

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

BRIEF ANNUAL REPORT ON SCIENTIFIC & ORGANIZATIONAL ACTIVITIES
FOR 2022

12 research works have been done on the topics of “Problems of the theory of approximations and frames in Banach function spaces” and “Spectral properties of differential operators in symmetric spaces and applications to the Noetherness of elliptic equations” by the employees of the Department of Non-Harmonic Analysis (DNHA) in 2022.

There are 16 employees in DNHA, including 4 Doctors of Sciences (3 of them part-timers), 7 PhD’s (2 of them part-timers), 2 researchers, 2 senior laboratory assistants and 1 laboratory assistant.

Most of the department's employees are engaged in teaching activities in higher educational institutions (Baku State University, Khazar University, Guba branch of Azerbaijan State Pedagogical University, Odlar Yurdu University).

42 research works have been published by the employees of DNHA in 2022, including 1 monograph, 1 book chapter, **16** scientific articles (6 of them published abroad; TR-13; SCOPUS-1). Short summaries of **24** research works by the employees of DNHA have been included in proceedings of various scientific conferences. Besides, 4 articles have been accepted and more than 10 articles have been submitted for publication in various scientific journals.

Monograph	Book Chapter	Articles	Abstracts
1	1	16	24

Monograph

Билал Билалов. Банаховы функциональные классы Харди и метод краевых задач в вопросах базисов. Баку, «ЭЛМ», 2022, 272 с.

Book Chapter

Bilalov B.T., Sadigova S.R., Kasumov Z.A. Some Solvability Problems of Differential Equations in Non-standard Sobolev Spaces. IntechOpen. Differential Equations, DOI: 10.5772/intechopen.104918

Articles

In journals included in the Web of Science and SCOPUS databases:

1. B.T. Bilalov, S.R. Sadigova, V.G. Alili, On solvability of Riemann problems in Banach Hardy classes. Filomat 35:10 (2021), 3331–3352 (**IF=0.844; WOS; SCOPUS**)
2. B. T. Bilalov, S. R. Sadigova & Seyma Cetin, The Concept of a Trace and the Boundedness of the Trace Operator in Banach-Sobolev Function Spaces, Numerical Functional Analysis and Optimization, 43:9, 1069-1094 (2022) (**IF=1.418; WOS; SCOPUS**)

3. B. T. Bilalov, Y. Zeren, S. R. Sadigova & S. Cetin, On solvability in the small and Schauder-type estimates for higher order elliptic equations in grand Sobolev spaces (nonseparable case), *Applicable Analysis*, DOI: [10.1080/00036811.2022.2052859](https://doi.org/10.1080/00036811.2022.2052859) (**İF=1.278; WOS; SCOPUS**)
4. B.T. Bilalov, N.R. Ahmedzadeh, T.Z. Garayev, Some Remarks on Solvability of Dirichlet Problem for Laplace Equation in Non-standard Function Spaces. *Mediterranean Journal of Mathematics* volume 19, Article number: 133 (2022) (**İF=1.315; WOS; SCOPUS**)
5. Bilalov B.T., Zeren Y., Sadigova S.R., Çetin Ş. Solvability in the small of m -th order elliptic equations in weighted grand Sobolev spaces. *Turk J Math* (2022) 46: 2078 – 2095 (**İF=0.954; WOS; SCOPUS**)
6. B.T. Bilalov, S.R. Sadigova, On local solvability of higher order elliptic equations in rearrangement invariant spaces. *Siberian Mathematical Journal*, 2022, Vol. 63, No. 3, pp. 425–437. (**İF=0.698; WOS; SCOPUS**)
7. Bilalov B.T., Ahmadov T.M., Y. Zeren, Sadigova S.R. Solution in the Small and Interior Schauder-type Estimate for the m -th Order Elliptic Operator in Morrey-Sobolev Spaces, *Azerbaijan J. Math*, 2022, v.12, N2, pp. 192-222 (**WOS; SCOPUS**)
8. Y. Zeren , M. Ismailov, and C. Karacam, The Analogs of Korovkin theorems in Banach Function spaces, *Positivity*, 26, 28 (2022). (**İF=0.853; WOS; SCOPUS**)
9. Y. Zeren, M. Ismailov , K. Acar and I. Aliyarova, On basicity of exponential and trigonometric systems in grand Lebesgue spaces, *Hacet. J. Math. Stat.* Volume 51 (6) (2022), 1577 – 1587 (**İF=0.867; WOS; SCOPUS**)
10. M.I. Ismailov, S.I. Jafarova, On existence and uniqueness of generalized solution of mixed problem for one class of third order differential equations in Banach spaces, *Azerbaijan Journal of Mathematics*, V. 12, No 1, 2022, 195-210. (**WOS; SCOPUS**)
11. Farman Mamedov and Vafa Mamedova, Some remarks on Sobolev's type trace inequalities. *Azer. J. Math.*, vol 12, No 2, 2022, pp. 95-111 (**WOS; SCOPUS**)
12. Ismailov M.I. On uncountable frames and Riesz Bases in Nonseparable Banach Spaces, *Sahand Commun. Math. Anal.* Volume: 19 Number: 2 Pages: 149-170. (**WOS; SCOPUS**)
13. Shukurov A.Sh., Jabrailova A.N., *On frames that are iterates of a multiplication operator* . *Revista Colombiana de Matematicas* Volumen 55(2021)2, pp. 139-147 (**SCOPUS**)
14. Z.A. Kasumov & N.R. Ahmedzade. О некоторых свойствах потенциала Рисса в пространствах гранд Лебега и гранд-Соболева. *Труды Московского математического общества*", Том 83, вып. 1, 2022 г., 77-85 (**SCOPUS**)

