

SEMI-ANNUAL REPORT OF “MATHEMATICAL ANALYSIS” DEPARTMENT ON SCIENTIFIC AND SCIENTIFIC ACTIVITY FOR 2023

The staff of “Mathematical Analysis” department consists of 11 research associates, including 4 doctor of sciences, professor, one corresponding member of ANAS.

- 1) Vagif Guliyev – head of department (doct. phys. math. sci. prof. Corr. member of ANAS).
- 2) Rovshan Bandaliev- doct. math. sci., senior researcher
- 3) Elman Ibrahimov – doct. math. sci., senior researcher
- 4) Hajibeyov Mubariz- doct. math. sci., senior researcher
- 5) Zaman Safarov - cand. phys. math. sci., ass. prof., leading researcher
- 6) Mehriban Omarova – ph. doctor in math., ass. prof., leading researcher
- 7) Elmira Hajiyeva – cand. phys. math. sci., res. ass.
- 8) Lala Aliyeva - ph. doctor in math., ass. prof., great researcher
- 9) Fatayi Isayev – ph. doctor in math., great researcher
- 10) Aytekin Abdullayeva – ph. doctor in math., great researcher
- 11) Aynur Mammadova – ph. doctor in math., great researcher

I. SCIENTIFIC PART

In 2023, according to the affirmed plan, six scientific works on the themes of “Modern problems of harmonic analysis” are carried out.

Work 1: Boundedness and applications of sublinear operators and their commutators generated by the Calderon-Zigmund operator in weighted Morrie spaces on homogeneous Lie groups.

Executors: Head of department, corr. member of ANAS, prof. V.S. Guliyev, ph. doctor in math., ass. prof., lead. res. M.N. Omarova

Works on application and boundedness of sublinear operators and their commutators generated by Calderon-Zygmund in weighted Orlicz-Morrey-type spaces on homogeneous Lie groups was investigated..Based on the results of researches, the following papers were published. Studies on this work are carried out.

1. V.S. Guliyev, Characterizations of Lipschitz functions via the commutators of maximal function in Orlicz spaces on stratified Lie groups, **Math. Inequal. Appl.** 26 (2023), no. 2, 447–464. (Impact factor 1.014) (WoS, SCIE, Q2)
<http://files.ele-math.com/abstracts/mia-26-29-abs.pdf>
 2. V.S. Guliyev, Commutators of multilinear Calderón-Zygmund operators with kernels of Dini's type on generalized weighted Morrey spaces and applications. **Positivity**, 27 (2023), no. 1, Paper No. 13, 29 pp. (Impact factor 0.853) (WoS, SCIE, Q3)
<https://link.springer.com/article/10.1007/s11117-022-00963-5>
 3. F. Deringoz, V.S. Guliyev, M.N. Omarova, M.A.Ragusa, Calderón–Zygmund operators and their commutators on generalized weighted Orlicz–Morrey spaces, **Bull. Math. Sci.** 13 (2023), no. 1, Paper No. 2250004, 26 pp. (impact factor 1.485) (WoS, SCIE, Q1)
<https://doi.org/10.1142/S1664360722500047>
 4. A. Kucukaslan, V.S. Guliyev, C. Aykol, A. Serbetci, *Maximal and Calderón–Zygmund operators on the local variable Morrey–Lorentz spaces and some applications*, **Applicable Analysis**, 102 (2023), no. 2, 406–415. (impact factor 1.278) (WoS, SCIE, Q3)
<https://doi.org/10.1080/00036811.2021.1952995>
 5. G.A. Abasova, M.N. Omarova, Commutator of anisotropic maximal function with BMO functions on total anisotropic Morrey spaces, **Trans. Natl. Acad. Sci. Azerb. Ser. Phys.-Tech. Math. Sci. Mathematics**, 43 (1), 3-15 (2023) (SCOPUS).
<https://trans.imm.az/volumes/43-1/4301-01.pdf>
- Tehsis**
6. M.N. Omarova, Global regularity in Orlicz-Morrey spaces of solutions to parabolic equations with VMO coefficients, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.317-319.
<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

Work 2: Boundedness and compactness of some sublinear operators in quasibanach grand Lebesgue spaces.

