

Report of department of “Algebra and mathematical logic” for 2022

About scientific activity

During the reporting period, 5 works were carried out by 8 performers on the topics "Application of methods of algebra and mathematical logic" and "Research of mathematical and logical works of Azerbaijani scientists". In 2022, 10 articles (1 in SKOPUS) and 5 abstracts were published. In addition, 6 articles and 1 thesis were accepted for publication.

1 Candidate of Physical and Mathematical Sciences, Doctor of Pedagogical Sciences:

1.

Aslanov Ramiz M.

 Leading Researcher, (1 state).

3 doctors of philosophy in Mathematics:

2. Babaev Ali E. - Head of Department, Leading Researcher , (1state)
3. Mammadov Eminaga M. – Leading Researcher, (1 state).
4. Shekhzamanova Leyla A. – Senior Researcher, (1 state).

3 researchers:

5. Majlumbayova Valeriya F. – Senior Researcher, (1 state).
6. Babaeva Rena G. - Researcher (1 state).
7. Aliyev Ali S. - Researcher, (1 state).

1 dissertation:

8. Mammadova Vafa M. - Junior Researcher, (1 state).

1 computer engineer:

9. Karimova Matanat K. - Software programmer.

2 laboratory assistants:

10. Gadjiyeva Aygun A. - senior laboratory assistant.
11. Shahbazova Sevinj T. - senior laboratory assistant.

Separate work

Theme 1. Application of the methods of algebra and mathematical logic.

Work 1. Compact weighted endomorphs of some regular functional algebras and structures of maximal ideals.

(Performers: leading researcher, Mammedov Eminaga M. and junior researcher V.M. Mammadova)

$T: A \rightarrow C(X, A): T = (u * f) \circ \varphi$ çəkili endomorfizmlərinin kompaktlığı araşdırılmışdır. Xüsusi halda aşağıdakı teorem isbat edilmişdir:

Theorem. Let X be a local compact set. $C(X, A)$ is a topological space of all continuous A -valued functions with compact-open topology. $A = A(X)$ is a subspace of $C(X, A)$. $T: A \rightarrow C(X, A): T = (u * f) \circ \varphi$ is a weighted composition operator. Then for compactness of the operator T it is necessary and sufficient: for each compact connected component $K \subset X_u$ either $\varphi(K)$ is finite set, or $\varphi(K) \subseteq X \setminus S_0(A)$.

At present, the process of refining this theorem and proving the theorem in a dissertation announced by the late A. Shakhbazov and publishing the results in the form of an article is being completed.

Work 2. Submaximal sub algebras of graded lines products of two-valued iterative Post algebras.

(Performers: head of the department, Ph.D. Ali Babaev, senior researcher Valeria Mejlumbekova)

We studied submaximal subalgebras for the category of two-valued iterative Post algebras. We considered maximal subalgebras in $P_2 \times P_2$. For direct products studied $P_2 \times P_2$

$$P_0 \times P_2, P_1 \times P_2, L \times P_2, M \times P_2, D \times P_2, \\ P_2 \times P_0, P_2 \times P_1, P_2 \times L, P_2 \times M, P_2 \times D$$

maximal subalgebras. The study continues for other maximal subalgebras.

Theme 2. Research of mathematical and logical works of Nasireddin Tusi.

Work 1. III and IV figures of the syllogism with mixed premises, in the work of N. Tusi "Asas ul-iktibas". result modes.

(Performers: head of the department, Ph.D. Ali Babaev, senior researcher Valeria Mejlumbekova)

Chapter IV of "Asas ul-iktibas" by N. Tusi was studied. Issues considered, associated with figure III of the syllogism with different premises (simple and modal), an increase in the number of effective modes is established and the reason for this is clarified. It has been established that, unlike Bahmanyar, Ibn Sina and other medieval scholars, N. Tusi, in addition to the modalities "possible", "necessary", "at the moment of time", considered modalities; "Absolutely "conditioned" "generally accepted" and their types; "substantially conditioned" "conditioned by circumstances, "general generally accepted", "private generally accepted", "absolutely in essence", "absolutely according to circumstances". Based on this, 15 types of modalities are formed.

Work 2: Studying the issues of temporal (characterized by time) modality and formalization in the modern language.

(Performers: leading researcher, Mammedov Eminaga M., researcher Babaeva Rena G.)

In classical logic, the modality of propositions and their classification, a comparative study of the views of Aristotle, N. Tusi, Ibn Sina and other classics regarding the influence of quantifiers, the study of modalities characterized by time, in addition, necessary, random, etc., continued. Work continued on the study of algebraic modalities, characterized by such characteristics, and by their expression in a formal language. The results of the study will be published as an article in the proceedings of the international conference to be held in November. The article provides a complete list and classification of modal sentences based on the work of N. Tusi "Tajrid al-mantik".

Work 3: Translation and study from Arabic of comments to the part of the book of Archimedes "Sphere and Cylinder" concerning sections of figures of revolution.

