

**Functional Analysis**  
**Report of "Functional Analysis" department of IMM**  
**2015.**

**Theme: Application of some problems of operator algebras and Heary of probability.**

**Work:1** Asimptotics of critical Galton-Vatson processes.  
(executive: d.ph.m.s. prof. s.r.a. **S.A.Aliyev**)

In the period under review took place following publication:

**Book:** 1.Fluid mechanics and heat transfer, Apple Academics Press, USA,2015,234p. (Aslı K.H.)

**Article:**

1. Assessment and optimal policies of limit killed Markov decision process, Trans. Of NAS of Azerbaijan, ser.phys. techn. And math. Sciences, 2014, XXXIV, №4.p.23-28
2. Method of assessment of producers risks in one model of quantitative market competition, Caspian journal of applied mathematics, ecology and economics, V.1,№2,2014.p.15-21
3. Stochastic model for exaluating insurance policies in health insurance, Trans. Of Nas of Azerb., ser. Informatics and control problems, V.XXXIV,№6,2014,p.85-90

**Thesis:**

1. Behaviour of solutions some classes of the nonlinear parabolic equations, XXV International conference, PDMU-2015,Abstracts,2015 Ukraine, p.21-22(Qadjiev T.,Rasulov R.)
2. Дифференциальные уравнения для ветвящихся процессов с миграцией и непрерывным временем, XXV Internet, conf.,PDMU, 2015,Ukraine,p. 62-63 Багилевич И.Б.
3. Blow up solitions some classes of the nonlinear parabolic equations, VI Annual intern.conf. of the Georgian Mathem Union, Book of abstracts,Batumi.2015 p.102-103(Guliev H, Gadjiev T.)
4. The general limit therome fot the family of the first moments of reaching the lewel of a randow walk, described the first-order AR(1)avtoregression processes, The 5.th Intern. Conf. en control and optimization with industrial applications,Book of abstracts, Baku 2015,p.414-417(Rahimov F,Farhadova A.)

**Work:2** Some approximation problems in morrey type spaces  
(executor c.ph.m.s. s.r.a. **A.N.Jabraiyilova**)

In the period under review took place following publication:

1. M.İsmailov,Afet Jabrailova. On  $\tilde{X}$ -frames and conjgate systems in Banach spaces. Sahand Communications in Mathematical Analysis(SCMA),vol1, N2(2014),p.p.19-29(İran)

2.R.Dzhabarzadeh, A.Jabrailova. Spektral Problems of Multiparameter System of Operators with two Parameters. Open Science Journal of Mathematics and Application, vol.3, N2(2015), p.p 34-38.

3. R.Dzhabarzadeh, A.Jabrailova. Multiparameter system of Operators with two parameters in finite dimensional spaces. Pure and Applied Mathematics Journal, vol 4, N4-1, 2015, p.p.1-4.

4. R.Dzhabarzadeh, A.Jabrailova. Spektral Problems of two parameter systems. Материалы XII Международ. Казанской летний науч. Школы-конференции, Казань, 27июня-4июля 2015г., 514-516.

5.S.Sadiqova, Afet Jabrailova. The General solution of the Homogeneous Pieman Problem in the Weighed Smirnov Classes. Book of Abstracts VI Annual International Conference of the Georgian Mathematic Union, Batumi, July 12-16, 2015, p.p. 161-162

**Work:3** General criteria on closeness of numerical range of operator in Banach space.

(executor. s.r.a **N.G.Vahabov**)

In the period under review took place following publication:

**Article:**

1.Vaqabov N.Q. "Spectral operators in Banach space". Transaction of NAS of Azerbaijan XXXV, №1, p96-105

**Work:4** Selection motion parameters of the partucles moving on the closed contour

(executor. c.ph.m.s. r.a. **I.A.Ibadova**)

In the period under review took place following publication:

**Article:**

1. On asymptotic behavior of the mean value of the first passage time of the level by a random walk described by autoregression process of order one ( $AR(1)$ ). Trans. of NAS of Azerb., 2015, №1, v. XXXV, pp-47-50. Kh.A. Jafarova V.A. Abdyrrahmanov

**Thesis:**

1. On asymptotic behavior of the mean value of the first passage time of the level by a random walk described by autoregression process of order one  $AR(1)$ . «Riyazi analiz, diferensial tənliklər və onların tətbiqləri» Azərbaycan-Türkiyə- Ukrayna Beynəl. Konfransın tezisləri Bakı 2015. H. A. Jafarova, V. A. Abdurahmanov

2. Choice of the movement parameters of particles on the circle . «Riyazi analiz, diferensial tənliklər və onların tətbiqləri» Azərbaycan-Türkiyə- Ukrayna Beynəl. Konfransın tezisləri Bakı 2015. H. A. Jafarova, V. A. Abdurahmanov

**Work:5** Applications of linear and nonliver problems for random wolks desiribed in autoreqression processes.

(executer l.a. **V.S.Khalilov**).

