ALEXANDER ALIPKANOVICH ZHENSYKBAEV (1947-2009)

Academician of the National Academy of Sciences of the Republic of Kazakhstan,
Doctor of Physics and Mathematics, Professor

Alexander Alipkanovich Zhensykbaev was born on the 21st of August in 1947, in Burgas (Bulgaria) into a military family. In 1970, he graduated from the Mechanics and Mathematics Faculty of Dnepropetrovsk State University and later continued his studies as a postgraduate student at the same university in the Department of Function Theory and Functional Analysis. In 1973, he successfully defended his candidate thesis "Some spline approximation problems in function spaces" in the specialty "Theory of Functions and Functional Analysis" under the supervision of the Academician of the National Academy of Sciences of Ukraine, N.P. Korneichuk. In the thesis, he presented exact estimates for the approximation of classes of continuous and differentiable functions by interpolation splines of minimal deficiency.

From 1974 to 1981, A.A. Zhensykbaev worked as a Senior Lecturer and an Assistant Professor in the Department of Mathematical Analysis of Kirov's Kazakh State University. From 1981 to 1998, he was the Head of that department. In 1998, he was appointed the Director of the Department of Attestation of Scientists at the Ministry of Science — the Academy of Sciences of the Republic of the Kazakhstan (RK). From 2000 to 2007, he worked as the Director of the Institute of Mathematics of the Ministry of Education and Science of RK.

In 1980, A.A. Zhensykbaev defended his Doctor of Sciences thesis "Extremal properties of monosplines and best quadrature formulae" in the specialty "Mathematical Analysis" at the Steklov Mathematical Institute of the USSR. In this thesis, a well-known problem of the best quadrature formula for the Sobolev classes of functions was solved. The methods for solving this problem proved to be applicable for solving many other problems connected with interpolation theory, the theory of widths, and the theory of quadratures, and have been further developed by many mathematicians.

A.A. Zhensykbaev was awarded the academic rank of Professor in 1982. In 1995, he was elected a Corresponding Member of the National Academy of Sciences of RK and, in 1999, he was elected a Member of the International Academy of Higher Education. In 2003, he became an Academician of the National Academy of Sciences of RK.

A.A. Zhensykbaev was a worldwide recognized expert in the field of function theory. He made significant contributions to the theory of approximation of functions and recovery of operators. His name is associated with the development of the theory of splines in Kazakhstan. He solved well-known problems of zeros of monosplines of arbitrary multiplicity as well as the best Gaussian quadrature formulae for weak Chebyshev systems. The other part of Zhensykbaev's research concerned the theory of functions of many variables. In this theory, he obtained a number of new significant results. In particular, he developed new optimal methods for recovering operators in the classes of functions of many variables as well as new multi-dimensional interpolation methods.

A.A. Zhensykbaev's most significant scientific achievements are as follows:

– obtaining exact estimates for the approximation of some classes of smooth periodic functions by interpolation splines,

– solving the well-known Kolmogorov-Nikol'skii problem on the best quadrature formula in Sobolev classes,

– introduction of a new method of approximation of functions of many variables, the so called Information-Nuclear Splines, which lead to the discovery of optimal methods for the recovery of a wide class of (not necessarily linear) operators on classes of elements of convolution type.

The methods are used to solve many problems in data processing, image identification and mathematical modelling.

A.A. Zhensykbaev was an INTAS expert (Brussels (1994) and Almaty (1996)). He was one of the Editors of the International Journal "East Journal on Approximation", published in Bulgaria, as well as the Editor-in-Chief of the "Mathematical Journal" (Almaty) and a Member of the American Mathematical Society. A.A. Zhensykbaev participated in Mathematical Congresses (Moscow, Warsaw, Zurich) and in many international conferences (Kazakhstan, Russia, USA, France, Spain, Yugoslavia, Poland, Hungary, Bulgaria, India, etc.) with his scientific reports, and lectured at universities in the USA, France, Spain, Poland and Pakistan. He was a Research Manager of the International INTAS program which brought together scientists from Germany, France, Spain, Russia and Kazakhstan.

