# On Seminar report of Functional analysis department of IMM on scientific and scientific-organizational activity for 2021

The staff of "Functional Analysis" department consists of 21 employees including 18 research associates. 8 of them doctor of sciences, professor.

1.Aslanov Hamidulla I.  doct. ph.m.s.,prof.sen.r.a.

2.Aliyev Soltan A. doct. ph.m.s.,prof.sen.r.a.

3.Mirzoyev Sabir S. doct. ph.m.s.,prof.sen.r.a.

4.Huseynov Hidayet M. doct. ph.m.s.,prof.sen.r.a.

5.Gurbanov Veli M. doct. ph.m.s..prof.sen.r.a.

6.Nabiyev Ibrahim M. doct. ph.m.s.,prof.sen.r.a.

7.Aliyev Araz R. doct. ph.m.s.,prof.sen.r.a.

8.Eyvazov Elshad H. ph.m.s., lead.r.a.

9.Mukhtarov Fekhreddin Sh.  c.ph.m.s.,lead.r.a.

10.Jabrailova Afet N.  c.ph.m.s.,lead.r.a.

11.Ibadova Irade A. c.ph.m.s,.lead.r.a.

12.Latifova Aygun R. phd in math.,chief.r.a.

13.Vahabov Nazim G. chief.r.a.

14.Guliyev Namiq I. c.ph.m.s.,r.a.

15.Khalilov Vuqar S. phd in math.,chief.r.a.

16.Alimardanova Kamilla A. c.ph.m.s.,chief. r.a.

17.Osmanli Jalala A. phd in math.,chief. r.a.

18.Safarova Aynur N.j.r.a.

19.Iskenderli Guller Z.sen.lab.ass.

20.Bayramova Aygun F.sen.lab.ass.

21.Dadashova Nigar Y.lab.ass.

# I. Scientific part

In the first half of 2021, according to the approved plan, 18 works are executed on the topics "Study of some problems of operator algebra and probability theory" and "Spectral analysis of differential operators".

Study of some problems of operator algebra and probability.

1). Work : "Convergence of branching random processes with migration " **Ex.: doct.ph.m.sc., prof. sen.res.ass. S.A.Aliyev.**

## Papers

1.S.A.Aliev. Forcing the system by a drift, Mathematychni Studii, 55(2), 2021, p.14-19.

2. S.A.Aliev . Reliability of a series system with redundancy and one repair facility, Transactions of NAS of Azerbaijan, ser.phys.techn.and çath.science, v.40(2020) issue4, p.40-48.

## Abstract

1. S.A.Aliev.Limit distribution for the first passage time of the branching processes for level, Актуальные проблемы математики и информационной технологии, материалы II Всероссийской конференциис международном участием,г.Махачкала , 5-7 февраля 2021 г., с.13-15.

2). Work: "A class of Djabbarzadeh self-adjoint operators in Banach space". **Ex: sen.res.ass. N.G.Vahabov.**

During the reporting period, the structure of the spectrum of Norm-Hermit operators was studied and compared with other Hermit-type operators.

An article was prepared and submitted for publication in the past.

3).work: "Study of random works described by autoregressive processes". **Ex: cand.ph.m.sc. ass.prof. lead.res.ass. I.A.Ibadova.**

## Paper

1.Rahimov F.H., Ibadova I.A.,Farhadova A.D. Limit theorem for first passage times in the random walk described by the generalization of the autoregressive process. Uzbek Mathematical Journal, 2020, 4, pp.102-110

DOI: 10.29229/uzmj.2020-4-11

## Theses

1. Rahimov F.H., Ibadova I.A.,Farhadova A.D. On the family of the first passage time of the parabola by a random walk described by the autoreqressive process. V.I.Romanovskiy Institute of Mathematics of the Academy of Sciences of Uzbekistan National University of Uzbekistan named after Mirzo Ulugbek

PROCEEDINGS OF SCIENTIFIC CONFERENCE "MODERN PROBLEMS OF STOCHASTIC ANALYSIS" dedicated to the 100th anniversary of the birth of academician S.Kh.Sirajdinov. September 21-22, 2020, Tashkent.pp.-69-71