**Theme: Spectral analysis of differential operators.**

**Work:6** Solition of operator-differential equations and related spectral problems  
( executor: d.ph.m.s. prof. s.r.a. **S.S.Mirzoyev**).

In the period under review took place following publication:

**Article:**

1. О разрешимости одного класса операторно-дифференциальных уравнений в частных производных. Вести Бакинского Университета, 2015, №2, с.5-13

2. О разрешимости одной краевой задачи для операторно дифференциального уравнения третьего порядка в конечной области. Proceedings of the Institute of Applied Mathematics. v:4, №1, 2015, с.26-39

3. On the solvability of one boundary value problem for the fourth order in the Hilbert space, Applied Mathematical Sciences, 2015, v.9, №8, p. 3925-3931

**Thesis:**

1. On a factorization of matrix pencils. "The 5th international conference on control and optimization with industrial applications" 2015, p.269-271

2. Operator-differential equations and spectral problems connected with them. "International Conference Azerbaijan-Turkey-Ukraine Mat.Anal.Differ.Equations and the Applications" 2015, p.116

**Work:7** Investigation of discrete part of spectrum of higher order operator-differential equations on a finite segment

(executor: d.ph.m.s. prof. s.r.a. **H.I.Aslanov**).

In the period under review took place following publication:

**Article:**

1. О резольванте операторно-дифференциального уравнения высокого порядка на полуоси. Sumqayıt Dövlət Universitetinin Xəbərləri, №1, 2015

**Thesis:**

1. Investigation of Green function of high order operator-differential equations on semi-axis. "Mat.Anal. Differ. equations and its appl." Turkiye-Ukrayna-Azərbaycan Beynəlxalq konfransının tezisləri, 8-12 sentyabr 2015

2. Investigation of resolvent of operator-differential equations on semi-axis "Differential equations and its appl." Beynəlxalq konfransın tezisləri ,Batumi 28-01 sent. 2015

**Work:8** Spectral properties of Sturm-Liouville operator with spectral parameter in discontinuity condition

(executor: d.ph.m.s. prof. s.r.a. **H.M.Huseynov**).

In the period under review took place following publication:

**Article:**

1 Задача рассеяния для системы Дирака с разрывным условием. Journal of cont. Appl.Math., vol1, issue 1, 2014 p.42-47.

2. Об одной равномерной аппроксимации целой функции, связанной с дзета-функцией Римана, Azerb. Journal of Mathematics №1, 2016

3. Kəsilmə şərtinə malik Şturм-Liuwill operatoru üçün tərs məsələnin həllinin yeganəliyi. J.Məmmədov 85 .Beynəlxəq konf.mater.2015, dekabr.

**Work:9** Investigation of spectral expansion of absolute continuous functions of second order differential operators and trigonometric expansion for summation order of the function under investigation”

(executor: d.ph.m.s. prof. s.r.a. **V.M.Gurbanov**).

In the period under review took place following publication:

1. Convergence of spectral expansion of an absolutely continuous function in eigenvalues of third order differential operator. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.93

2. Theorem on componentwise equiconvergence for Schrodinger operator with matrix potential. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.94

3. Convergence of spectral expansion of the function from the class  $W_{p,m}^1(G)$ ,  $1 < p \leq 2$  in eigen vector-functions of fourth order differential operator. Azerbaijan State Pedagogical University. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.95

4. Basicity of the systems of root vector-functions of one-dimensional Dirac operator. Azerbaijan University of Languages Baku. Azerbaijan State Pedagogical University. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.96

5. On convergence of spectral expansion in eigenfunctions of an even order differential operator. Azerbaijan State Pedagogical University. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.97

6. Influence of summability degree of the expanded function on equiconvergence rate. Актуальные Azerbaijan State Pedagogical University. Institute of Mathematics and Mechanics of NAS of Azerbaijan, Baku, p.98

**Monograph:** В.Курбанов, А. Исмаилова., “Разложение по корневым вектор-функциям оператора Дирака” Lap Lambert Academic Publishing. Saarbrücken 2015

**Work:10** Inverse scattering problem on a semi-axis in the case of three incident waves.

(executor: d.ph.m.s. prof. s.r.a. **N.Sh.Iskenderov**).