Executors: doct. math. sci., senior researcher Rovshan Bandaliyev., cand. phys. math. sci., ass. prof., lead. res. ass Zaman Safarov

Boundedness and compactness of some sublinear operators in quasibanach grand was investigated. Based on the results of researches, the following papers were published. Studies on this work are carried out.

1. **R.A. Bandaliyev**, K.H. Safarova, *On the solvability of nonlinear ordinary differential equations in grand Lebesgue spaces*, **Ukrainian Mathematical Journal**, 74(8), 2023, p.1155–1164. (WoS, IF 0.464, Q4)
<https://link.springer.com/article/10.1007/s11253-023-02127-4>

Thesis

2. **R.A. Bandaliyev**, R.F. Babayev, *On weak compactness in weighted variable Lebesgue spaces*, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.142.
<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

Work 3: Boundedness of given potentials in hypergroups in variable exponent Lebesgue spaces

Executors: doct. math. sci., senior researcher Hajibeyov Mubariz. , cand. phys. math. sci., res. ass Elmira Hajiyeva

Boundedness of given potentials in hypergroups in variable exponent Lebesgue spaces was investigated. Studies on this work are carried out. Based on the results of researches, the following papers were published. The thesis was published at the International Conference.

1. **M.G. Hajibayov**, R.Sh. Huseynzade, *Behavior at zero of finite differences of Riesz potentials*, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.189-191.
<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

Work 4: Boundedness of fractional maximal operator generated by Gegenbauer differential operator and its commutator in generalized Morrey spaces.

Executors: doct. math. sci., senior researcher Elman Ibrahimov

Works on boundedness of fractional maximal operator generated by Gegenbauer differential operator and its commutator in generalized Morrey spaces are carried out. Based on the results of researches, the following papers were published.

1. V. Kokilashvili, **E.J. Ibrahimov**, *Weak and strong type inequalities criteria for fractional maximal functions and fractional integrals associated with Gegenbauer differential operator*, **Georgian Mathematical Journal**, 2023. (SCOPUS)

<https://doi.org/10.1515/gmj-2023-2031>

Work 5 : Two-weighted inequalities for the commutator of sublinear operator derived from parabolic B-singular integral.

Executors: cand. phys. math. sci., ass. prof., great researcher Lala Aliyeva, ph. doctor in math., great researcher Fatayi Isayev

Studies on two-weighted inequalities for the commutator of sublinear operator derived from parabolic B-singular integral are carried out. Also, the relationship between high-order generalized oscillation of the locally summable function and the theorem on the isomorphism of the functional spaces determined with the help of those characteristics was proved. As a result of research, the article was given to publish. The thesis was published at the International Conference.

1. **F.A. Isayev**, *Commutators of multilinear Calderon – Zygmund operators with kernels of Dini type on generalized local Morrey spaces*, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.206-208.

<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

Work: 6. Approximation theorems expressed by weighted discontinuity modulus in Lebesgue space.

Executors: ph. doctor in math., great researcher Aytekin Abdullayeva, ph. doctor in math., great researcher Aynur Mammadova.

Studies on Approximation theorems expressed by weighted discontinuity modulus in Lebesgue space are carried out. As a result of research, the article was given to publish. The thesis was published at the International Conference.

1. **A.E. Abdullayeva**, *On characterization of precompact on weighted Lebesgue spaces*, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.29-32.

<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

2. **A.N. Mammadova**, *On properties of weighted modulus continuity in Lebesgue spaces*, Modern problems of Math. and Mech. Proceedings of Inter Conference dedicated 100-th anniversary of H. Aliyev. Baku 2023, p.261-263.

