Report of "Differential Equations" Department on scientific and social activities for 2019

The department consists of 15 collaborators. There are 12 scientific workers, including 8 doctors of sciences and 4 philosophy doctors. The department conducts 10 research studies on one subject according to the plan in 2019.

Executed scientific works

Theme: "Some problems of Theory of Partial Differential Operators".

Work 1. Asymptotic of the solutions to the initial boundary problem under the condition of acoustic transmission for nonlinear hiperbolic equations. **Executer: d.ph.m.s., prof. A.B.Aliev.**

Suppose that $\Omega \subset R^3$ is a bounded domain with the border Γ_1, $\Omega_2 \subset \Omega$ is a Γ_2 border subdomain and $\Omega_1 = \Omega \setminus \Omega_2$ is a $\Gamma = \Gamma_1 \cup \Gamma_2$ border subdomain, so that $\Gamma_1 \bigcap \Gamma_2 = \emptyset$.

Let's look at the following mixed problem under the condition of acoustic coupling in the domain Ω

$$u_{tt} - \Delta u + \alpha_1 u_t + u + f_1(u) = 0 \quad \text{in} \quad \Omega_1 \times (0,\infty), \tag{1}$$

$$\upsilon_{tt} - \Delta \upsilon + \alpha_2 \upsilon_t + \upsilon + f_2(\upsilon) = 0 \quad \text{in} \quad \Omega_2 \times (0,\infty), \tag{2}$$

$$\delta_{tt} + \beta \delta_t + \delta = -u_t \quad \text{on} \quad \Gamma_2 \times (0,\infty), \tag{3}$$

$$u = 0 \quad \text{on} \quad \Gamma_1 \times (0,\infty), \tag{4}$$

$$u = \upsilon, \ \delta_t = \frac{\partial u}{\partial \nu} - \frac{\partial \upsilon}{\partial \nu} \quad \text{on } \Gamma_2 \times (0,\infty), \tag{5}$$

$$u(x,0) = u_0(x), \ u_t(x,0) = u_1(x), \quad x \in \overline{\Omega}_1, \tag{6}$$

$$\upsilon(x,0) = \upsilon_0(x), \ \upsilon_t(x,0) = \upsilon_1(x), \quad x \in \overline{\Omega}_2, \tag{7}$$

$$\delta(x,0) = \delta_0(x), \ \delta_t(x,0) = \frac{\partial u_0}{\partial \nu} - \frac{\partial \upsilon_0}{\partial \nu} \equiv \delta_1, \ x \in \overline{\Gamma}_2, \tag{8}$$

where ν is a outer normal of Γ; $\alpha_i > 0 \ (i = 1,2)$ and $\beta > 0$ are some constants; $f_i : R \to R \ (i = 1,2)$, $u_0, u_1 : \overline{\Omega}_1 \to R$, $\upsilon_0, \upsilon_1 : \overline{\Omega}_2 \to R$, $\delta_0 : \overline{\Gamma}_2 \to R$ are given functions.

Let's introduce the following functional space

$$V = H^1_{\Gamma_1}(\Omega_1)\times L^2(\Omega_1)\times H^1(\Omega_2)\times L^2(\Omega_2)\times L^2(\Gamma_2)\times L^2(\Gamma_2).$$

V is a Banach space with respect to the following norm:

$$\|w\|^2_V = \|w_1\|^2_{H^1_{\Gamma_1}(\Omega_1)} + \|w_2\|^2_{L^2(\Omega_1)} + \|w_3\|^2_{H^1(\Omega_2)} + \|w_4\|^2_{L^2(\Omega_2)} + \|w_5\|^2_{L^2(\Gamma_2)} + \|w_6\|^2_{L^2(\Gamma_2)},$$

$\forall w = (w_1, w_2, w_3, w_4, w_5, w_6) \in V$.

