Report of the department of "Function Theory" on scientific and scientific-organizational activities for the year 2022

In the report period, 5 works connecting 7 researchers on the theme "Approximation of functions of many variables by ridge functions, neural networks, linear and nonlinear superpositions, and embedding theorems for functional spaces" were carried out. 5 papers were published. These articles were published in journals indexed in the databases Clarivate Analytics "Web of Science" and "Scopus". In addition, 3 articles were accepted for publication. 2 monographs were published.

The staff of "Function Theory" department consists of 7 researchers:

1. Vugar Ismailov - chief of the department (dr. math. sci., associate professor)
2. Alik Najafov - chief research assistant (dr. ph.-m. s., professor)
3. Rashid Aliev - chief research assistant (dr. math. sci., professor)
4. Ibrahim Maharov - senior research assistant (cand. ph.-m. s., associate professor)
5. Niyazi Ilyasov - senior research assistant (cand. ph.-m. s., associate professor)
6. Aygun Omarova - research assistant (phd in math.)
7. Aida Asgarova, - junior research assistant (phd in math.)

On scientific-organizational activity

Head of the department Vugar Ismailov made a presentation on "On a theorem of Hecht-Nielsen" at the institute seminar.

In the reporting period, the chief researcher of the department, dr. ph.-m. s., prof., Alik Najafov made a presentation on "Study of solutions of p-harmonic type equations in Grand Sobolev spaces" at the institute seminar.

In the reporting period, the chief researcher of the department, dr. ph.-m. s., prof., Rashid Aliev made a presentation on "Some properties of discrete analogues of singular integral transforms" at the institute seminar.

Head of the department Vugar Ismailov made a presentation on "Linear superpositions of functions and their application to neural networks" at the seminar "FIRST INTERNATIONAL BILATERAL WORKSHOP ON SCIENCE BETWEEN DOKUZ EYLÜL UNIVERSITY AND AZERBAIJAN NATIONAL ACADEMY OF SCIENCES".

On August 1-10, 2022, senior researcher of the department Niyazi Ilyasov was a member of the organizing committee of the "International School-Conference named after S. B. Stechkin on function theory, dedicated to the memory of a corresponding member RAS Yu.N. Subbotin and professor S.A. Telyakovsky" in Kyshtym, Chelyabinsk Region, Russia and made a plenary talk on the topic "On one problem of S.B. Stechkin" online.

Head of the department Vugar Ismailov was a reviewer of the journals: Journal of Approximation Theory, Neural Networks, Transactions on Neural Networks and Learning Systems.

On February 2, 2022, a junior researcher of the department, Aida Asgarova, was awarded the "YOUNG SCIENTIST of the YEAR" award by the Institute of Mathematics and Mechanics of the National Academy of Sciences of Azerbaijan "For Effective Activity in the Field of Mathematical Sciences in 2021".

Head of the department   **dr.math.sc. Vugar Ismailov**

Publications:

Papers published in journals indexed by Clarivate Analytics:

Surnames, academic degrees and positions of collaborators	Names of scientific works	Printed or submitted for publication	Name of publisher, journal №, year	Page	Co-authors

1	2	3	4	5	6
Papers, published in journals indexed in the databases Clarivate Analytics "Web of Science" and "Scopus"					
1. Vugar Ismailov	1. "A formula for the approximation of functions by single hidden layer neural networks with weights from two straight lines"	Paper	*Proc. Inst. Math. Mech. Natl. Acad. Sci. Azerb.* **48** (2022), no. 1, 140-149 https://proc.imm.az/volumes/48-1/48-01-12.pdf (Clarivate Analytics ESCI)	10	
	2. "The double difference property for the class of locally Hölder continuous functions"	Paper	*Moscow Mathematical Journal* **22** (2022), no. 3, 393-400, http://www.mathjournals.org/mmj/2022-022-003/2022-022-003-002.html (Clarivate Analytics SCIE)	8	R.A. Aliev, A.A. Asgarova
2. Alik Najafov	3. "On smoothness of solution of a class of p-harmonic type equations"	Paper	*Journal of Elliptic and Parabolic Equations* **8** (2022), no. 2 https://link.springer.com/article/10.1007/s418		Sain T. Alekberli

	4. "A solution of p-harmonic equations of fractional order"	Paper	[08-022-00170-z](#) (Clarivate Analytics ESCI) *Lobachevskii Journal of Mathematics,* **43,** (2022), no. 8, p. 2244-2249. (Clarivate Analytics ESCI)	6	Sain T. Alekberli
3. Rashid Aliev	5. "Boundedness of the discrete Ahlfors-Beurling transform on discrete Morrey spaces"	Paper	*Proceedings of IMM, NAS of Azerbaijan*, 47:2, (2021) (Clarivate Analytics ESCI) http://proc.imm.az/inpress/pimm0200.pdf	9	A.N. Ahmadova, A.F. Huseynli
Published monographs					
1. Vugar E. Ismailov	1. Ridge functions and applications in neural networks. Mathematical Surveys and Monographs, 263.	Monograph	*American Mathematical Society, Providence, RI,* 2021.	186	
2. Rashid A. Aliev	2. Generalized integrals and boundary properties of Cauchy type integrals	Monograph	*"Science",* Baku, Azerbaijan, 2022.	292	
Papers, accepted for publication					

Alik Najafov	1. "On some embedding teorems in grand Nikolski-Morrey spaces with dominant mixed derivatives"	Paper			Ahmet Eroglu, Firide F. Mustafayeva
Niyazi Ilyasov	2. "Порядковые равенства в пространствах $L_p(T)$, $1 < p < \infty$, для наилучших приближений и модулей гладкости производных периодических функций с монотонными коэффициентами Фурье"	Paper	*Труды Института Математики и Механики Уральского Отделения Российской АН* **28**, *(2022), № 4*		
	3. "О различных свойствах периодических суммируемых функций с одним условием на модуль непрерывности второго порядка"	Paper	*Математические заметки* **112**, (2022) (Clarivate Analytics SCIE)		

Published abstracts

Vugar E. Ismailov	1. "Linear superpositions of functions and their application to	Abstract	*First international bilateral workshop on*	1	

	neural networks"		*science between dokuz eylül university and azerbaijan national academy of sciences*		
Rashid A. Aliev	2. "Properties of discrete Hilbert transform on discrete Orlich spaces"	Abstract	*"Actual problems of mathematics and mechanics", Proceedings of the Republican scientific conference dedicated to the 99th anniversary of the birth of national leader of Azerbaijan Heydar Aliyev, Baku, Azerbaijan, May 11-13, 2022, pp. 34-36.*	3	Hashimova F.V.

Head of the department   **Dr.Math.Sci. Vugar Ismailov**