Semi-annual report of the department
of "Function Theory" for 2019

Scientific direction: Approximation by ridge functions and neural networks

Topic: "Approximation of functions of many variables by ridge functions, neural networks, linear and nonlinear superpositions"

On scientific activity

On the report period 5 works connecting 7 executors on the theme "Approximation of functions of many variables by ridge functions, neural networks, linear and nonlinear superpositions" are conducted. 8 papers were published, 3 of them in "Science Citation Index Expanded" base of the Thomson Reuters agency.

About works

Work 1: The study of the universal approximation properties of a two-layer neural network

(Executor: prof. of ANAS, dr. math. sci. Vugar Ismailov)

2 papers were published:

1. R.A. Aliev, A.A. Asgarova, V.E. Ismailov, A note on continuous sums of ridge functions, J. Approx. Theory 237 (2019), 210-221.

2. R.A. Aliev, A.A. Asgarova, V.E. Ismailov, On the Holder continuity in ridge function representation, Proceedings of IMM, NAS of Azerbaijan 45 (2019), 31-40.

Work 2: Some differential properties of functions from Lebesgue-Morrey and Grand Lebesgue-Morrey spaces

(Executors: dr. ph.-m. s., prof, Alik Najafov and PhD Aygun Orujova)

4 papers were published:

1. Alik M. Najafov, Sain T. Alekberli "On properties functions from grand grand Sobolev-Morrey spaces" Journals of Baku Engineering University, Number1,Volume2(2018)

    http://journal.beu.edu.az/content.php?page=article&j_id=16&s_id=102&a_id=180

2. Alik M. Najafov, Rena E. Kerbalayeva "Embedding theorems for Besov–Morrey spaces of many groups of variables" Georgian Math. J. 2019: 26(1): 125–131. https://doi.org/10.1515/gmj-2017-0032

3. Alik M. Najafov, Nilufer R. Rustamova, Sain T. Alekberli "On solvability of a quasi-elliptic partial diferential equations" Journal of Elliptic and Parabolic Equations, 2019, Vol.5, Issue 1, pp 175–187. doi:10.1007/s41808-019-00037-w

4. Alik M. Najafov, Azizgul M. Gasimova "On properties of functions from Lizorkin–Triebel–Morrey type spaces" Journal of Mathematical Sciences, 2019, Vol. 239, Issue 1, pp 51–61, https://doi.org/10.1007/s10958-019-04287-w

2 abstracts were published:

1. Alik M. Najafov, On embeddings of grand Sobolev-Morrey spaces with dominant mixed derivatives, Operators in General Morrey-Type Spaces and Applications (OMTSA 2019)

2. Aygun Orujova, Poincare Type Inequality in Sobolev-Morrey Type Spaces with Dominant Mixed Derivatives, Operators in General Morrey-Type Spaces and Applications (OMTSA 2019)

Work 3: Properties of some integral transformations of harmonic analysis

(Executor: prof. of ANAS, dr. math. sci. Rashid Aliev)

3 papers were published:

1. Rashid A.Aliev, Aysel A.Asgarova, Vugar E.Ismailov, *A note on continuous sums of ridge functions*, Journal of Approximation Theory, **237 (2019)**, 210-221, https://doi.org/10.1016/j.jat.2018.09.006

2. Rashid A.Aliev, Aynur F.Amrahova, *Properties of the discrete Hilbert transform*, Complex Analysis and Operator Theory **(2019)**,

https://doi.org/10.1007/s11785-019-00936-9

3. Р.А.Алиев, Ч.А.Гаджиева, *Об аппроксимации преобразование Гильберта*, Труды Института Математики и Механики УрО РАН, **25:2 (2019),** 30-41 http://journal.imm.uran.ru/2019-v.25-2-pp.30-41

Work 4: Properties of an extremal element in the problem of approximation by radial functions

(Executors: cand. ph.-m. s. Ibrahim Maharov and cand. ph.-m. s. Arzu Babayev)

Published abstract:

1. Asgarova A.Kh., Babayev A.M-B., Maharov I.K. On sums of ridge functions with two fixed directions, «Complex Analysis and Approximation Theory» May 29 - 31 (2019)

Work 5: Representation by the sums of algebras of the space of continuous functions

(Executor: j.r.a. Aida Asgarova)

2 abstract were published:

1. Asgarova A.Kh. Levelling algorithm for the approximation by sums of two compositions, «Complex Analysis and Approximation Theory» May 29 - 31 (2019)

2. Asgarova A.Kh., Babayev A.M-B., Maharov I.K. On sums of ridge functions with two fixed directions, «Complex Analysis and Approximation Theory» May 29 - 31 (2019)

On scientific-organizational activity

In the reporting period, the chief researcher of the department, prof. of ANAS, dr. math. sci., Rashid Aliev made a presentation on "A-integral and Alfors-Berling transformation" at the institute seminar. Collaborators of the department actively participated at department seminars.

Head of department Vugar Ismailov was a reviewer of the Australian & New Zealand Journal of Statistics, Filomt, and the Ural Mathematical Journal.

Chief researcher of the department Rashid Avazaga oglu Aliev had received affirmation of the Higher Attestation Commission for the dissertation defended by him, "Boundary properties of Cauchy type complex dimensional integrals and

some problems of theory of the approximation of analytical functions" to get a scientific title "doctor of mathematical sciences".

Head of the department   **prof. of ANAS, dr.math.sc. Vugar Ismailov**