2. İradə A.İbadova Nigar İ.Rüstəmova-Mikayılova. Çevrə üzrə hissəciklərin hərəkətinin riyazi modeli. Azərbaycan Respublikasi Təhsil Nazirliyi Lənkəran Dövlət Universiteti "Informasiya, elm, texnologiya və universitet perspektivləri" mövzusunda doktorantlarin və gənc tədqiqatçilarin onlayn respublika elmi konfransinin materiallari Lənkəran, 18 dekabr 2020-ci il, səh.55

3. İ.A.İbadova., F.H. Rahimov.,S.A.Aliyev. Limit theorems in the random walk described by the generalization of the autoregressive process. The 7th International

4). work: "Boundary value problems for random walks described by order one autoregressive process " **Ex: ph.d.in math. ass. prof. lead res. ass. V.S.Xalilov.**

1.F.H.Rahimov., V.S.Khalilov., T.E.Hashimova.On the generalization of the central limit theorem for the least-squares esimator of the unknown parametr in the autoregressive process of order one (AR(1)).( submitted for publication)

5). work: "Estimation of the first eigenvalues of magnetic Laplace operator corresponding to  magnetic field equal to zero along a third-order algebraic line" **Ex:doct.ph.m.s., ass.prof. sen.res.ass. E.H.Eyvazov.**

In the first quarter of the reporting year, three research papers were prepared and one of them was published.

## Papers

1. E.H.Eyvazov "Correct proof of finding the exact lower bound of the Rayleigh magneti value".

2. E.H.Eyvazov "Оценка числа собственных значений магнитного оператора Шредингера в трехмерном слое".

3. E.H.Eyvazov "Связь между функцией спектрального сдвига и собственных значений возмущенного оператора".

**Topic: "Spectral analysis of differential operators"**

6). work: solvability Conditions for operator-differential equations and some spectral problem" **Ex: doct.ph.m.sc.prof. sen.res.ass. S.S.Mirzoyev.**

In the first half of the reporting year, scientific research on the topic was continued and two articles were submitted for publication.

7).work: " Kolmogorov  type  Inequalityes  for the norm of intermediate derivative operators  in the space of  smooth vector functions".
**Ex. doct.ph.m.sc.prof. sen.res.ass. H.I.Aslanov.**

## Papers

1. H.İ.Aslanov.G.M.Eyvazlı.On reqular solvability of a boundary value problem for a fourth order operator differential equation on a finite seqment  Transactions of NAS of Azerbaijan , İssue Mathematics ,volume 41, №1, 2021, p 24-34.

2. H.İ.Aslanov.G.M.Eyvazlı. On Kolmoqorov tupe inequalites for the norms of operators of inter mediate derivaties on the space of smooth vector-funktions on a finite seqment .Proceedings of the İnstitute Mathematics and  Mechanics, volume 47,number1, 2021, p.143-155.

## Theses

1.Г.И.Асланов, Г.М.Эйвазлы.О корректной разрешимости одной краевой задачи для однородного операторно дифференциального уравнения четвертого порядка в гильбертовом пространстве. Актуальные проблемы математики и информационной технологии, материалы II Всероссийской конференциис международном участием,г. Махачкала , 5-7 февраля 2021 г., с.25-27.

2. Г.И.Асланов, Р.Ф.Гатамова . О корректной разрешимости одного класса операторно дифференциальных уравнений второго порядка с частными производными во всем пространстве. Актуальные проблемы математики и информационной технологии, материалы II Всероссийской конференциис международном участием,г.Махачкала , 5-7 февраля 2021 г.,с . 27-29.

8).work: "Direct problem of scattering for discontinuous coefficients Dirac equation on a semiaxis "

**Ex: doct.ph.m.sc. prof. sen.res.as. H.M.Huseynov.**

The existence and description of the Yost solution are given in the work, the properties of the nucleus are studied.

## Paper

1. H.M.Huseynov. Self-adjont extrens for a class of singler operators.Turkish Jouranl of Mathematics (2021) 45,p.300-304.

9).work: "Mandatory convergence of spectral expansions of functions from the Sobolev class in eigenfunctions of odd order differential operator." **Ex: doct.ph.m.sc. prof. sen.res.ass V.M.Kurbanov.**

## Paper

1.V.M. Kurbanov, R.I. Shahbazov, A.I. Ismailova. absolute and uniform convergence of the spectral expansion in the eigenfunctions of an odd order differential operator // Azerbaijan Journal of Mathematics, 2021, V. 11, No 1, pp. 169-188.

