

**REPORT OF “MATHEMATICAL ANALYSIS” DEPARTMENT
OF IMM NASA FOR THE YEAR OF 2014**

I. SCIENTIFIC PART.

The following research works were carried out:

Theme: Functional spaces and theory of operators. Up-to-date problems of analysis.

The following works were executed:

- A.** Boundedness of fractional-maximal operator, Riesz potential and singular integral operators in generalized Campanato spaces.

Executor: Corr. member of NASA, doctor of ph.m.s. V.S.Guliyev, j.r.a. F.Isayev.

- B.** Boundedness of singular operators in generalized weighted Holder spaces with generalized shift and its applications.

Executor: d.ph.m.s. S.K.Abdullayev.

- C.** Investigation of absolute values of Fourier coefficients of two one-variable periodic functions and decrease order of smoothness module of convolution of these functions in terms of remainder terms of the series constructed from the product of the elements of certain weighted sequences. (inverse theorems)

Executor: cand. ph. m. s. doc. lead. r.a. N.A.Ilyasov.

- D.** Investigation of maximal Riesz potential and singular operators generated by Laplace-Bessel differential operator.

Executor: cand. ph. m. s. lead. r. a. J.J. Hasanov, j.r.a. A.E.Abdullayeva

- E.** Analogue of Riesz theorem on compactness in variable degree Lebesgue spaces and some applications.

Executor: cand. ph. m. s. doc. lead. s. a. R.A.Bandaliyev, j.r.a. A.N. Mammadova.

- F.** Obtaining weighted inequalities in Lebesgue space for singular integral operators generated by Laplace-Bessel differential operator.

Executor: c. ph. m. s. doc. lead. s. a. Z.V. Safarov

- G.** Boundedness of singular integrals in group structure spaces in Lebesgue spaces.

Executor: cand. ph. m. s. s.r.a. M.C. Hajibeyov.

- H.** Inequalities between the local oscillation characteristics of a function and smoothness modules, and investigation of properties of their integral operators.

Executor: j.r.a. L.Aliyeva.

The following results were obtained.

1. Corr. member of NASA, doctor of ph.m.s. V.S.Guliyev, j.r.a. F.Isayev.

In the work the boundedness of fractional maximum operator, Riesz potential and singular integral operators in generalized Kampanato spaces $L_{comp}^q(\mathbb{R}^n)$ was studied.

A paper on the theme was published .

2. Doct.ph.m.s., prof.l.r.a. S.K.Abdullayev.

The boundedness of generalized shift generated by the Laplace-Bessel differential operator and many-dimensional singular operator in weighted Holder spaces was studied. The case when the kernel's characteristics in dependent on the pole.

3. Cand. ph. m. s. doc. lead. r.a. N.A.Ilyasov.

In the terms of residual terms of series constructed from the products of absolute values and the elements of the certain weight sequences of the Fourier series of two variable periodic functions, some upper estimations of smoothness modules of the convolution of these function were obtained. In definite cases the exactness of the obtained estimations were shown.

The exachness marsho type inegualities for total smoothness module of periodic functions and their derivatives in the space $L_p(T^m)$ ($1 \leq p \leq \infty$, $m \geq 1$, $T^m = (-\pi, \pi]^m$) were shown.

4. Cand. ph. m. s. lead. r. a. J.J. Hasanov, j.r.a. A.E.Abdullayeva.

Maximum Riesz potential generated by laplace-Bessel differential operator were studied in generalized weighted Morrey spaces and weighted inegualities were prowed.

5. Cand. ph. m. s. doc. lead. s. a. R.A.Bandaliyev, j.r.a. A.N. Mammadova.

Under ε -shell of the metric spaces we undestand a space containing the sets with a diameter greater than ε . If for any $\varepsilon > 0$ the metric space has finite ε -shell, then it is said that this space is completely bounded. It is known that the necessary and sufficiend condition for the metric space to the compact in its complete boundedness.

6. Cand. ph. m. s. doc. lead. s. a. Z.V. Safarov.

Weighted inegualitties for singular integral operators generated by the Laplace-Bessel differential operator were studied in Lebesgue spaces. A sufficient condition on the weighted functions to show the boundedness of singular integral operators in this space, was found.

7. Cand. ph. m. s. s.r.a. M.C. Hajibeyov.

The boundedness of the generalized potential in commutatore semigroup containing the structural properties of the group in the Jewett sense was studied.

8. j.r.a. L.Aliyeva.

The inequalities between the local oscillation properties of the function and the smoothness module and their applications to the properties of integral operators were studied. Some inequalities between the local oscillation of locally summable function and smoothness modules in the metric L_p were obtained. By means of these inequalities appropriate estimations for potential type integral operator were obtained.