Let's define the operator $A: D(A) \subset V \to V$ in this space:

$$Aw = (w_2, \Delta w_1 - w_1 - \alpha_1 w_2, w_4, \Delta w_3 - w_3 - \alpha_2 w_4, w_6, -w_2 - w_5 - \beta w_6),$$

$$D(A) = \{ w = (w_1, w_2, w_3, w_4, w_5, w_6) \in V : \Delta w_1 \in L^2(\Omega_1), w_2 \in H^1(\Omega_1), \Delta w_3 \in L^2(\Omega_2), \\ w_4 \in H^1(\Omega_2), \ w_6 = w_{1\nu} - w_{3\nu}|_{\Gamma_2} \}.$$

The condition $w_6 = w_{1\nu} - w_{3\nu}|_{\Gamma_2}$ must be understood in the following weak sense:

$$\int_{\Omega_1} (\Delta w_1 \varphi + \nabla w_1 \nabla \varphi) dx + \int_{\Omega_2} (\Delta w_3 \psi + \nabla w_3 \nabla \psi) dx = \int_{\Gamma_2} w_6 \varphi \, dx$$

$$\forall \varphi \in H^1(\Omega_1), \forall \psi \in H^1(\Omega_2), \quad \varphi = \psi|_{\Gamma_2}.$$

Let's define the function $\Phi: V \to V$;

$\Phi(w) = (0, -f_1(w_1), 0, -f_2(w_3), 0, 0)$, for $\forall w \in V$. Then the problem (1)-(8) can be rewritten in the following form:

$$\begin{cases} w_t = Aw + \Phi(w) \\ w(0) = w_0 \end{cases}$$

$w = (u, u_t, \upsilon, \upsilon_t, \delta, \delta_t)$ and $w_0 = (u_0, u_1, \upsilon_0, \upsilon_1, \delta_0, \delta_1) \in V$.

Suppose that, $w_0 = (u_0, u_1, \upsilon_0, \upsilon_1, \delta_0, \delta_1) \in V$ then the function $w \in C^0([0,\infty); V)$, satisfying the equality

$$w(t) = e^{At} w_0 + \int_0^t e^{A(t-s)} \Phi(w(s)) ds$$

is a weak solution of the problem (1)-(8) . It's proved that the problem (1)-(8) has a weak solution under some conditions. Thus, the problem (1)-(8) poses a strong continuous subgroup.

It's proved that this subgroup has unique minimal global attractor in the space V .

Published works:

1. AKBAR B. ALIEV AND GULSHAN KH. SHAFIYEVA, POTENTIAL WELLS AND GLOBAL SOLVABILITY OF THE CAUCHY PROBLEM FOR SYSTEM OF SEMI-LINEAR KLEIN-GORDON EQUATIONS WITH DISSIPATION, Proceedings of the Institute of Mathematics and Mechanics, National Academy of Sciences of Azerbaijan Volume 45, Number 1, 2019, Pages 119–136.

Accepted for publication:

1. **А.Б.Алиев**, С.Э. Исаева, Аттракторы для нелинейных волновых уравнений с акустическими условиями сопряжения, Дифференциальные уравнения.

2. **А.Б.Алиев**, Г.Х. Шафиева, Смешанная задача с динамическим граничным условием для одномерного волнового уравнения сильной диссипацией, Математические заметки.

Submitted for publication:

1. **Akbar Aliev** and Gunay Gadirova, The well-posedness of the mixed problem for one system of termoelasticity with singular coefficient.

Thesis and conference materials:

1**. A.B. Aliev** and Y.M. Farhadova, Investigations of the mathematical model for the oscillations of the bridge, which has one common point of contact with the cable , **Фундаментальные и прикладные проблемы математики и информати-ки.** Материалы XIII Международной конференции, приуроченной к 55-летию факультета математики и компьютерных наук (г. Махачкала, 16–20 сентября 2019 г.). – Махачкала: Издательство ДГУ, 2019. – 230 с. 25-27.

2. **Akbar B. Aliev**, Sevda E. Isayeva, Attractor for Nonlinear Transmission Acoustic Problem, 8-th International Euroasian Conference on Mathematical sciences and Applications, Dedicated to the 100 th Ansevary of Baku State University, Baku, 2019, pp.99-100.

3. **Akbar B. Aliev,** Gulshan Kh.Shafiyeva. On Potential Wells and Global Solvability of Cauchy Problem for System ofSemi-linear Klein-Gordon Equations, Operators in General Morrey-Type Spaces and Applications (OMTSA 2019)Kutahya Dumlupinar University, Kutahya, Turkey, 16-20 July, 2019, p.51.