(Performers: Researcher Ali Aliyev, Senior Researcher Leyla Sheikhzamanova)

The comments of Nasreddin Tusi to the first part of the first book "On the ball and the cylinder", which includes Theorems 1-16 and is devoted to the definition of the lateral surface of the cone and the cylinder, are considered. Nasreddin Tusi, in his comments on the proofs of the theorems, gives very clear explanations with pictures, Nasreddin Tusi makes a very important comment on Archimedes' theorem 11 about the inadmissibility of applying the assertion of the theorem in the process of proof. Even M.Ya. Vygodsky and I.N. Veselovsky did not mention this fundamental mathematical principle in their comments on the 11th theorem of Archimedes, but limited themselves to proving in the formulas the position that the sum of two adjacent triangles is greater than a triangle, on the plane at their base. And here Nasreddin Tusi gives his obvious proof.

About scientific and organizational activities

On April 1, 2022, the head of the department Ali Babaev and Art. researcher V. Mejlumbekova with the report "Formation of the concept of a real number in the works of Nasireddin Tusi" spoke at the International Conference held by the Institute of the History of Science and Technology of the Russian Academy of Sciences in Moscow.

On June 2, 2022, the head of the department A. Babayev made a presentation "Mathematical and logical works of Nasireddin Tusi, scientific novelty in these papers" at the seminar "History of Mathematics", held by the branch of the Institute mathematics them. Steklov RAS.

On June 29, 2022, 6 employees of the department spoke at a conference dedicated to the 110th anniversary of the birth of academician Ibragim Ibragimov.

1. Aslanov Ramiz. Emergence and history of complex analysis.

2. Babayev Əli, Məclumbəyova Valeriya. Tables in the mathematical and logical works of N.Tusi.
3. Əliyev Əli, Şeyxzamanova Leyla. About the commentaries of . Nasireddin Tusi of the work of Archimedes "About the ball and the cylinder".
4. Məmmədova Vəfa. Compactness of weighted endomorphism of functional algebras of A-valued functions on local compacted sets.

At the international conference held on October 14, 2022 at the Institute of the History of Science, Ali Babayev and Valeria Majlumbekova spoke on the topic "The History of Mathematics - the Science of the Past or a Mathematical Discipline", and on October 25, 2022 at the St. Petersburg Branch of the Institute of the History of Science and Technology RAS at the international conference made a report "To the question of geometric algebra".

On November 2, 2022, 6 employees of the department spoke at a conference dedicated to the scientific heritage of Nasireddin Tusi at the Central Scientific Library of the Academy of Sciences.

1. Misir Mərdanov, Əli Babayev. Nəsirəddin Tusi bir müəllim kimi.
2. Əli babayev, Valeriya Məclumbəyova. Aksiomatika Nasiredina Tusi.
3. Eminağa Məmmədov, Rəna Babayeva. Nəsirəddin tusinin "təcrid əl-məntiq" əsərində modal təkliflər.
4. Leyla Şeyxzamanova, Əli Əliyev. Комментарии Н.Туси к теоремам Архимеда из сочинения «О шаре и цилиндре».

Professor Ramiz Aslanov, senior researcher of the department, took part in the following conferences.

1. Структура и содержание курса дисциплины «Уравнения математической физики» в подготовке бакалавров. // Управление качеством образования: проблемы и перспективы: Материалы Всеросс. научно-практ. конф. – Ульяновск: ФГБОУ ВО «УлГПУ им. И.Н. Ульянова», 2022. – 225 с. (стр.7–10) (соавтор Сушков В.В.) (плeнарный доклад).
2. О формировании контрольных работ при организации учебного процесса в курсе теории функций комплексного переменного // Задачи в обучении математике, физике и информатике в условиях цифровой трансформации: материалы III Международной научно-практической конференции, посвященной 130-летию П.А.Ларичева (16–18 марта 2022 г.) / Ми-нистерство науки и высшего образования Российской Федерации, Вологодский государственный университет– Вологда : ВоГУ, 2022. – 243 с. (стр.7-9) (соавтор Сушков В.В.)

3. О технологии разработки электронных обучающих средств для программ высшего образования, сопряженных с программами профессионального обучения // Сопряжение основных и дополнительных образовательных программ общего и профессионального образования в условиях цифровизации общества: материалы Всероссийской научно-практической конференции с международным участием (28 февраля 2022 года) / отв. ред. проф. Т.И.Уткина. – Орск: Издательство Орского гуманитарно-технологического института (филиала) ОГУ, 2022. – 116 с. стр.11–13 (соавтор Сушков В.В.) (пленарный доклад).
4. Использование тестовых форм в обучении истории математики // Математика, информатика, физика: проблемы и перспективы. Международная научно-практическая конференция: сборник научных статей международной научно-практической конференции «Математика, информатика, физика: проблемы и перспективы», Оренбург, 21–22 апреля 2022 г. Министерство просвещения РФ; ФГБОУ ВО «Оренбургский государственный педагогический университет». – Оренбург: 2022.– 373 с. стр.116–125 (соавтор Игнатушина И.В.)
5. Штрихи к портрету Давида Гильберта (к 160-летию со дня рождения Давида Гильберта) // Математика и математическое образование: сборник трудов 10 Международной научной конференции «Математика. Образование. Культура. (к 160-летию со дня рождения Д. Гильберта)» (Россия, г. Тольятти, 27-29 апреля 2022) Тольятти: Изд –во ТГУ,2022. (соавтор М.Д. Марданов) (пленарный доклад).
6. Штрихи к портрету И.И. Ибрагимова // Вестник, Набережночелнинского государственного педагогического университета: спец. выпуск, Вып. 2(37) – Набережные Челны, 2022. – С.8–11.

Head of department:

A.A. Babaev