II. TƏŞKİLATI HİSSƏ

- On the report the works were executed according to scientific-organizational plan. The collaborators of the department have participated and given talks at the institute seminars.

- The seminar under the guidance of acad. A.J. Hajiev "Actual problems of harmonic analysis" is held at each thusday of the week. The obtained results and interesting themes are discussed in these seminars. The collaborators of the department take an active part in the work of the institute seminar, too. V.S.Guliyev, J.J.Hasanov, R.Bandaliyev, M.N.Omarova, M.Hajibeyov, Y.Mammadov, A.E.Abdullayeva, A.N. Mammadova and other have given talks at there seminars.

- The department consists of 16 collaborators (6 of them work part-time) 3 of them are professor, 5 docent, 6 junior research associate, 1 senior laboratory assistant, 1 laboratory assistant.

- The department collaborators execute research works on 8 themes.

- In 2014 (2013) the collaborators of the department have published 38 (33) papers, 35 (25) pares are in print. 16 (13) of them were published in index journals, 6 (5) papers in authorative foreign journals, 15 (3) in Republican journals, 15 (10) abstracts in the proceedings of Republican and International conferences. In 2014, 5 papers of the collaborators were accepted to be published in authorative foreign journals.

- The main a priori direction of the department are modern problems of harmonic analysis.

- The corr. member of NASA, prof. V.S.Guliyev has worked at grant projects within the Ahi Evran University scientific investigations (PYO.FEN.4003.13.003; **4000 YTL**) and (PYO.FEN.4001.14.01; **4000 YTL**). In 2014 1 project to science development Foundation and 1 project to scientific reseaches programs competition held by NASA were submitted.

- In 2014 corr. member of NASA, prof. V.S.Guliyev have worked at Defence Council of Padova University (Italy), Ahi Evran University (Turkey), doc. J.Hasanov and doc. M. Hajibeyov of defence commil of IMM.

- The leading research associate of the department doc. R. Bandaliyev worked as scientific secretary of special subject seminar under the Dissertation Council, the lead. r. a., doc. J.hasanov is the member of this seminar.

- L.A. Aliyeva has defended Phd dissertation on 24.06.2014.

- The leading research associate of the department R. Bandaliyev submitted doctor of science dissertation to Doctor of degree dissertation Council, the special subject seminar at the Council was held and the defence of the dissertation planned to the end of the year.

- Doc. Y.Mammadov doctor of science dissertation work was submitted to the Dissertation Council.

- Prof. V.S.Guliyev was on a professional trip at Ankara University on 24.02.2014-07.03.2014 conducted scientific researches together with prof. of Ankara University Ayhan Sherbetchi, prof. of Kardiff and Euroasia University Viktor Burenkov and associate professor of Cardiff University Dr. Tamara Tararykova at Mathematics Department of Ankara University (Ankara, Turkey). They carried out joint investigations on "Boundedness of fractional Hardy operator in Morrey type spaces".

- Prof. V.S.Guliyev gave a talk at the seminar of IMM NASA on "Boundedness of classic integral operators in Morrey type local and global spaces" on 09.04.2014.

- On march prof. V.S.Guliyev together with prof. Yoshihiro Sawano (Tokyo Metropolitan University, Japan) conducted "Workshop on Function spaces and Applications" and carried out joint researches on "Generalized Hardy Morrey spaces".

- On april 14-24 prof. V.S.Guliyev together with prof. Stefan samko (Alvarge University, Portugal) conducted "Workshop on Function spaces and Applications" and carried out joint researches on "Generalized Hardy Morrey spaces". As a result of this investigation they published the paper: F.Deringoz, V.S.Guliyev, Stefan Samko, Fractional maximal and potential operators and their commutators in vanishing Orlicz-Morrey spaces.

- On 24.04.2014-08.05.2014 prof. V.S.Guliyev together with prof. of Department of Civil Engineering, Second University of Naples (Aversa, Italy) Lubomira Softova was on a professional trip at Ahi Evran University (Turkey) and published the paper: V.S.Guliyev, L.Softova, Generalized Morrey estimates for the gradient of divergence from parabolic operators with discontinuous coefficients.

- On may 15-16. 2014 prof. V.S.Guliyev participated at the International Conference On Actual Problems on Mathematics and Informatics (APMI2013) held in Baku, Azerbaijan and gave a talk "Boundedness of some classical operators on generalized Orlicz-Morrey spaces".

- On 02.06.2014-06.06.2014 prof. V.S.Guliyev was on a professional trip at Ahi-Evran University (Kirshehir, Turkey) and carried out joint investigations.