4. **Aliev A.B.,** Isayeva S.E., Attractor for nonlinear transmission acoustic problem//Spektral Theory and its Applications, Book, Abstracts, Baku / June 7-8, 2019, p.31.

5. **Akbar B. Aliev,** Gulshan Kh.Shafiyeva. Mixed problem for the strongly damped nonlinear wave equatin with dynamic boundary conditions. "Modern Problems of Mathematics and Mechanics". International Conference devoted 60^{th} anniversary of IMM of ANAS, Baku-2019, 23-25 Oktober, p. 84.

6. **Akbar B. Aliev, Y.M.Farkhadova.** . Existence of strong solutions for the coupled suspension bridge equations. "Modern Problems of Mathematics and Mechanics". International Conference devoted 60^{th} anniversary of IMM of ANAS, Baku-2019, 23-25 Oktober, p. 83.

Work 2: On the boundary problem which the boundary condition depends on the function of Nevanlinna. **Executers: d.ph.m.s., prof. M.Bayramogly, d.m.s., prof. N.M.Aslanova.**

Published works:

1. **Nigar M. Aslanova, Mamed Bayramoglu**, Khalig M. Aslanov "On one class eigenvalue problem with eigenparameter in boundary condition at one endpoint" Filomat 32:19 (2018), 6667–6674 https://doi.org/10.2298/FIL1819667A
2. On some theoretic functional results concerning the theory of extremality and their application, Bayramoglu M., Jabbarov I.S., Kazimova L.G.,Proceedings of IMM, 44,N2,2018, 229-237
3. F.Akgun, **M.Bayramoglu, A.Bayramov.** The second regularized trace formula for the Sturm-Liouville operator, January 2019, Miskolc Mathematical Notes 20(1):17DOI: 10.18514/MMN.2019.2621

Thesis

1. **N.Aslanova**, Kh.M.Aslanov, "On selfadjoint extensions of symmetric operator wih exit from space" AMEA RMI-nin 60 illiyinə həsr olunmuş beynəlxalq elmi konfransın materialları. Baki-2019, 23-25 oktyabr, s. 140
2. **N.M.Aslanova, M.Bayramoglu,** Kh.M.Aslanov,"On some spectral problems of boundary value problem with Herglotz –Navanlinna function of spectral parameter in boundary condition, Operators,Functions and Systems of Math. Physics, Conference 10-14 june 2019, Khazar Universitu, Baku , Azerbaijan

3. **Work 3:** Asymptotics of differential equations and Wiman-Valiron-type estimations. **Executor: d.ph.m.s., prof. N.M.Suleymanov**.

Published works:

1. Nadir M. Suleymanov, Dunya E. Farajli. "On estimates of the Wiman-Valiron type for evolution equations" Proceedings of the University Scientific Conference on "New stage of the development of mathematics" dedicated to the 80th anniversary of Professor Nihan Aliyev. Lankaran, December 28, 2018, pp. 131

2. Nadir M. Suleymanov, Dunya E. Farajli. "On some applications of spectral asymptotics in Wiman-Valiron theory". An International Workshop dedicated to the 80th anniversary of an academician Mirabbas Geogja oglu Gasymov "Spectral theory and its applications". Baku, 2019, June 7-8. pp.167-170

3. Nadir M. Suleymanov, Dunya E. Farajli. "On Wiman-Valiron type estimations for the solutions of parabolic equations" Modern problems of Mathematics and Mechanics. Proceedings of the International Conference dedicated to the 60th anniversary of Institute of Mathematics and Mechanics . Baku, 2019,October 23-25. Pp.471-472.

Two articles of my post-graduate student have been published:

4. Dunya E. Farajli. « On estimates of the Wiman-Valiron type for solving the Cauchy problem » Journal of Contemporary Applied Mathematics. V.9, №2, 2019, December, pp. 3-9.

