

DEPARTMENT OF NON-HARMONIC ANALYSIS
Institute of Mathematics and Mechanics
National Academy of Sciences of Azerbaijan

BRIEF REPORT ON SCIENTIFIC & ORGANIZATIONAL ACTIVITIES
FOR THE YEAR 2017

15 research works have been done in the fields of “Frame theory and its applications” and “Spectral properties of non-self-adjoint differential operators” by the employees of the Department of Non-Harmonic Analysis (DNHA) in 2017.

There are 22 employees in DNHA, including 1 Doctor of Sciences, 12 PhD’s (5 of them being part-timers), 2 researchers, and 7 laboratory assistants (2 PhD’s have been fired in September 2017).

Every Wednesday at 12⁰⁰ and every Thursday at 11⁰⁰ DNHA holds its weekly seminars. Many employees of DNHA are engaged in education works in various higher education institutions: Bilalov Bilal is lecturing to Master’s degree students at IMM, NAS of Azerbaijan, Telman Kasumov and Migdad Ismailov are teaching students at the Baku State University, while Ali Huseynli, Tarlan Garayev and Sabina Sadigova are the members of teaching staff of the Khazar University.

34 research works including 18 scientific articles have been published by the employees of DNHA in 2017. Short summaries of 16 research works by the employees of DNHA have been included in proceedings of various scientific conferences. 11 articles have been published in international journals (3 of them in the journals with an impact factor) and 7 articles have been published in local journals.

Articles published in the journals indexed in Web of Science

- Bilalov B.T., Sadigova S.R. Frame properties of the part of a system of exponents with degenerate coefficient in Hardy classes. Georgian Mathematical Journal, ISSN (Online) 1572-9176, ISSN (Print) 1072-947X, DOI: <https://doi.org/10.1515/gmj-2016-0051>, November 2016
- Mohammad Mursaleen, Bilalov B.T., Syed M. H. Rizvi Applications of Measures of Noncompactness to Infinite System of Fractional Differential Equations. Filomat 31:11 (2017), 3421–3432 <https://doi.org/10.2298/FIL1711421M>
- Huseynli A.A., Mirzoyev V.S., Quliyeva A.A. On Basicity of the Perturbed System of Exponents in Morrey-Lebesgue Space. AzJM, vol 7, No 2, 2017, p. 197-216

- Shukurov, A. Sh. Comment on "On the Frame Properties of Degenerate System of Sines". *J. Funct. Spaces* 2017, Art. ID 9257076, 4 pp.
 - Shukurov, A. Sh., Ismailov, N. A. On the minimality of double exponential system in weighted Lebesgue space. *Azerb. J. Math.* **7** (2017), no. 1, 120-129.
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INTERNATIONAL PARTNERSHIP

I. Aligarh Muslim University, Aligarh, India.

Within the frameworks of the partnership agreement signed between Aligarh Muslim University and IMM, professor Bilalov was a reviewer for the following theses during the reporting period:

- 1) Ahmed A.H. Al-Abeid. "Application of q-calculus in summability and approximation."
- 2) Taqseer Khan. "Approximation by some positive linear operators."

Within the framework of the same agreement, the following scientific article has been published in co-authorship with professor Bilalov:

Mohammad Mursaleen, Bilalov B.T., Syed M. H. Rizvi. Applications of Measures of Noncompactness to Infinite System of Fractional Differential Equations. *Filomat* 31:11 (2017), 3421–3432 <https://doi.org/10.2298/FIL1711421M>

II. Yildiz Technical University, Istanbul, Turkey.

During the reporting period, professor Bilalov was a reviewer for a frame theory-related thesis submitted by Yunus Sacli, post-graduate student at the Yildiz Technical University.

ACTIVITIES IN THE FRAMEWORK OF THE PROGRAM ENTITLED "APPROXIMATION BY NEURAL NETWORKS AND SOME PROBLEMS OF FRAMES"

The following methodological manuals have been published in 2017:

- I. Signals. Classification. Wavelet analysis.
- II. Mathematical methods for the identification of lands using satellite data.

