

## **Report of the department of “Function**

### **Theory” on scientific and scientific-organizational activities for 2018**

In the reporting year, on the topic “Approximation of functions of several variables by ridge functions, neural networks, linear and nonlinear superpositions, embedding theorems for functional spaces” 4 works connecting 7 researchers were conducted. 9 scientific articles and 7 abstracts were published. 6 articles were published abroad. Among these, 5 were published in journals indexed in the Web of Science platform of the Clarivate Analytics (namely, 3 in the "Science Citation Index Expanded", 2 in the "Emerging Sources Citation Index" databases). In addition, 4 articles were accepted for publication.

#### **Seminars and conferences:**

During the reporting period, head of the Department, dr. of sci. in math., Professor ANAS Vugar Ismailov and leading researcher of the Department, dr. of sci. in math. Rashid Aliyev made presentations at institutional seminars. Researchers of the Department regularly speak at the seminars of the Department.

Head of the Department dr. of sci. in math. Vugar Ismailov was a member of the program Committee of the International conference "Operators, functions and systems of mathematical physics", dedicated to the 70th anniversary of Professor Hamlet Isakhanli (Isayev), held in May 21-24, 2018 at the Khazar University in Baku. Dr. Rashid Aliyev, a member of the Department, made a report at the conference. Researchers of the Department, candidate of physico-mathematical Sciences Ibrahim Maharov, candidate of physico-mathematical Sciences Arzu Babaev, ph. doctor in math. Aygun Orujov, Aida Asgarova presented abstracts at the conference.

Head of the Department Vugar Ismailov was also a member of the program committee of the international conference on mathematical analysis, differential equations and applications dedicated to the 80th anniversary of the academician M. Samoilenko, held at the Kyrgyz-Turkish University of Manas 17.06.2018-23.06.2018.

In the period of 4.09.2018-15.09.2018 head of the Department Vugar Ismailov visited Gebze Technical University, located in Gebze, Turkey. The work was carried out within the framework of the project "Investigation of approximative properties of ridge functions, multilayer perceptron (MLP) model of neural networks and applications", grant of the Science Development Foundation under the President of the Republic of Azerbaijan. A broad discussion of the subject of the project was conducted with Professor Mansour Iskenderoglu, head of the mathematics faculty of the Technical University of Gebze. In addition, there were scientific discussions with professors of this faculty Emil Novruz, Koskun Yakar, Mustafa Akkurt. Vugar Ismailov also gave a talk on ridge functions and their applications in the seminar of the faculty of mathematics at Gebze Technical University.

### **Programmes and projects:**

The project "Investigation of approximative properties of ridge functions, multilayer perceptron (MLP) model of neural networks and applications", prepared jointly by Vugar Ismailov, head of the Department and Rashid Aliyev, leading researcher of the Department, became the winner of the grant project "Integration of science and education" supported by the Science Development Foundation under the President of the Republic of Azerbaijan.

Head of the Department Vugar Ismailov, senior researcher Arzu Babayev. and junior research fellow Aida Asgarova continued research, "Approximation by neural networks and some problems of frames" supported by Presidium of ANAS.

In the first half of this year 3 articles were published. 2 of them were published in journals with high impact factors.

### **Defended Theses:**

Rashid Aliyev, a leading researcher of the Department, successfully defended his thesis for the degree of doctor of mathematical sciences "Boundary properties of Cauchy type integrals of complex measures and some problems in the approximation theory of analytical functions".

### **Reviewer work for international scientific journals :**

Head of the Department Vugar Ismailov was a reviewer of the "Journal of Mathematical Analysis and Applications", "Analysis Mathematica", "IEEE Transactions on Neural Networks and Learning Systems", "IEEE Transactions on Emerging Topics in Computational Intelligence".

### **Publications:**

#### **Papers published in journals indexed by Clarivate Analytics SCIE:**

1. N.J. Guliyev, V.E. Ismailov, On the approximation by single hidden layer feedforward neural networks with fixed weights, Neural Networks 98 (2018), 296-304 <https://doi.org/10.1016/j.neunet.2017.12.007>
2. V.E. Ismailov, A note on the criterion for a best approximation by superpositions of functions, Studia Mathematica 240 (2018), no. 2, 193-199, <https://doi.org/10.4064/sm170314-9-4>

3. Rashid A. Aliev, Khanim I. Nebiyeva, The A-integral and restricted Ahlfors–Beurling transform, *Integral Transforms and Special Functions*, 29:10 (2018), 820–830. <https://www.tandfonline.com/doi/full/10.1080/10652469.2018.1501046>

#### **Papers published in journals indexed by Scopus:**

4. Alik M. Najafov, Nilufer R. Rustamova, Some properties of grand Sobolev-Morrey type spaces. *Transactions of A. Razmadze Mathematical Institute* Volume 172, Issue 1, April 2018, Pages 82-89. <https://doi.org/10.1016/j.trmi.2017.10.001>

5. A.Kh. Asgarova, On a generalization of the Stone Weierstrass theorem, *Annales mathématiques du Québec* 42 (2018), Issue 1, 1–6, <https://doi.org/10.1007/s40316-017-0081-2>

#### **Papers published in other journals:**

6. Alik M. Najafov, Rovshan F. Babayev "Some properties of functions from generalized Sobolev-Morrey type spaces" *Mathematica Aeterna*, Vol. 7, 2017, no. 3, 301 – 311. <https://www.longdom.org/articles/some-properties-of-functions-from-generalized-sobolevmorrey-type-spaces.pdf>

7. Alik M. Najafov, Nilufer R. Rustamova On properties of functions from Sobolev-Morrey type spaces with dominant mixed derivatives, *Trans. of NAS of Azerbaijan, Issue Mathematics*, 37 (4), 132–141 (2017). Ser. of Phys.-Tech. and Math. Sci. <http://trans.imm.az/volumes/37-4/3704-14.pdf>

8. Aida Kh. Asgarova, Arzu M-B. Babayev, Ibrahim K. Maharov, On the error of approximation by radial basis functions with fixed centers. *Trans. of NAS of Azerbaijan, Issue Mathematics*, 38 (1), 22–29 (2018). Ser. of Phys.-Tech. and Math.Sci. <http://trans.imm.az/volumes/38-1/3801-03.pdf>

9. Orujova A.T., Mustafayeva F.F. Interpolation theorems on the Nikolskii-Morrey type spaces, Caspian Journal of Applied Mathematics, Ecology and Economics. v.6, no 1, 2018, pp.111-121. <http://cjamee.org/wp-content/uploads/2018/10/9.pdf>

**Head of the department**

**Dr.Math.s., Professor of ANAS Vugar Ismailov**