A.A. Zhensykbaev published approximately 90 scientific papers, 3 monographs and 2 textbooks and supervised 10 candidate theses. He was awarded the Lenin Komsomol Prize in Science and Technology (USSR, 1978) for his scientific achievements. In 1984, he was awarded the "Badge of Honor", and in 2001 he was awarded the "10 years of independence of Kazakhstan" medal. In 1999, he became the winner of the "Al-Khwarizmi Award" (Iran). In 2000, A.A. Zhensykbaev was elected an Honorary Member of the American Association of Scientific Advisors.

Professor A.A. Zhensykbaev died on September 4, 2009.

A.A. ZHENSYKBAEV'S MOST IMPORTANT PUBLICATIONS

1. Exact bounds for the uniform approximation of continuous periodic functions by r-th order splines. Mathematical Notes, **13**:2 (1973) 130–136.
(http://www.springerlink.com/content/h01l64323774613n/fulltext.pdf)

2. The approximation of periodic differentiable functions by splines with respect to a uniform partition. Mathematical Notes, **13**:6 (1973) 483–489.
(http://www.springerlink.com/content/k246103781k3357n/fulltext.pdf)

3. Approximation of certain classes of differentiable periodic functions by interpolational splines in a uniform decomposition. Mathematical Notes, **15**:6 (1974) 569–575.
(http://www.springerlink.com/content/l6731j7348pj2416/fulltext.pdf)

4. Best quadrature formula for the class $W^r L_p$. Soviet Math. Dokl, **17** (1976) 377–380.

5. Best quadrature formula for the class $W^r L_2$. Analysis Mathematica, **3**:1 (1977) 83–93.
(http://www.springerlink.com/content/j273220244768322/fulltext.pdf)

6. Best quadrature formulas for some functions. Doklady Akad. Nauk SSSR, Math., **236**:3 (1977) 531–534 (in Russian).

7. On best quadrature formulae for some classes of non-periodic functions. Soviet Math. Dokl, **18** (1977) 1222 – 1226.

8. Best quadrature formula for some classes of periodic differentiable functions. Mathematics of the USSR-Izvestiya, **11**:5 (1977) 1055–1071.
(http://iopscience.iop.org/0025-5726/11/5/A08/pdf/0025-5726_11_5_A08.pdf)

9. One property of best quadrature formulas. Mathematical Notes, **23**:4 (1978) 301–307.
(http://www.springerlink.com/content/q23hj42451316t8n/fulltext.pdf)

10. Spline interpolation and best approximation by trigonometric polynomials. Mathematical Notes, **26**:3 (1979) 670–676.
(http://www.springerlink.com/content/n4n334676h446183/fulltext.pdf)

11. Monosplines and best quadrature formulae for certain classes of non-periodic functions. Analysis Mathematica, **5** (1979) 301–331.
(http://www.springerlink.com/content/j5114q0518234870/fulltext.pdf)

12. Characteristic properties of best quadrature formulas. Siberian Mathematical Journal, **20**:1 (1979) 34–49.
(http://www.springerlink.com/content/h6m2776q762nl279/fulltext.pdf)

13. Monosplines least deviating from zero and best quadrature formula. Soviet Math. Dokl., **20** (1979) 1257–1261.

14. Monosplines of minimal norm and the best quadrature formulae. Russian Mathematical Surveys, **36**:4 (1981) 121–180.
(http://iopscience.iop.org/0036-0279/36/4/R03/pdf/0036-0279_36_4_R03.pdf)

15. Optimal recovery methods for the integral on classes of differentiable functions. Analysis Mathematica, **7** (1981) 303–318.
(http://www.springerlink.com/content/vu12734h00h4u401/fulltext.pdf)

16. Extremal properties of monosplines and best quadrature formulas. Mathematical Notes, **31**:2 (1982) 145–154.
(http://www.springerlink.com/content/p34q22233p945769/fulltext.pdf)

17. Extremality of monosplines of minimal deficiency. Mathematics of the USSR-Izvestiya, **21**:3 (1983) 461–482.
(http://iopscience.iop.org/0025-5726/21/3/A04/pdf/0025-5726_21_3_A04.pdf)

18. Monosplines of minimal L_1-norm. Mathematical Notes, **33**:6 (1983) 443–452.
(http://www.springerlink.com/content/u0rj6508p1n00v4m/fulltext.pdf)

19. Extremal properties of certain sets of splines and their applications, Constructive theory of functions. Proc. Int. Conf., Varna, Sofia (1984) 917–927.