In other journals

15. Telman Gasymov, Ulkar Hashimova, Reyhan Taghiyeva. On the Basicity of Eigenfunctions of a Non-self-adjoint Spectral Problem with a Spectral Parameter in the Boundary Condition in Lebesgue Spaces. *Caspian Journal of Applied Mathematics, Ecology and Economics* V. 10, No 1, 2022, July. P.31-43.
16. Fatih Sirin, Yusuf Zeren, Telman Gasymov. On basicity of eigenfunctions of one discontinuous differential operator in Banach function spaces. *Authorea*. November 02, 2022. DOI: [10.22541/au.166736702.23017975/v1](https://doi.org/10.22541/au.166736702.23017975/v1)

INTERNATIONAL COOPERATION

- Aligarh Muslim University

- Yildiz Technical University
- Bashkir State Pedagogical University
- Sterlitamak branch of Bashkir State University

PLENARY REPORT

Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	“On the strong solvability in the small of elliptic equations of the m-th order in weighted grand Sobolev spaces”	International Conference on Mathematical Advances and Applications (5-th ICOMAA2022), 2022, Istanbul, Turkey (online)
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	"On approximative properties of a perturbed exponential system in symmetric spaces"	Республиканская научная конференция «Теория функций, функциональный анализ и их приложения», посвященная 110-летию со дня рождения академика Ибрагима Ибиш оглу Ибрагимова (28-29 ноября 2022 г., г. Баку, Азербайджан)
The regular seminar of the Institute of Mathematics and Mechanics		
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	Solution of elliptic equations with respect to non-standard spaces	
OTHER		
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	Some features of the replenishment operation in topological structures	Online lecture at Nakhchivan State University (October 14, 2022)

REVIEWERSHIP FOR PEER REVIEWED INTERNATIONAL REFERRED JOURNALS

- American Mathematical Society;
- Applied Mathematics Letters (Elsevier);
- Proceedings of the Estonian Academy of Sciences ;
- Journal of Applied Mathematics and Computing (Springer);
- Zentralblatt MATH;
- British Journal of Mathematics & Computer Science;
- Sahand Communications in Mathematical Analysis;
- Wavelet and Linear Algebra;
- International Journal of Mathematical Analysis;
- Applied Mathematical Sciences;
- Asian Journal of Mathematics and Computer Research;
- Advances in Analysis;
- Turkish Journal of Matheamtics;
- Kuwait Journal of Science;
- Filomat;

- Journal of Classical Analysis;
- Sarajevo Journal of Mathematics;
- Kragujevac Journal of Mathematics;
- Communications Faculty of Sciences University of Ankara Series A1 Mathematics and Statistics;
- Mathematics and Statistics;
- Mathematical Sciences;
- Iranian Journal of Mathematical Sciences and Informatics;
- Siberian Mathematical Journal;
- Mathematics.

