# IN MEMORIAM OF SCIENTIST

## In memory of the talented mathematician, our comrade and friend Krasnov Yakov Alexandrovich (1951–2023)

Krasnov Yakov Alexandrovich was born on March 28, 1951 in Aktyubinsk town, Kazakh SSR, in a family of doctors – Alexander Grigoryevich (subsequently, a personal pensioner of republican significance) and Lyudmila Samoilovna Krasnova. In 1968 Yakov graduated secondary school No. 2 in Aktyubinsk and in the same year entered the Mechanics and Mathematics Faculty, Mathematics department of the Moscow State University named after M.V. Lomonosov, which graduated in 1973.

In 1973 he started to work as lecturer of the Math department at the Ust-Kamenegorsk Road-Construction Institute. In 1975 he became postgraduate student of the Institute of Mathematics and Mechanics of the Academy of Sciences of the Kazakh SSR. In 1978 he successfully completed his postgraduate studies and in the same year, under the supervising of a Corresponding Member of the Academy of Sciences E.I. Kim he successfully defended his Candidate thesis of the Physics and Mathematics Sciences "Solution of the problems of the theory of heat conduction and potential with nonlinear boundary conditions of a special type and their applications" on the specialization 01.01.02 "Differential equations, dynamical systems and optimal control".

After defending his dissertation, he continued research as a Researcher at the (headed by E.I. Kim) laboratory of Equations of Mathematical Physics of the Institute of Mathematics and Mechanics (IMM). In 1981, he was certified as a Senior Researcher. In this time, he was already the author of 15 published scientific papers.

During his work at the IMM of the Academy of Sciences of the Kazakh SSR, Ya.A. Krasnov carried out a number of important scientific researches in the field of the qualitative theory of partial differential equations, which have practical application in the construction of electrical apparatus and in other areas of science and technology. In particular, he obtained solutions to a number of nonlinear boundary problems of the theory of heat conduction and potential, in a form suitable for engineering calculations.

Under his and E.I. Kim's supervising R.N. Kantaeva prepared and succesfully defended the PhD dissertation "Potential Method in Boundary Value Problems with a Moving Boundary for a System of Equations of a Parabolic Type" (01.01.02).

In addition to scientific work, Ya.A. Krasnov also performed various complimentary assignments and duties: he was the editor of the institute's wall newspaper, worked at the Small Academy of School pupils, took part in the design of thematic stands, posters.

In the collective of the Institute, Yakov Alexandrovich was distinguished by a cheerful and responsive character, and he was a respected person.

In 1991, the family of Yakov Aleksandrovich together with his parents went to Israel and settled in Tel Aviv, in the Ramat Gan region. In Israel, he was hired in a renowned university Bar Ilana to the position of a researcher at the Department of Mathematics, where he continued his scientific activities, and also taught the courses:

– Numerical analysis,
– Calculus of variations,
– Ordinary differential equations.

The themes of his scientific works were:

Elements of a spectral theory in non associative algebras,
Application of the stability theory to homogeneous of ODEs,
The operator analytic functions theory,
Symmetries of the Dirac equation,
Numerical methods for free boundary value problem,
Theory of non-conformal finite element method preserving harmonic moments,
Geometrically optimal space-time motion algorithms.

Unfortunately, in recent years, he was diagnosed with heart problems, which eventually led to his untimely death in May 2023.

Numerous friends and colleagues who worked with him remember him as a talented scientist, a respected and responsible emploeee, a kind and sympathetic person, and a wonderful family man.

Yakov Aleksandrovich Krasnov is the author and co-author of numerous scientific articles, the most significant of which are listed below:


1 The solution of nonlinear moving boundary value problems in the theory of heat conduction and potential and their applications. Ph.D. thesis, 1978.

2 Solution of a class of nonlinear boundary value problems. (Russian) Izv. Akad. Nauk Kazakh. SSR Ser. Fiz.-Mat. 1978, no. 1, 73–76.

3 The potential of the electromagnetic fields of the system of spherical discs. in "Theoretically and Applied Problems of Mathematics and Mechanics", vol. II, 1979.

4 Roots of polynomials with real coefficients. (Russian) Izv. Akad. Nauk Kazakh. SSR Ser. Fiz.Mat. 1980, no. 1, 83–84, (with Ten, V.D.).

5 A class of nonlinear problems of heat conduction. (Russian) Partial differential equations, 83–86, 250, "Nauka" Sibirsk. Otdel., Novosibirsk, 1980 (with Kim, E.I.; Kharin, S.N.).

6 Theoretically study of processes commutations in electrical switches. In "Application of computers methods in engineering", Alma-Ata, 1980 (with D.U.Kim, S.N.Kharin).

7 Solution a class of nonlinear problems of heat transfer in contacts phenomena. "Differential equation", vol. 1, Novosibirsk, 1980.