- On June 27, 2014, prof. V.S.Guliyev spoke as an opponent at PhD dissertation Board at the University of Padova of Italy. Note that in 2011-2013 years he also has spoken as an opponent at PhD dissertation Board at the University of Padova.

- On June 23-27, prof. V.S.Guliyev has participated at the international conference "Mini courses in Mathematical Analysis 2014", department of pure and applied mathematics of the

University of Padova and given a talk "Boundedness of some classical operators in generalized weighted Orlicz-Morrey spaces".

- Corr. member of NASA, prof. V.S.Guliyev was on a professional trip at Kirshehir (Turkey) from 09.10.2014 to 31.10.2014 and conducted icint researches. On 15.10.2014 at the mathematics department of Ahi-Evran University he was a member of the difence Commission of philosopy doctor dissertation of Okan Kuzu "Boundedness of Marshinkevich integral operator generated by Schrodinger operator in Morrey spaces".

- In 2014 prof. V.S. Guliyev was again elected one of four members of the international editorial Staff of the second issue "Morrey spaces and related function spaces" of 0,656 impact factor journal "**Journal of function spaces**";

- Corr the scientific results of corr. member of NASA, prof. V.S.Guliyev were reflected in were than 140 papers published in impact factor and other authoratine international journals. The member of references in **MathSciNet Mathematical reviews** in **269 (196)**, in **Google Scholar** 1094 (**785**);

- The scientific result of doc. J.J.Hasanov were reflected in the papers published in more than 10 impact factor and other authoritative international journals. The member of references to his papaers in 60, in **Google Scholar** 158;

- Doc R.A. Bandaliyev result were reflected in more than 10 impact factor and other autherative international journals. The member of references in **MathSciNet Mathematical reviews** in **11**, in **Google Scholar** 65;

- Doc R.A. Bandaliyev gave the talk "On boundedness of some sublinear operator in Lebesgue weight spaces with variable exponents" in the international Conference "Fourier series and their application" held in Novorossiysk city of Russia on 27.05.2014-03.06.2014;

- Doc R.A. Bandaliyev gave the talk "On a two-weighted inequality for certain sublinear operator in weighted Musielak-Orlicz spaces" the international Conference "**Caucasian Mathematics Conference. CMC I**" held in Tbilisi city of Georgian Republic.

The revies written to the papers sent by foreign and republican journals.

1. Corr. member of NASA, prof. V.S.Guliyev: 6 papers from **Journal of Mathematical Inequalities** (Impact Factor – 0.770); 1 paper from **Integral Transforms And Special Functions** (Impact Factor – 0.814); 1 paper from **The Scientific World Journal** (Impact Factor – 1.730); 4 papers from **Journal of Function Spaces** (Impact Factor – 0.656); 1 paper from **MathematischeNachrichten** (Impact Factor – 0.658); 1 paper from **Complex Variables and Elliptic Equations** (Impact Factor – 0.650); 1 paper from **Journal of**

- Mathematical Analysis and Applications** (Impact Factor –1.119); 4 papers from **Proc. Inst. Math. & Mech. (PIMM)** ;
2. Doc R.A. Bandaliyev: 2 papers from **Azerbaijan Journal of Mathematics**, 5 papers from **Journal of Mathematics Researcher**, 2 papers from **Proc. Inst. Math. & Mech. (PIMM)**, 1 paper from **Trans. of Nat. Acad. of Sci. of Azerb.**;
 3. Doc. J. Hasanov: 1 paper from **Turkish Journal of Mathematics**, 1 paper from **The Scientific World Journal**, 1 paper from **Journal of Inequalities and Applications**, 1 paper from **Pioneer Scientific Publisher**, 2 papers from **Journal of Function Spaces** (Impact Factor – 0.656), 1 paper from **Journal of Mathematical Inequalities** (Impact Factor – 0.770), 1 paper from **Proc. Inst. Math. & Mech.(PIMM)** , 1 paper from **Trans. of Nat. Acad. of Sci. of Azerb.**

- Corr. member of NASA, prof. V.S.Guliyev is the member of expert counciln of Higher Certificate Commission at the President of the Republic of Azerbaijan.

- Corr. member of NASA, prof. V.S.Guliyev is the member of the international journal “Eurasian Mathematical Journals”, of the republican journal “Proceedings of Institute of Mathematics and Mechanics of NAS of Azerbaijan”, “Transaction of NAS of Azerbaijan” (Series of physical, technical and mathematical sciences.

- Doc. R.A. Bandaliyev is the member of the international journal "Journal of Mathematics Reshearch" published by science and education center of Canada.

**Head of the department
“Mathematical Analysis”**

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