In the period under review took place following publication:

1. N.Ş.İsgəndərov, L.N.Cəfərova. Yarımoxda üç səpələn dalğa halında səpilmə məsələsi. “Riyaziyyat və Mexanikanın aktual problemləri” Bakı 2015, səh.43-44

2. N.Ş.İsgəndərov, A.A.Məmmədov. Birtərtibli adi diferensial tənliklər sistemi üçün yarımoxda səpilmə məsələsi. “Riyaziyyat və Mexanikanın aktual problemləri” Bakı 2015, p.45-46
3. N.Ş.İsgəndərov, A.F.Hüseynova. Обратная краевая задача для уравнения Бенни-Люка с интегральным условием первого рода. “Riyaziyyat və Mexanikanın aktual problemləri” Bakı 2015, p.50-51
4. N.Ş.İsgəndərov, A.A.Məmmədov. Inverse scattering problem on a semi-axis. Azerbaijan-Turkey-Ukrainian International conference. Mat.Anal.Dif.Equations and their Applications, 2015, p.76

**Work:11** Renewal of Dirac operator with a spectral parameter on one of the non-separated boundary conditions.

(executor: d.ph.m.s. l.r.a. **I.M.Nabiyev**).

In the period under review took place following publication:

**Article:**

1.The properties of the eigenvalues of the Dirac operator with a spectral parameter in the boundary condition.Journal of Qafqaz University 2015,vol.1,p.5-17 (T.Ş Abdullayev,)

**Thesis:**

1.On uniqueness of renewal of Sturm-Liouville operator with nonseparated boundary conditions and with a spectral parameter in the boundary condition. Azerbaijan-Turkey-Ukrainian International conf. “Math. Analysis, Diff. Eq. and their Applications” (September 08-13, 2015, Baku, Azerbaijan), Abstracts, p.74. Ch.G.Ibadzadeh

2.Ob algoritme vosstanovleniə operatora diffuzii so spekktralğnım parametrom v qraniçnom uslovii.Materialı konferenüii,posv.85-letio Ə.D.Mamedova,s.80-83(Ç.Q.İbadzade)

**Work:12** Investigation of some problems of nonlinear Markov renewal Heary.

(executor: d.ph.m.s. l.r.a. **F.H.Rahimov**).

In the period under review took place following publication:

1. Raimov F.G., Abdurrahmanov V.A., Hasimova T.G. On the asymptotics of the mean value of the moment of the first level-crossing by the first order autoregression process AR(1) Transaction of NAS Azerbaijan XXXIV. №4 2014 s.93-97
2. Rahimov F.H., Hasimova T.E.,Farkhadova A.D.İnteqral limit theorem for the first passagetime of the level by a random walk described by process of orde one AR(1)
3. Rahimov F.H.,Aliev S.A.,Farhadova A.D. The central Limit Theorem for the family of the first moments of reaching the level of a random walk, described the first order(AR(1))autoregression process.Book of abstracts of the 5-th international conferece on control and optimization with industrial applications.27-29 avqust,2015.Baku Azerbaijan.c.414-417
4. Rahimov F.H., Hasimova T.E.,Farkhadova A.D.İnteqral limit theorems for the first reaching the level of the random walk described by the first-

order (AR(1)) autoregression process. Book of abstracts of the 5-th international conference on control and optimization with industrial applications. 27-29 August, 2015. Baku Azerbaijan. c.417-419

**Work:13** Plane solution of operator-differential equation in Hilbert space”  
(executor: cand.ph.m.s.. s.r.a. **E.H.Gamidov**).

In the period under review took place following publication:

**Article:**

On solvability of a boundary value problem for second order operator-differential equations in the space of smooth vector-functions. Transactions of National Academy of Sciences of Azerbaijan, Vol. XXXV, №1, 2015, p.24-30

**Work:14** Spectral analysis of impulse Laplace operator  
(executor: cand.ph.m.s.. s.r.a. **A.R.Aliyev**)

In the period under review took place following publication:

1. Доказательство полноты собственных функций оператора Штурма-Лиувилля в дивергентном виде методом конечных разностей // Журнал вычислительной математики и математической физики, 2015, том 55, № 1, с. 3-9 (E.H.Eyvazovla ), *impakt-faktor* 0,789.
2. On a class of operator-differential equations of the third order with multiple characteristics on the whole axis in the weighted space // Mathematica Slovaca, 2015, vol. 65, № 3, p. 667-682 (with A.L.Elbably), *impakt-faktor* 0,409.
3. Fourth order elliptic operator-differential equations with unbounded operator boundary conditions in the Sobolev-type spaces // Boundary Value Problems, 2015, vol. 2015, 14 pages, “SpringerOpen”, doi 10.1186/s13661-015-0453-y (E.S.Al-Aidarous, E.S.Rzayev and H.A.Zedan ), *impakt-faktor* 1,01.
4. Description of the domain of definition of the electromagnetic Schrödinger operator in divergence form // Eurasian Mathematical Journal, 2014, vol. 5, № 4, p. 134-138 (E.H.Eyvazov) (jurnal Scopus).
5. On wave operators for multidimensional electromagnetic Schrödinger operator in divergence form / Abstracts of Azerbaijan-Turkey-Ukrainian International Conference "Mathematical Analysis, Differential Equation and Their Applications, MADEA-7", September 08-13, 2015, Baku, Azerbaijan, p. 14 (E.H.Eyvazov).