5. Dunya E. Farajli. "On Wiman-Valiron type estimations for parabolic equations" Transaction of NAS of Azerbaijan. 39(4), 1-5 (2019)**.**

Work 4: Smoothness of the solutions of nonlinear equations with discontinuous coefficient. **Executor: d.ph.m.s., prof. T.S.Gadjiev.**

In the work, it is considered linear elliptic equations with discontinuous coefficient. The smoothness of the solution of the Dirichlet problem is studied in the non-smooth ends. Coefficients are taken from BMO spaces. Belonging of generalized solutions to the generalized Morrey spaces has been shown.

Published works:

1. **Т.С. Гаджиев**, С.Я. Алиев , М.Н. Керимова, Сильная разрешимость краевой задачи для линейных недивергентных вырождающихся уравнений эллиптико-параболического типа, Proceedıngs of IAM, V.8, N.1, 2019, pp.14-23

2. **Tahir S. Gadjiev**, Tarlan A. Maharramova, Konul G. Suleymanova, Some apriori estimates for the solutions of a degenerate nonlinear elliptic equations, Trans. Natl. Acad. Sci. Azerb. Ser. Phys.-Tech. Math. Sci. Mathematics, 39 (1), 54-60 (2019).

3.**Gadjiev Tahir**, Galandarova Shahla and Guliyev Vagif, Regularity in generalized Morrey spaces of solutions to higher order nondivergence elliptic equations with VMO coefficients, Electron. J. Qual. Theory Differ. Equ. 2019, No. 55, 1-17.

4. **T. Gadjiev**, V. Guliyev, A. Şerbetçi, Regularity of solutions higher order elliptic equationsin üeighted generalized Morrey spaces, Nonlinear studies. 2019, № 6, p. 18-29

Accepted for publication:

1. The behaviour of solution nonlinear elliptic-parabolic equations, UKR math.journal.

2. The solvability of linear degenerate elliptic equations, Vestnik Bakinskogo universiteta,2019

Thesis:

1. **Tahir S. GADJIEV**, Faig M. NAMAZOV, Regularity Estimates in Weighted Generalized Morrey Spaces for Quasilinear Parabolic Equations, Operators in General Morrey-Type Spaces and Applications, 2019, p.18.

2. **Tahir S. GADJIEV**, Shahla GALANDAROVA, Konul SULYEMANOVA, The Uniformly Elliptic and Parabolic Equations of Higher Order with Discountinuous Data in Generalized Morrey Spaces and Elliptic Equations in Unbounded Domains, Operators in General Morrey-Type Spaces and Applications, 2019, p.19.

3. **Tahir S. GADJIEV**, Konul YASINLI, The Regularity of Solutions Elliptic Equations of Higher Order with Discontinuous Data in Generalized Orlicz-Morrey Spaces, Operators in General Morrey-Type Spaces and Applications, 2019, p.30.

4. **Гаджиев Т.С.,** Мамедова А.В., Регулярность решений классов нелинейных эллиптико-параболицеских задач, Современные Методы Теории Краевых Задач, Воронеж 2019, стр. 97

5. **Gadjiev T.S.,** Mammadova A.V. Regularity of solutions of classes nonlinear elliptic-parabolic problems, International Workshop "Spectral Theory and Its Applications", 2019, p.68.

Work 5: Asymptotic bifurcation of solutions of nonlinear Dirac problems, structural properties of solutions of linear and nonlinear boundary problems for definite and indefinite weighted second and fourth order differential operators. **Executers: prof. Z.S.Aliyev, j.s.w. H.Rzayeva.**

Published works:

1. **Z.S. Aliyev,** S.M. Hasanova, Global bifurcation of positive solutions of semi-linear elliptic partial differential equations of indefinite weight, Zeitschrift für Analysis und ihre Anwendungen, **38**(1) (2019), 1-15.
2. **H.Sh. Rzayeva,** Global bifurcation from infinity in nonlinear one dimensional Dirac problems, Proc. IMM NAS Azerbaijan, 45(1) (2019), 146–154.
3. **Z.S. Aliyev**, P.R. Manafova, Oscillation properties for the Dirac equation with spectral parameter in the boundary condition, Bulletin of the Malaysian Mathematical Sciences Society, 2019, 1-15; doi.org/10.1007/s40840-019-00749-1
4. **Z.S. Aliyev**, F.M. Namazov, On the spectral problem arising in the mathematical model of bending vibrations of a homogeneous rod, Complex Analysis and Operator Theory, 2019, 19 p.; doi.org/10.1007/s11785-019-00924-z