<https://mpmm.imm.az/wp-content/uploads/2023/05/Abstract-Aliyev-100-2023.pdf>

II SCIENTIFIC ORGANIZATIONAL ACTIVITY

- The main priority of the department is modern problems of harmonic analysis.
- In the department the research works are carried out on 6 themes.
- The department staff consists of 16 collaborators. One of them is a professor (corr. member of ANAS), one doctor of sciences (professor of ANAS), 4 associate professor, 4 senior res. ass., 4 res. ass., 2 engineer programmer, 1 senior laboratory assistants, 2 laboratory assistants.
- Prof. V.S., Guliyev, doct. math. sci., senior researcher Rovshan Bandaliyev, doct. math. sci., senior researcher Elman Ibrahimov, ph. doctor in math., senior researcher Fatayi Isayev, ass. prof., lead. res. M.N. Omarova, cand. phys. math. sci., ass. prof., senior researcher Lala Aliyeva, ph. doctor in math., senior researcher Aytakin Abdullayeva, ph. doctor in math., senior researcher Aynur Mammadov took part in seminars. In the first quarter of annual report member of department, doct. math. sci., senior researcher Elman Ibrahimov delivered talk over the topic of “Strong and weak type inequalities for maximal fractional functions and fractional integral operators derived from Gegenbauer differential operators”.
- Under the management of V.S. Guliyev seminars of the department named “Actual Issues of Harmonic Analysis” continued its activity on the fourth day of every week. In the seminars, prof. V.S. Guliyev, doct. math. sci., senior researcher Rovshan Bandaliyev, ph. doctor in math., senior researcher Fatayi Isayev, ass. prof., lead. res. M.N. Omarova, doctoral student of the department J. Azizov give seminars.

- Prof. V.S. Guliyev has continued his activity as a member of the The High Attestation Commission under the President of the Republic of Azerbaijan.

- Prof. V.Guliyev is one of the editors-in-chief of "Caspian journal of applied mathematics, ecology and economics", editor-in-chief in mathematics issues of "AMEA-nın Xəbərləri" (Fizika-texnika və riyaziyyat elmləri seriyası) and Deputy Editor-in-Chief of the international journal "Applied and Computational Mathematics". While being also member in the editorials board of many international "Journal of Nonlinear Sciences and Applications" (J. Nonlinear Sci. Appl.), "Eurasian Mathematical Journals", "Communications de la Faculté des Sciences de l'Université d'Ankara. Séries A1. Mathematics and Statistics", "TWMS Journal of Pure and Applied Mathematics" and other local Proceedings of Institute of Mathematics and Mechanics of NAS of Azerbaijan", "Azerbaijan Journal of Mathematics" journals.

- Statistics related to the references in "Google Scholar" to the papers of memners of ANAS in the department of Physics ,Mathematics and Technical Sciences have become released.Vagif Guliyev was the most mentioned person in the list.

- Under the management of Prof V.Guliyev as an editor-in-chief, **vol. 43, no. 1, 2023** issue of "Transactions of Azerbaijan National Academy of Science, Issue Mathematics, Series of physical-technical and mathematics science" was completed and released. Works on **vol. 43, no 4, 2023** issue of journal are going on.

- ass. prof., lead. res. M.N. Omarova was appointed the scientific secretary of the Mathematics and Mechanic expert council of AKK.

- At 1-10 march 2023, cand. phys. math. sci., ass. prof., senior researcher Lala Aliyeva participated as a member of Accreditation Commission in evaluation of accreditation which held in Azebaijan State Economic University with the attempt of the Agency for Quality Assurance in Education.

- In the first quarter of annual report 7 articles of departament staff (6 of them for foreign, one of for national, 5 of for impact factoring , 2 of for Scopus)and 6 theses were published, 7 articles were accepted for publication, 12 articles were given to publish.

Head of the department
"Mathematical Analysis"

Corr. member of NASA,
prof. V.S. GULIYEV