The following scientific articles have been published:

1. Zabidov Z.C., Fətdayev H.F. Borda qaydası ilə hidrometrik müşahidə məntəqələrinin su sərfinə dair məlumatlarının informativliyinin qiymətləndirilməsi // Su problemləri: Elm və Texnologiyalar Jurnalı, Bakı, 2016, № 4, s. 47-53
2. Bilalov B.T., Zabidov Z.C. Müxtəlif istiqamətlər və fərqli optik intervallar üçün şəhər havasının optik vəziyyətinin informativliyinin qiymətləndirilməsi // Azərbaycan Neft Təsərrüfatı Jurnalı, Bakı, 2017, № 01, s.40-43
3. Zabidov Zakir J., Gasymov Telman B. Application of Condorcet, Bordo, Koplund and Simpson rules to rational organization and control ground observation set network of remote sensing of urban air // Asian Journal of Mathematics and Computer Research, 2017, Vol 16 Issue 2, pp. 129-133, <http://www.ikpress.org/issue/886>
4. Zabidov Zakir J., Gasymov Telman B. The application of Condorcet, Bordo, Koplund and Simpson rules to rational organization and control of the ground observation the network of remote sensing of urban air // Экологический вестник научных центров Черноморского экономического сотрудничества, 2017, №1, pp. 83-87

List of journals which published the articles written by DNHA employees in 2017:

- Georgian Mathematical Journal
- Filomat
- Journal of Function Spaces
- Afrika Matematika
- Уфимский математический журнал
- Eurasian Mathematical Journal
- Azerbaijan Journal of Mathematics
- Proceedings of the Institute of Mathematics and Mechanics
- Transactions of National Academy of Sciences of Azerbaijan
- Sahand Communications in Mathematical Analysis
- The Aligarh Bulletin of Mathematics.
- Mathematical Sciences Letters
- Caspian Journal of Applied Mathematics, Ecology and Economics
- Azərbaycan Neft Təsərrüfatı Jurnalı
- Su problemləri: Elm və Texnologiyalar Jurnalı
- Asian Journal of Mathematics and COMPUTER Research,
- Экологический вестник научных центров Черноморского экономического сотрудничества

A monograph co-authored by a DNHA employee:

R.M.Aslanov, A.I. Nijnikov, A.A. Mukhanova, S.A. Mukhanov, **T.R. Muradov**. Higher Mathematics. Textbook. Moscow, "Prondo", 2017, 328 pp. (in Russian)

Plenary reports by DNHA employees

Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	Statistical convergence, its generalization, continuous version and applications to Fourier series	Yildiz Technical University, Istanbul, Turkey
	Atomic decomposition and some problems of frames. t-frames. The concept of uncountable frame in non-separable Hilbert spaces	Yildiz Technical University, Istanbul, Turkey
	Statistical convergence, its generalization, continuous version and applications to Fourier-Stieltjes transform	Sterlitamak branch of Bashkir State University, international conference "Modern Mathematics and its Applications", Sterlitamak, Russia

SCIENTIFIC VISITS

Time Period	Employee	Destination (city, country)	Purpose of the visit
17.01.2017- 28.01.2017	Bilal Bilalov	Istanbul, Turkey	Participation in the joint project with the Yildiz Technical University entitled "Frame Theory – Application of Wavelet Analysis to Signal Processing in Seismology and Other Fields"
19.05.2017- 26.05.2017	Bilal Bilalov	Sterlitamak, Russia	Participation in the international conference "Modern Mathematics and its Applications"
01.10.2017- 08.10.2017	Sabina Sadigova	Heidelberg, Germany	Participation in the international conference "Mathematical Methods for Quantum Chemistry" hosted by the Heidelberg University

Journals prepared for publication by DNHA in 2017:

- **AZERBAIJAN JOURNAL OF MATHEMATICS, VOL. 7, No 1, 2017, JANUARY**
- **AZERBAIJAN JOURNAL OF MATHEMATICS, VOL. 7, No 2, 2017, JULY**
- **CASPIAN JOURNAL OF APPLIED MATHEMATICS, ECOLOGY AND ECONOMICS, VOLUME 5, No 1, 2017, JULY**

Preliminarily discussed theses

Telman Kasumov	Investigation of spectral properties of discontinuous differential operators	Scientific consultant: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan
Toghrul Muradov	Some problems of approximation theory and bases in generalized Lebesgue spaces	Scientific consultant: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan
Fatima Guliyeva	Frames and approximation properties of systems in different linear structures	Scientific consultant: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan
Zakir Zabidov	Applying mathematical and aerocosmic methods to the problems of optical monitoring of urban air	Scientific Supervisor: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan
Tubu Nazarova	Statistical types of convergence in topological spaces	Scientific Supervisor: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan
Arzu Safarova	Basicity of a double exponential system with degeneration	Scientific Supervisor: prof. Bilal Bilalov, corresponding member of the NAS of Azerbaijan

Prof. B.T.Bilalov

Head of the Department of Non-Harmonic Analysis

Corresponding Member of the National Academy of Sciences of Azerbaijan