Journals prepared for publication by DNHA in 2022:

- **AZERBAIJAN JOURNAL OF MATHEMATICS, VOL. 12, No 1, 2022, JANUARY**
- **AZERBAIJAN JOURNAL OF MATHEMATICS, VOL. 12, No 2, 2022, JULY**
- **CASPIAN JOURNAL OF APPLIED MATHEMATICS, ECOLOGY AND ECONOMICS , VOL 10, No 1, 2022**

THESIS

DOCTOR OF SCIENCE

DEFENDED THESES:

Ismailov Migdad Imdad oglu	” On Generalizations of Frames and Some Questions of Approximation in Grand Lebesgue Spaces ”	Scientific consultant: Corresponding Member of the National Academy of Sciences of Azerbaijan, prof. Bilalov B.T.
Shukurov Aydin Shukur oglu	“ Frame properties of degenerate trigonometric systems, basis properties of Kostyuchenko type systems and some applications	Scientific consultant: Corresponding Member of the National Academy of Sciences of Azerbaijan, prof. Bilalov B.T.

THESES THAT HAS PASSED PRELIMINARY DISCUSSION:

Sadigova Sabina Ragib kizi	On frame properties of systems in linear topological spaces	Scientific consultant: Corresponding Member of the National Academy of Sciences of Azerbaijan, prof. Bilalov B.T.
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PhD:

DEFENDED THESES:

Zakir Jumshud oglu Zabidov	“Application of mathematical and aerospace methods to the problems of optical monitoring of urban air”	Scientific supervisor: Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan
Dashgin Alekper oglu Seyidov	The spectral properties of the weighted endomorphisms of uniform algebras	Scientific supervisor: doctor of mathemstical sciences,assoc.prof. Telman Benser oglu Gasymov

SUCCESSFULLY DEFENDED MASTER THESES

Author	Title	Scientific Advisor
Alizade Batula Mahir kizi	On a generalization of symmetric spaces	Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan

PROGRAMMES and GRANTS		
Project	Title	Supervisor
1st Azeri-Russian International Grant Competition organized by the Science Development Foundation under the President of the Republic of Azerbaijan	“Methods of the theory of functions in the theory of operators”	Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan
A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan
1st Azeri-Russian International Grant Competition organized by the Science Development Foundation under the President of the Republic of Azerbaijan	“Methods of the theory of functions in the theory of operators”	Telman Kasumov

A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Telman Kasumov
A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Migdad Ismaylov
A project of Science Development Foundation Under the President of the Republic of Azerbaijan	Methods of spectral theory and non-harmonic Fourier analysis in some problems of classical and quantum mechanics	Migdad Ismaylov
A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Ali Huseynli
A project of Science Development Foundation Under the President of the Republic of Azerbaijan	Methods of spectral theory and non-harmonic Fourier analysis in some problems of classical and quantum mechanics	Ali Huseynli
A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Aydin Shukurov
A project within the framework of the joint cooperation programme between NAS of Azerbaijan and The Scientific and Technological Research Council of Turkey (TÜBİTAK)	“Frame properties of the system of eigenfunctions of a second order discontinuous differential operator”	Aida Guliyeva

PEDAGOGICAL ACTIVITIES BY DNHA EMPLOYEES	
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	Institute of Mathematics and Mechanics of the NAS of Azerbaijan (master degree, 1st and 2nd course)
Associate Prof. Telman Kasumov	Baku State University
Associate Prof. Migdad Ismaylov	Baku State University
Associate Prof. Terlan Garayev	Khazar University
PhD Ali Huseynli	Khazar University
Aida Tagiyeva	Odlar Yurdu University