### Thesis

1. Курбанов В.М., Исмайлова А.И. Оценка скорости равносходимости для одномерного оператора Шредингера с потенциалом из класса $L_r$ , r > 1. // Современные методы теории краевых задач. Материалы Международной конференции. Воронежская весенняя математическая школа Понтрягинские чтения—XXXII, Посвящается памяти Александра Дмитриевича Баева (3–9 мая 2021 г). стр.158-160.

10).work: Reconstruction of a differential operator of the second order from the spectrum and sequence of signs "**Ex: doct.ph.m.sc prof. sen.res.as. I.M.Nabiyev.**

**Conference materials**

1.Набиев И., Гасанли А. О восстановлении одномерной системы Дирака / Материалы международной открытой конференции «Современные проблемы в науке и технике. Теория и практика». Воронеж, 21-23 декабря 2020, ФГБОУ ВО «ВГЛТУ», 2021, с. 243- 246. https://585386.wixsite.com/math

2.Маммадова Л., Набиев И. Обратная задача для оператора Штурма-Лиувилля с граничным условием, зависящим от параметра / Материалы международной открытой конференции «Современные проблемы в науке и технике. Теория и практика». Воронеж, 21-23 декабря 2020, ФГБОУ ВО «ВГЛТУ», 2021, с. 213-215. https://585386.wixsite.com/math

**Thesis**

1.Ibrahim Nabiev, Chinara Rzayeva. The inverse problem for the Sturm-Liouville operator with semi-separated boundary conditions/ International Black Sea coastline countries scientific research symposium – VI, Abstracts Book, April 28-30, 2021/ Giresun, Turkey, p. 161. https://b0699d12-70ad-4313-81f1 0833a431c01a.filesusr.com/ugd/614b1f_48f5b8178ff54d3fbf95686b97a4489c.pdf

11). work:" Expantion of magnetic Schrödinger operator by eigenfunctions " **Ex: doct.ph.m.s. prof. sen.res.ass. A.R.Aliyev.**

**Papers**

1. Алиев А. Р., Раджабов Ш. Ш. Разложение по собственным функциям магнитного оператора Шредингера в ограниченных областях // Вестник Томского государственного университета. Математика и механика, 2021, № 69, с. 5-14. http://journals.tsu.ru/mathematics/&journal_page=archive&id=2072 (Web of Science, Scopus)

2. Aliev A. R., Ismayilov E. A. Selection of the optimal class of features for recognition of the Azerbaijani handprinted characters // In: 11th World Conference on Intelligent Systems for Industrial Automation - WCIS-2020. Advances in Intelligent Systems and Computing, vol. 1323. Springer Nature Switzerland AG, 2021, p.p. 96-102. https://link.springer.com/chapter/10.1007/978-3-030-68004-6_12 (Web of Science, Scopus)

3. Aliev A. R., Manafov M. Dzh. Trace formula for a Sturm–Liouville operator with a δ′-interaction point // Differential Equations, 2021, vol. 57, no. 5, р.п. 563–569. https://link.springer.com/article/10.1134/S0012266121050013 (Web of Science, Scopus)

12).work: "Special and addition of operator group in Hilbert space about the multiplicity of elements. ” **Ex: cand.ph.m.sc. ass.prof. lead r.a. A.N.Jabrailova.**

## Papers

1.Джабраилова А.Н.  О кратной полноте системы собственных и присоединенных элементов операторного пучка в гильбертовом пространстве. Научный журнал ''CHRONOS'',2021, т.6 ,№ 2(52), стр.67-70.

2.Джабарзаде Р.М., Джабраилова А.Н.  О разложении по собственным и присоединенным векторам двупараметрической системы операторов в гильбертовом пространстве. Евразийское Научное Объединение, 2021,№ 4(74), стр.13-16.

3.A. Jabrailova, J. Asadzadeh. On stability of bases from perturbed exponential systems in Orlicz spaces, Azerbaijan Journal of Mathematics, 2021, vol.11, №2 (is in print).

13).work: "Spectral properties of antiperiodic Sturm-Liouville problem with discontinuity divide the region". **Ex: cand.ph.m.s.ass prof. lead r.a. F.Sh.Mukhtarov.**

## Paper

1.F.S.Muhtarov, Serdar Paş, K.Aydemir. Spectral Properties of the Antiperiodik Boundary – Value-Transition Problems. Journal of New Theory.2021.ISSN2149-1402. Vol.40-49.

