical Society. In 1995 he won a grant and was given the honorary title "Soros professor". In 1997, being a member of a scientific association, he won a DFG (German Research Association) and several DAAD grants. For his scientific achievements V. L. Makarov was awarded various medals and distinctions and in 2000 was elected a Corresponding Member of the National Academy of Sciences of Ukraine.

Volodymyr Leonidovych Makarov is full of energy and new scientific ideas. He is still a driving force in numerical mathematics in Ukraine and one of the most recognized Ukrainian mathematicians in the world scientific community. We wish Volodymyr Leonidovych long years of good health, new successes and scientific longevity.

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