Accepted for publications:

1. **Z.S. Aliyev,** P.R. Manafova, Global bifurcation in nonlinear Dirac problems with spectral parameter in boundary condition, Topological Methods in Nonlinear Analysis, 14 p.
2. **Z.S. Aliyev,** F. M. Namazov, Spectral properties of the equation of a vibrating rod, at both ends of which the masses are concentrated, Banach Journal of Mathematical Analysis, 21 p.
3. **З.С. Алиев,** Н.Б. Керимов, В.А. Мехрабов, О сходимости разложений по собственным функциям одной краевой задачи со спектральным параметром в граничных условиях, I и II, Дифференциальные уравнения, 14 с, 12с.
4. **Submitted works for publication:**

1. **Z.S. Aliyev**, E.H. Yusifova, Ya.T. Mehraliyev, On one nonlocal inverse boundary problem for partial differential equations of third order, Analysis and Mathematical Physics, 15 p.

2. **Z.S. Aliyev,** N.B.Kerimov, On the uniform convergence of Fourier series expansions in the system of eigenfunctions of the equation of vibrating rod with the load concentrated on one end, Rocky Montain Journal of Mathematics, 18 p.

3**. Z.S. Aliyev,** K.F. Abdullayeva Uniform convergence of the spectral expansions in the terms of root functions of a spectral problem for the equation of vibrating beam, Zeitschrift für Analysis und ihre Anwendungen,

4. **Z.S. Aliyev**, G.T. Mamedova, Some properties of eigenfunctions for the equation of vibrating beam with a spectral parameter in the boundary conditions, Journal of Differential Equations, 18 p.

4. **Z.S. Aliyev,** N.A. Neymatov, H. Sh. Rzayeva, Unilateral Global Bifurcation from Infinity in Nonlinearizable One Dimensional Dirac Problems, Nonlinearity, 11.

5. **Z.S. Aliyeva**, N.A. Ismayilova, Global bifurcation from zero in nonlinear Sturm-Liouville problems with a spectral parameter in the boundary condition, Nonlinear Analysis, 9 p.

6. **Z.S. Aliyev,** X.A. Asadov Global bifurcation in nonlinear fourth order eigenvalue problems with a spectral parameter in the boundary condition, Journal of American Mathematical Society, 10 pp.

Work 6. Asymptotic behaviour of eigenvalues of one boundary problem for second-order elliptic differential operator equation contained in spectral parameter both equation itself and boundary condition. **Executor: d.m.s., prof. B.A.Aliyev.**

Published works:

1. **B.Aliev,** V.Z.Kerimov "Solvability of a boundary value problem for second order elliptic differential operators with a complex parameter in the equation and in the boundary condition" Spectral theory and its applications; An İnternational Workshop dedicated to the 80th anniversary of an academician Mirabbas Geogja oglu Gasymov . p.36-37.

2. **Б.А.Алиев** , В.З.Керимов неклассической асимптотике собственных значений одной краевой задачи для эллиптического дифференциально-операторного уравнения второго порядка. ФУНДАМЕНТАЛЬНЫЕ И ПРИКЛАДНЫЕ ПРОБЛЕМЫ МАТЕМАТИКИ И ИНФОРМАТИКИ. Материалы XIII Международной конференции, приуроченной к 55-летию факультета математики и компьютерных наук (г. Махачкала, 16–20 сентября 2019 г.), с.23

Submitted works for publication

1. **Б.Алиев,** "Асимптотическое поведение собственных значений одной краевой задачи для эллиптического дифференциально-операторного уравнения второго порядка со спектральным параметром в уравнении и в граничном условии", «Дифференциальные уравнения», 2019 (в печати).

Work 7: Spectral issues for differential and difference equations and their application to the nonlinear equations. **Executor: d.ph.m.s., prof. Agil Kh. Khanmamedov.**

1) **А.Ханмамедов,** Операторы преобразования для возмущенного гармонического осциллятора // Математические заметки, 2019, т. 105, № 5, с.740-746.

