

## SEMI-ANNUAL REPORT OF “MATHEMATICAL ANALYSIS” DEPARTMENT ON SCIENTIFIC AND SCIENTIFIC ACTIVITY FOR 2022

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 Bandaliyev- 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 2022, according to the affirmed plan, six scientific works on the themes of “Modern problems of harmonic analysis” are carried out.

- 1) **Work 1: Boundedness and applications of sublinear operators and their commutators generated by the parabolic Calderon-Zigmund operator in parabolic weighted Orlicz-Morrey spaces.**

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

In parabolic weighted Orlicz-Morrey spaces, the problem of sublinear operators generated by the parabolic Calderon-Zigmund operator and their commutators, and their applications, are investigated. Studies on this work are carried out. As the results of researches, the following papers were published.

1. V.S. Guliyev, M.N. Omarova, *Estimates for operators on generalized weighted Orlicz-Morrey spaces and their applications to non-divergence elliptic equations*, **Positivity** (2022), 1-29. (impact factor 1.030) Q2  
<https://doi.org/10.1007/s11117-022-00896-z>

2. H. Armutcu, M.N. Omarova, *Some characterizations of BMO spaces via maximal commutators in Orlicz spaces over Carleson curves*, **Trans. Natl. Acad. Sci. Azerb. Ser. Phys.-Tech. Math. Sci. Mathematics**, 42 (1), 47-60 (2022). (SCOPUS)  
<http://trans.imm.az/volumes/42-1/4201-05.pdf>
3. M.N. Omarova, K.A. Mustafayev, *Boundedness of maximal operator in generalized local Morrey spaces*, Republican Scientific Conference “**Actual Problems of Mathematics and Mechanics**” dedicated to the 99th anniversary of the birth of National Leader Heydar Aliyev, 374-376, 2022.

**2) Work: Compactness and applications of the Hausdorff operator in Lebesgue spaces of variable degree.**

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

The compactness and applications of the Hausdorff operator in Lebesgue spaces of variable degree are investigated. Studies on this work are carried out. As the results of researches, the following papers were published.

1. R.A. Bandaliyev & K.H. Safarova, *On Hardy type inequalities in grand Lebesgue spaces  $L_p$  for  $0 < p \leq 1$* , **Linear and Multilinear Algebra**, (2022), 1-14. (WoS, Q1).  
 DOI: 10.1080/03081087.2021.1944968
2. T.K. Yuldashev, B.J. Kadirkulov, and R.A. Bandaliyev, *On a Mixed Problem for Hilfer Type Fractional Differential Equation with Degeneration*, **Lobachevskii Journal of Mathematics**, 2022, Vol. 43, No. 1, pp. 263–274  
<https://link.springer.com/article/10.1134/S1995080222040229?noAccess=true>

**3) Work: Boundedness of given maximal and fractional maximal operators in hypergroups in Lebesgue spaces of variable degree.**

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

The boundedness of given maximal and fractional maximal operators in hypergroups in Lebesgue spaces of variable degree is investigated. Studies on this work are carried out. As the results of researches, the following papers were published.

1. Mubariz G. Hajibayov, *Hardy-Littlewood Maximal Functions and Fractional Integrals on Hypergroups*, **Thai Journal of Mathematics**, Vol. 20, No. 1 (2022), Pages 1–11,  
<http://thaijmath.in.cmu.ac.th>

**4) Work: Weighted inequalities for fractional maximal and fractional integral commutators induced by the Gegenbauer differential operator.**

**Executor:** doct. math. sci., senior researcher Elman Ibrahimov

Work on weighted inequalities for fractional maximal and fractional integral commutators induced by the Gegenbauer differential operator is continued.

**5) Work: Two-weighted inequalities for the commutator of a sublinear operator induced by the B-potential integral.**

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

Work is continued on the subject of two-weighted inequalities for the commutator of the sublinear operator generated by the B-potential integral.

**6) Work: A weighted continuity modulus in Lebesgue space. Estimation in weighted Lebesgue space for averaging function in Sobolev sense.**

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

Work continues on the subject of weighted continuity modulus in Lebesgue space and evaluation in weighted Lebesgue space for the averaging function in the Sobolev sense. Using the compactness criterion in the weighted Lebesgue space, an analogue of the Kolmogorov-Riesz type theorem in the weighted Besov space was obtained. A.E. Abdullayeva, A.N. Mammadova's thesis "On compactness of sets in the weighted Besov spaces" I. It was sent for publication in the materials of the International conference dedicated to Ibrahimov's 110th anniversary. An article on the topic has been prepared and will be sent to print.

## 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.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) while being also member in the editorials board of many international "Journal of Nonlinear Sciences and Applications" (J. Nonlinear Sci. Appl.), "Applied and Computational Mathematics", "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.

- Under the management of Prof V.Guliyev as an editor-in-chief, **vol. 42, no. 1, 2022** 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. 42, no 4, 2022** issue of journal are going on.

- In the first quarter of annual report **5** articles of departament staff were published, **6** articles were accepted for publication and **12** articles were presented.

**Head of the department**  
**"Mathematical Analysis"**

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