8 About richness of content in the W.I. Smirnov theory of the conjugates function. "Differential equations and their applications". vol II, Alma-Ata, 1981.

9 Thermal potentials in problems with a moving boundary. (Russian) Boundary value problems for differential equations and their applications in mechanics and technology, 86–90, "Nauka" Kazakh. SSR, Alma-Ata, 1983.

10 The thermal potentials in the theory of heat conduction with the moving boundary. "Boundary value problems and their applications", Alma-Ata, 1983.

11 Solution of problems of the theory of heat conduction in domains with moving boundaries. (Russian) Analytic and numerical methods for solving problems in mathematics and mechanics, 67–72, 213, "Nauka" Kazakh. SSR, Alma-Ata, 1984.

12 On the correctness and existence in some inverse heat conduction problems. Trudy Kazakh Sci. Conf. of Math. and Mech. vol 2, 1984 (with U.M. Sultangazin).

13 Singularities of weak solutions of diffusion approximation of a kinetic equation of retardation in the X-Y-geometry. (Russian) Izv. Akad. Nauk Kazakh. SSR Ser. Fiz.-Mat. 1984, no. 3, 49–53 (with Sultangazin, U.M.; Sakabekov, A.).

14 Solution of some problems of the heat conduction theory in domains with moving boundary. "Analytical and Numerical solution of Mathematical Problems", Alma-Ata, 1984.

15 Computer models of the interaction between a material and laser beam, being processed via the trajectory. In Proc. of Conf. "Progressive Technology harden of machine parts and tools". Moscow, 1986 (with R. Kantajeva).

16 Theoretical study of the kinetics of austenitization in steels with heating by continuous laser radiation. Journal of Engineering Physics. Vol 22, No 2, 1986 (with E. Kim, A. Grigoriantz)

17 Evaluating the deep heat flow taking into account the phase transitions in the lithosphere. Izvestija AN USSR. Earth Physics. Vol. 22, No 2, Moscow, 1986.

18 Computation of structure zone of cathode during influence on electrical arc. In "Electrical contacts and electrodes". Kiev, 1987, (with E. Kim, S. Kharin).

19 Modeling of the thermal treatment of rock. Kazakh Politechnika Alma-Ata, 1987, (with S. Saparev, R. Kantaeva).

20 Dynamics of thermo physical processes in the cathode during influence up on arc. "Switching arc phenomena Lodz, 1989 (with W. Pak, E. Kim).

21 Calculation of the kinetics of steel austenization in laser heating, Journal of Engineering Physics and Thermophysics, 1989, (with A.N. Safonov, E.A. Shcherbakova, M.N. Ivlieva, A.N. Trofimov).

22 Some inverse problem for systems of parabolic differential equations. In "Conditional correct problem in mathematical physics". Moscow, 1989.

23 Modeling of thermochemical and diffusive intra electrode processes during arcing. In Proc. of Int. symposium on electrical contacts. Theory and Applications. Almaty, 1993 (with A. Kavokin, R. Kantaeva).

24 Quadratic divisors of harmonic polynomials in $R^n$, Anal. Math. 82(1), 2012, 379–395 (with M. Agranovsky).

25 Commutative algebras in Clifford Analysis, In 3rd International ISAAC conference Proceedings, Berlin, 2001.

26 Complex structures in algebras and bounded solutions to quadratic ODE's. Functional differential equations and applications (Beer-Sheva, 2002). Funct. Differ. Equ. 10, no. 1-2, 2003, 65–81 (with Z. Balanov, W. Krawcewicz).

27 Harmonics maps by Clifford analysis technique, In: Mid-West Geometry Conference, University of Arkansas, Fayetteville, 2004.

28 Operator method for solution of PDEs based on their symmetries. Operator theory, systems theory and scattering theory: multidimensional generalizations, Oper. Theory Adv.Appl., 157, Birkhäuser, Basel, 2006, 107–137 (with S.D. Eidelman).

29 Analytic function in Operator Variable as solution to PDEs, In 17th International Conference on the Application of Computer Science and Mathematics in Engineering, Weimar, 2006, 1–16.

30 Differential equations in algebras. In Hypercomplex analysis. Birkhäuser. Trends in Mathematics, 2010, 187–205.

31 Properties of ODEs and PDEs in algebras, Complex Analysis and Operator Theory: Volume 7, Issue 3, 2013, 623–634.

32 Spectral Properties of Differential Equations in Clifford Algebras, in Hypercomplex Analysis: New Perspective and Applications, 2014, 203–213.

33 Complex structures in algebra, topology and differential equations. Georgian Math. J., no. 21(3), 2014, 249–260 (with Z. Balanov).

Patent:

34 Method of thermal strengthening of the surfaces machine parts with the number of concentrated heat sources. U.S.S.R. Certificate of Invention No 3852567/22, 1986, (with S. Kharin, A. Grigoriantz, A. Safonov)

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