**Journal editor.**

A.R.Əliyev

«Journal of Contemporary Applied Mathematics»

«Azerbaijan Journal of Mathematics»

«Proceedings of the Institute Mathematics and Mechanics, National Academy of Sciences of Azerbaijan» (Azərbaycan), «Pure and Applied Mathematics Journal» (ABŞ) və «Mathematics and Statistics» (ABŞ)

**Grant:**

The Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah, Saudi Arabia, grant No 363-686-D1435, 2015.

**Work:15** Some problems on applications many-parameter spectral theory with compact self-adjoint operator

(executor: cand.ph.m.s. l.r.a **E.H.Mammadov**)

In the period under review took place following publication:  
Submitted for publication of an article.

**Article:**

“Variational principle for two-parameter spectral problem under left definiteness condition” Proceedings of IMM

**Work:16** Finding different condition for solvability of a class of partial operator-differential equations

(executor: r.a. **I.J.Jafarov**)

**Work:17** On multi-interval Sturm-Liouville problem.

( executor: c.ph.m.s. r.a. **F.Sh.Muxtarov**)

In the period under review took place following publication:

**Article:**

1. Kadriye Aydemir and Fahrettin S.Muhtarov, Contemporary Analysis and Applied Mathematics, Modified Parseval and Carleman equalities for Sturm-Liouville problems with interior singularities, vol2. №1, p.78-87,2014

**Work:18** Investigation of normal and regular solutions of third and fourth order elliptic type operator-differential equations

(executor: r.a. **K.A.Kerimov**)

Submitted for publication of an article.

**Work:19** Investigation of the scattering problems on the axis for a system of ordinary differential equations.

(executor: r.a. **K.A.Alimardanova**)

In the period under review took place following publication:

**Article:**

1.Rakhshanda Dzabarzadeh, Kamilla Alimardanova “Multiparameter Operator systems with three Parameters” Journal, Spectral Theory of multiparameter Operator Pencils and its Applications, volume4, issue 4-1, august2015, pp.5-10

**Work:20** Continuous dependence of the solution of a second order nonclassical boundary condition inverse problem on data

( executor: j.r.a **A.N.Safarova**)

In the period under review took place following publication:

Safarova A.N. Непрерывная зависимость классического решения одной одномерной обратной краевой задачи для параболического уравнения

второго порядка с неклассическими краевыми условиями. “Riyaziyyat və onun aktual problemləri” Bakı 2015, p.102-103

**Work:21** Investigation of inverse problems of spectral analysis for Sturm-Liouville operator with a spectral parameter in discontinuity condition

( executor: r.a. **N.J.Guliyev**)

**Work:22** “Built at the Sturm-Liouville operator from the requirement to cut straight to the issue of spectral data”

(executor: c.ph.m.s. r.a. **A.R.Latifova**)

**Work:23** “The one-dimensional Schrodinger equation, which is the conventional way to cut straight to the issue of direct scattering”

(executor: r.a. **J.A.Osmanly**)

**On scientific organizational activity.  
The investigation are conducted on the themes.**

“Investigations of operator algebras and some problems of theory of probability” and “Spectral analysis of differential equations”. On the report period 1 book, 1 monograph, 27 papers and 25 abstracts were published.

On this period, on post-graduate student supervised by s.r.a.prof. H.M.Huseynov has defended PhD degree, and one person defended his doctor of science degree under supervision of prof. S.S.Mirzoyev. Two persons submitted their dissertation works to Defence Council prof.S.A.Aliyev and prof. H.I.Aslanov work on grant project of SOCAR. At the same S.A.Aliyev, H.I.Aslanov participate in interdisciplinary program “Investigation of theoretical and practical problems of geomechanics”.

The department is going to participate at Azerbaijan-Ukraine Conference on mathematical analysis and differential equations to be held in a Baku. Prof. S.A.Aliyev and prof.H.I.Aslanov will participate at their conference