20. Monosplines with nonnegative coefficients, Proc. University of Oregon, Eugene (1986) 1–18.

21. On monosplines with nonnegative coefficients. J. Approx. Theory, **55**:2 (1988) 172–182.
(http://www.sciencedirect.com/science/article/pii/0021904588900846)

22. The fundamental theorem of algebra for monosplines with multiple nodes. J. Approx.Theory, **56**:2 (1989) 121–133.
(http://www.sciencedirect.com/science/article/pii/0021904589901044)

23. Information-Nuclear Splines in recovery problems. Rus. Acad. Sci. Dokl. Math., **47**:1 (1993) 62–67.

24. Spline approximation and optimal recovery of operators. Russian Academy of Sciences. Sbornik. Mathematics, **80**:2 (1995) 393–409.
(http://iopscience.iop.org/1468-4802/80/2/A07/pdf/1468-4802_80_2_A07.pdf)

25. Nonlinear interpolation and norm minimization. Mathematical Notes, **58**:4 (1995) 1033–1041.
(http://www.springerlink.com/content/rll16xk1k6475070/fulltext.pdf)

26. Recovery of operators on classes of multivariate functions. East Journal on Approximations, **1**:2 (1995) 197–220.

27. Recovery problems on sets of multivariate functions by accurate data. Analysis Mathematica **23**:1 (1997) 149–157.
(http://www.springerlink.com/content/w2n1378816966815/fulltext.pdf)

28. Approximation methods of multivariate functions. Int. Conf. on Func. Analysis and Approximation, Moscow (1998) 78.

29. Derivatives of Chebyshev's systems and interpolation. Mathematical Journal, Almaty, **1**:1 (2001) 41–51 (in Russian).

30. Interpolation of sourcewise multivariate functions. East Journal on Approximations, **10**:1–2 (2004) 57–65.

31. Interpolation and smoothing of multivariate functions. Bulletin of Marathwada Mathematical Society, **6** (2007) 78–94.

32. Smoothing of sourcewise multivariate functions. Mathematical Journal, Almaty, **9**:2 (2009) 53–63
(http://www.math.kz/math/2009-2/Zhensykbaev.pdf).

Monographs and Textbooks

1. Splines in Problems of Recovery. Almaty, 2001, 352 pages (in Russian).
2. Problems of Recovery of Operators. Regular and Chaotic Dynamics Press, Moscow-Izhevsk, 2003, 414 pages (in Russian).
3. Differential Forms on Manifolds. Almaty, 2003, 114 pages (in Russian).
4. Theory of Sequences. Textbook, Almaty, 2005, 46 pages (in Russian).
5. Differential Forms and Manifolds. Regular and Chaotic Dynamics Press, Moscow-Izhevsk, 2007, 136 pages (in Russian).

Please follow the links below to get more information on A.A. Zhensykbaev and his publications

at Math-Net.Ru:

http://www.mathnet.ru/php/person.phtml?&personid=17459&option_lang=eng

at Springer.com:

http://www.springerlink.com/content/?k=(au%3a(Zhensykbaev)+OR+ed%3a(Zhensykbaev))

at math.kz:

The 60th anniversary of the birth of A.A. Zhensykbaev. Mathematical Journal, Almaty, **7**:3 (2007) 97–99 (in Russian)
http://www.math.kz/math/jensik.htm

obituary (necrologue) for A.A. Zhensykbaev. Mathematical Journal, Almaty, **9**:3 (2009) 106–107 (in Russian)

http://www.math.kz/math/2009-3/nekrolog.pdf

http://www.kazscinet.unesco.kz/html/12.html

http://biografia.kz/famous/2376

http://www.kimep.kz/files/BCB/profiles/Alexander_Zhensykbayev.pdf

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