2) **А.Ханмамедов**, Алгоритм решения задачи Коши для одной бесконечномерной системы нелинейных дифференциальных уравнений // Журнал вычислительной математики и математической физики, 2019, т. 59, № 2, с. 247-252.

3) **A.Khanmamedov**, The inverse spectral problem for the perturbed harmonic oscillator on the entire axis// Proceedings of the Institute of Mathematics and Mechanics, National Academy of Sciences of Azerbaijan Volume 44, Number 2, 2018, Pages 285–294.

Work 8: Gradient estimations for the parabolic equations in the weighted Morrey spaces. **Executor: ass.prof. Sh.A.Muradova.**

1. Sh.A. Muradova. "Parabolic-fractional integral operators with rough kernels in parabolic local generalized Morrey spaces", OMTSA-2019, Kutahya, TR, 16-20 July, 2019, p. 62.

2. Sh.A. Muradova. Parabolic maximal operator in anisotropic generalized Morrey spaces. ФУНДАМЕНТАЛЬНЫЕ И ПРИКЛАДНЫЕ ПРОБЛЕМЫ МАТЕМАТИКИ И ИНФОРМАТИКИ. Материалы XIII Международной конференции, приуроченной к 55-летию факультета математики и компьютерных наук, г. Махачкала, 16–20 сентября 2019 г., с.116.

3. **Sh.A. Muradova.** Investigation of anisotropic fractional maximal operator in anisotropic Morrey-type spaces. "Modern Problems of Mathematics and Mechanics". International Conference devoted 60^{th} anniversary of IMM of ANAS, Baku-2019, 23-25 Oktober, p. 393-394.

Work 9: Investigation of multidimensional mixed problem for the one class third order differential equation with a non-linear operator on the right-hand side. **Executor: d.ph.m. ass.prof. A.G.Aliyeva.**

In the work, the existence and uniqueness theorems have been proved for the almost everywhere solution of the multidimensional mixed problem for the one class third order differential equation with a non-linear operator on the right-hand side.

Published works:

1. S.Aliyev, A.Aliyeva,G.Abdullayeva. On the existence of solution to multidimensional third order nonlinear equations. European Journal Pure and Appliet mathematics, vol.12, No2, 2019, p.577-589. (Thompson Reuters).

2. S.Aliyev, F.Namazov, A.Aliyeva. The study of one-dimensional mixed problem for one class of fourth order differential equations. 8th International Eurasian Conference on Mathematical Sciences and Applications, 2019, Baku, p.165.

Work 10: On the solvability of Drichlet problem for the Laplace equation in the weighted Morrey classes. **Executer: d.ph.m. N.R.Ahmedzade.**

In the report period, the solvability of Drichlet problem for the Laplace equation is studied in the weighted Morrey classes. The obtained results were published in 1 article and 1 thesis.

Published works:

1) **N. R. Ahmedzade**, Z. A. Kasumov, On the Dirichlet problem for the Laplace equation with the boundary value in Morrey space, Eurasian Math. J., 2018, Volume 9, Number 4, 9–21

2) Ahmedzade N.R., Kasumov Z.A. Solvability of the Dirichlet problem for the Laplace equation with boundary value from the Morrey space. International Workshop "Spectral Theory and Its Applications" dedicated to the 80th anniversary of the outstanding mathematician, academician Mirabbas Gasymov. Baku, Azerbaijan, 07-08 June, 2019, pp. 19-20.

3) **N.R. Ahmadzade**, Z.A. Kasumov, On the solvability Dirichlet problem for the Laplace equation with the boundary value in grand-Lebesgue space. International Conference "Modern Problems of Mathematics and Mechanics" devoted to the60th anniversary of the Institute of Mathematics and Mechanics, 23-25 October, 2019, Baku, Azerbaijan, pp. 62-64.

Submitted works for publication

1. T.B. Gasymov, Akhtyamov A., **N.R. Ahmedzade**. On the basicity in weighted Lebesgue spaces of eigenfunctions of a second-order differential operator with a discontinuity point. Proceedings of the Institute of Mathematics and Mechanics, National Academy of Sciences of Azerbaijan.