Membership in organizing committees of international conferences	
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan Prof. Bilal Bilalov	5th International Conference on Mathematical Advances and Applications (5-th ICOMAA 2022), Istanbul, Turkey, 11-14 May, 2022
	International Conference "Modern Problems of Mathematics and Mechanics", dedicated to the 110th anniversary of Academician Ibragim Ibragimov. June 29 - July 1, 2022
Telman Kasumov	5th International Conference on Mathematical Advances and Applications (5-th ICOMAA 2022), Istanbul, Turkey, 11-14 May, 2022
Aydin Shukurov	5th International Conference on Mathematical Advances and Applications (5-th ICOMAA 2022), Istanbul, Turkey, 11-14 May, 2022
Migdad Ismaylov	5th International Conference on Mathematical Advances and Applications (5-th ICOMAA 2022), Istanbul, Turkey, 11-14 May, 2022
Ali Huseynli	5th International Conference on Mathematical Advances and Applications (5-th ICOMAA 2022), Istanbul, Turkey, 11-14 May, 2022
Aida Tagiyeva	International Conference "Modern Problems of Mathematics and Mechanics", dedicated to the 110th anniversary of Academician Ibragim Ibragimov. June 29 - July 1, 2022

Workshops

Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	1 st INTERNATIONAL WORKSHOP ON FUNCTIONAL ANALYSIS AND APPLICATIONS (13-15 January, 2022) 2 nd INTERNATIONAL WORKSHOP ON FUNCTIONAL ANALYSIS AND
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	APPLICATIONS (24-26 May, 2022)
Associate Prof. Migdad Ismaylov	2 nd INTERNATIONAL WORKSHOP ON FUNCTIONAL ANALYSIS AND APPLICATIONS (24-26 May, 2022)

SOCIAL ACTIVITIES BY DNHA EMPLOYEES	
Prof. Bilal Bilalov, Corresponding Member of the NAS of Azerbaijan	<ul style="list-style-type: none"> • Member of Problem Council on Physical-mathematical and technical sciences; • Reviewer of the Science Development Foundation under the President of the Republic of Azerbaijan; • President of the Actuarial Society of Azerbaijan • The member of the Board of the Azerbaijan Mathematical Society; • Editor-in-Chief of Caspian Journal of Applied Mathematics, Ecology and Economics; • Editor-in-Chief of Azerbaijan Journal of Mathematics; • Member of the Coordination Council of Sciences under the President of ANAS; • Chairman of the Baku State University Graduation Commission; • Expert on evaluation of textbooks with the Ministry of Education of the Republic of Azerbaijan; • Member of The Scientific Council of The Institute of Mathematics and Mechanics of Azerbaijan National Academy of Science; • Deputy Chairman of the Academic Seminar of The Institute of Mathematics and Mechanics of Azerbaijan National Academy of Science.
Dr., Associate Prof. Telman Gasymov	<ul style="list-style-type: none"> • Member of the Editorial Board of the "Azerbaijan Mathematical Journal" • Member of the Editorial Board of the "Caspian Journal of Applied Mathematics, Ecology and Economics" • Member of the Editorial Board of the "Journal of Contemporary Applied Mathematics" jurnalının Redaksiya Heyətinin üzvü

	<ul style="list-style-type: none"> • Secretary of the scientific seminar on the specialty "Mathematical Analysis" of the Council of Doctoral Dissertations at the National Academy of Sciences of ANAS.
Associate Prof. Terlan Garayev	Executive Editor of Caspian Journal of Applied Mathematics, Ecology and Economics
Aida Guliyeva	Executive Editor of Azerbaijan Journal of Mathematics, Caspian Journal of Applied Mathematics, Ecology and Economics and Journal of Contemporary Applied Mathematics

Prof Bilal T. Bilalov

Head of the Department of Non-Harmonic Analysis

Corresponding Member of the National Academy of Sciences of Azerbaijan