14).work: "Inverse problems of spectral analysis for Bessel spectator with a spectral parameter in the boundary condition" **cand.ph.m.s. lead.r.a. N.J.Guliyev.**

Over the past period, some inverse problems of spectral analysis have been investigated for the Bessel spectator with spectral parameters in the boundary condition.

15).work: " Scattered problems for a system of first-order hyperbolic equations in special cases **Ex:c.ph.m.s.,chief. r.a. Alimardanova Kamilla A.**

Research on the topic was conducted during the reporting period. A work is prepared for the anchor.

16).work: "Direct and inverse problems of spectral analysis for a class of differential operators " **Ex:phd in math.,chief.r.a. Latifova Aygun R.**

The solution of a straight problem for a class of differential operators was studied, the construction of integral solutions, the properties of special functions, special numbers were studied.

17).work: "Inverse problem for Sheturm-Liouville operator in the form of Impedance". **Ex: phd in math.,chief. r.a. Osmanli Jalala A.**

In the reporting half-year, a link was found between the nucleus of the conversion operator and the scattering data.

18).work:" The scattering problem for a system of six hyperbolic equations on the semiaxis in the case of 2 incident and 4 scattered waves" **Ex: j.r.a. Safarova Aynur N.**

In this work, for six systems of hyperbolic equations, the problem of scattering in the form of two to four scattered waves coming from the hemisphere was studied.

## II. Scientific and organizational activities.

**D. f-m. D., prof. GI Aslanov** suggested teaching at BSU. He was appointed chairman of the State Examination Commission at BSU. He was a member of the Committee of the Republican Competition "Scientist of Tomorrow", organized by the Ministry of Education. Participated in academic councils as a member of the Defense Council. He is a member of the editorial committee of the journals "Transaction of NAS of Azerbaijan" and "Proceedings of the Institute of Mathematics and Mechanics". Scientific supervisor of three candidates for a degree.

**D. f-m. Sci., prof., ch. n. with. I. M. Nabiev** took part in 3 international conferences, was an opponent of 1 doctoral dissertation, published 3 scientific works. Was the chairman of the State. Attestation Commission in the Azerbaijan State. University of Petroleum and Industry (Master's degree)

Many employees of the department are engaged in teaching activities in various higher educational institutions of the Republic.

**doct. ph.m.s.,prof.sen.r.a. S.A. Aliyev** is a member of the editorial board of six scientific journals. Has supervised one ph.d. dissertation Engaged in pedagogical activity at BSU.

**doct. ph.m.s.,prof.sen.r.a. A.R. Aliyev** is an editor-in-chief of the international scientific journal "Azerbaijan Journal of High performance computing" (Azerbaijan), manager editor of the international scientific journal "Azerbaijan journal of Mathematics" and a member of the journals: «Proceedings of the Institute Mathematics and Mechanics, National Academy of Sciences of Azerbaijan» (Azərbaycan), «Transactions of Azerbaijan Institutes of Technology» (Azərbaycan).

**doct. ph.m.s.,prof.sen.r.a. H.M. Huseynov** is a member of editorial board of a lot of international and republican scientific journals. He is an adviser of magisters and doctoral students.

**doct. ph.m.s.,prof.sen.r.a. S.S. Mirzoyev's** two cand. for degrees have submitted their dissertation works to the Scientific Council of IMM.

**doct. ph.m.s.,prof.sen.r.a. V.M. Gurbanov** is a member of editorial board of a lot of international and republican scientific journals. He is an adviser of magisters and doctoral students.

Many of the department collaborators are engaged in pedagogical activity in different higher education institutions of the Republic.

## PARTICIPATION IN SCIENTFIC SEMINARS

All the collaborators have participated in the institute and department seminars.

## PUBLISHED SCIENTFIC PAPAERS

In the report period the employees of our department have published 1 textbook, 13 papers, 8 abstracts, 2 proceedings of conference, 7 papers and 2 abstracts were submitted for publication. 4 of these articles are in the Thomson and Scopus databases and 2 in the Scopus databases.

**Heard of department**:                    **d.ph.m.s.prof. H.İ.Aslanov**