SOCIAL ACTIVITY OF COLLABORATORS OF THE "DIFFERENTIAL EQUATIONS" DEPARTMENT

The head of the department prof. Akper Aliev is the member of the Expert Commission under the HAC.

Collaborators of the department are the members of Editorial Boards of the following journals of the İnstitute and other foreign journals:

- Proceedings of IMM - **prof. Akper Aliev, prof. Mammad Bayramogly, prof. Tahir Gadjiev, prof. Ziyatkhan Aliyev;**

- Transactions of IMM - **prof. Akper Aliev, prof. Mammad Bayramogly, prof. Tahir Gadjiev**;

- Azerbaijan Journal of Mathematics - **prof. Akper Aliev**, **prof. Ziyatkhan Aliyev;**

- Caspian Journal of Applied Mathematics, Ecology and Economics - **prof. Akper Aliev, prof. Mammad Bayramogly, prof. Ziyatkhan Aliyev, prof. Agil Khanmamedov, ass.prof. Nigar Aslanova**.

- Balkan Journal of Mathematics - **ass.prof. Nigar Aslanova**.

Participation in the Institute Seminar

All collaborators have been actively participated in the Institute's general works, including the Institute Seminar.

- **prof. Agil Khanmamedov g**ave a talk on the theme "On the inverse scattering problem for the the Schredinger Equation, which has an additional linear potential"

- On May 29, 2019, **prof. Tahir Hajiyev** gave a talk on the theme "The regularity of the solutions of elliptic equations with the discontinuous coefficient on non-smooth domains"

- On June 12, 2019, d.m.s., **prof. Nigar Aslanova** gave a talk on the theme "Learning trace issues when parameter contained in both equation and boundary conditions ", in the Institute's Seminar

-Sevda Isaeva

Gave a talk on the theme "Transmission acoustic problems for nonlinear hyperbolic equations with nonlinear dissipation".

Every Wednesday, at 12.00, the scientific seminar named "Modern problems of the theory of differential equations" guided by A.B.Aliev, is conducted. All collaborators of department, including doctoral and post-graduate students participated in the seminar.

A.B.Aliyev and Y.M. Farhadova, Sh.A. Muradova participated in the XIII International Conference on "**Fundamental and applied problems of mathematics and computer science"** in Makhachkala on September 16-20, 2019.

As A.B. Aliyev is a member of the program committee of that conference, all expenses would be borne by the organizing committee if he participated in the work of conference.

A.B.Aliyev attended the 8th Eurasian Conference dedicated to the 100th anniversary of Baku State University.

Collaborator of the department Sh.A. Muradova was a member of the Working Group of the International Conference on the 60th Anniversary of the Institute of Mathematics and Mechanics.

A.B.Aliyev attended the conference "Operators in General Morrey-Type Spaces and Applications (OMTSA 2019)" held at Dumlu Pinar University in Kütahya, Turkey. A.B.Aliyev attended the conference named "Spectral Theory and its Applications", dedicated to the 80th anniversary of academician M.G. Gasimov.

A.B.Aliyev is a member of the Expert Commission under the HAC. He is also a member of the Scientific Council on Mathematical Problems under the Republican Scientific Research Coordination Council.

During this period, several scientific works and dissertations were discussed at the department.

On June 11, 2019, master of the department Aishen Mammadova had defended her dissertation work entitled “The solvability of non-linear elliptic-parabolic equations”.

The collaboratos of the department, prof. Akper Aliev, prof. Mammad Bayramogly, prof. Ziyatkhan Aliyev, prof. Tahir Gadjiev, prof. Agil Khanmamedov**,** prof. Bakhram Aliev, ass.prof. Nigar Aslanova**,** ass.prof. Sh.A. Muradova teaches at the universities of the Republic (Azerbaijan Technical University, BSU, ASPU, AACU**)** for bachelors and masters.

Total– 62

Article- 19 (published) and 19 (prepared for publication)

Thesis – 24.

Head of Department **prof. Akbar B. Aliev**