



NORWEGIAN JOURNAL OF DEVELOPMENT OF THE INTERNATIONAL SCIENCE

№83/2022

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Scientific journal “Norwegian Journal of development of the International Science” is issued 24 times a year and is a scientific publication on topical problems of science.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@njd-iscience.com

site: <http://www.njd-iscience.com>

CONTENT

ARCHITECTURE

Amenzade R.

MAUSOLEUM OLJAYTU XODABENDE (1310-1312).....3

BIOLOGICAL SCIENCES

Balakhanova G.

EVALUATION OF MUSHROOMS EXPOSED TO
ANTHROPOGENIC FACTORS BY SOIL MOISTURE
PROPERTIES.....7

Abdullayeva Sh.

BIOTECHNOLOGIES OF NITROGEN-FIXING BACTERIA
IN THE FIELDS OF SOME REGIONS OF AZERBAIJAN.....9

CHEMICAL SCIENCES

**Aliyev I., Ahmedova C., Rzaev R.,
Gashimov Kh.**

PHASE FORMATION IN THE $As_2Se_3-Tl_2S_3$ SYSTEM AND
THE PHYSICO-CHEMICAL PROPERTIES OF THE
OBTAINED PHASES 11

MEDICAL SCIENCES

**Krivoshchekov E., Molchanov M.,
Yakovlev R., Grigor'eva T.**

TREATMENT OF PATIENTS WITH UMBILICAL HERNIA
WITH MINI-INVASIVE HERNIOPLASTY 16

PEDAGOGICAL SCIENCES

Zhubaigaliyeva Zh., Zhacheva Y.

THE EVOLUTION OF THEORETICAL ISSUES ON
MULTILINGUAL EDUCATION 19

Ismoilov E.

PEDAGOGICAL EXPERIMENTS CONDUCTED IN THE
FRAMEWORK OF RESEARCH AIMED AT DEVELOPING
STUDENTS' PROFESSIONAL COMPETENCIES ON THE
BASIS OF AN INTEGRATIVE APPROACH, THEIR
RESULTS AND STATISTICAL ANALYSIS 22

PHILOLOGICAL SCIENCES

Najaryan A.

STRUCTURAL ELEMENTS OF LINGUISTIC PERSONALITY
IN A MONOLOGUE (BY THE EXAMPLE OF SPEECH OF
POLITICIAN MARTIN LUTHER KING "I HAVE A
DREAM" 34

PHILOSOPHICAL SCIENCES

Elubaeva K.

EXISTENTIALIST MOTIF IN THE STORY OF THE
MOURNING BEAUTY BY M.AUEZOV.....52

PHYSICAL SCIENCES

Orujov A., Rustamova S.

ELECTRICAL AND OPTICAL PROPERTIES OF RHENIUM
COVERED BY GRAPHITE MONO LAYER.....55

TECHNICAL SCIENCES

Ovcharuk V., Yushchuk I.

METHODS OF ECOLOGIZATION OF SUGAR
PRODUCTION WITH THE PURPOSE OF REDUCING
EMISSIONS INTO THE ATMOSPHERE.....59

Puzyr R., Shvets L.

DEVELOPMENT OF METHODS OF EXPERIMENTAL AND
ANALYTICAL RESEARCH OF METAL FLOW IN THE
CENTER OF DEFORMATION OF ALUMINUM ALLOYS
DURING COMBINE PARTS ROLLING 63

ARCHITECTURE

MAUSOLEUM OLJAYTU XODABENDE (1310-1312)

Amenzade R.

Doctor of architecture, professor

МАВЗОЛЕЙ ОЛДЖАЙТУ ХУДАБЕНДЕ (1310-1312)

Амензаде Р.

Доктор архитектуры, профессор

Abstract

The genius of architectural art of Azerbaijan people is imprinted upon the compositional structure of the mausoleum of Oljaytu (1310-1312). Here leading constructive engineering successes together with architectural - artistic means reach extraordinary summits. Technically remarkable solution of the dome cover is worthy of intent attention. The thickness of walls reaching 7.40 m is divided into two parts - in the interior deep lancet niches, from without through vaulted arcade crowning the whole building corresponding the tier of under - domed constructions worked out in the form of three horizontal rows of stalactite hoops providing a smooth crossing to the dome. The egg-shaped side - view of the dome and its construction suggests an idea that in the solution of the architectural problem the architect was guided by great invention of the nature the eggshell which occupies a special place among biological structures and is no doubt, one of the most perfect multifunctional biological outward forms. Minarets - pinacles on the corners of the building so as to prevent moving forces and balancing of the dome's thrust which in its turn strengthened the dynamics of the whole composition

Аннотация

В композиционном строе мавзолея Олджайту запечатлен гений зодческого искусства азербайджанского народа. Здесь передовые инженерно - конструктивные достижения, вкупе с архитектурно - художественными средствами достигают необыкновенных вершин. Особенного внимания заслуживает технически выдающееся решение купольного перекрытия. Толщина стен сооружения, достигающая 7,40 м членилась как бы на две части, в интерьере глубокие стрельчатые ниши, извне венчающая весь корпус сквозная сводчатая аркада, соответствующая ярусу подкупольных конструкций, разработанных в виде трех горизонтальных рядов сталактитовых колец, обеспечивших плавный переход от восьмерика к куполу. Яйцевидный купол и сама его конструкция наталкивают на мысль, что зодчий в решении архитектурной задачи руководствовался гениальным изобретением природы - яйцом, скорлупа которой среди биологических структур занимает особое место, и, несомненно является одной из самых совершенных многофункциональных биологических оболочечных форм. Значительную роль приобретают минареты - пинакли, поставленные на углах корпуса с целью предотвращения сдвигающих сил и уравнивания распора купола.

Keywords: architecture, composition, constructions, dome, stalactites

Ключевые слова: архитектура, композиция, конструкции, купол, сталактиты

Олджайту, сын четвертого ильхана Аргуна (1234-1282) был правнуком Хулагу-хана, основателя государства Ильханидов. Он правил двенадцать лет и девять месяцев и умер 16 декабря 1316 г. в городе Султание, который находится близ Зенджана. Сын Олджайту Абу Саид станет его преемником. Вскоре после смерти Олджайту, визирь Рашид ад-Дин обвиненный в его смерти будет казнен.

Единовременная застройка Султание, расположенного в исключительно живописной местности достигла размаха уже в самом начале XIV в. в силу целого ряда обстоятельств, и, в частности выгодное расположение и статус столичного города обеспечили его процветание. Нагруженные товарами караваны бороздили торговые пути в направлении Казвин-Зенджан с востока на запад, к Тебризу и Дамаск с севера на юг через Хамадан на Багдад. Судя по миниатюре-зарисовке Насуха Матракчи город, построенный согласно своей радиально - кольцевой системе планировке приобрел

форму почти правильного овала, охваченного высокой каменной стеной с шестнадцатью круглобашенными бурджами, с двумя воротами - северными и южными (5). Длина оборонительных стен, охватывающая территорию города, названного Gungurülüng первоначально приближалась к 12 тыс. шагам [2, с. 1103]. Была возведена цитадель (296x314 м), построены жилые домовладения (квартал Рашид ад-Дина, квартал Тадж ад-Дина Али шаха), культовые, мемориальные, а также гражданские и торговые строения.

Главным градоформирующим фактором города явился культовый комплекс Олджайту хана (1304 - 1316). Он состоял из мечети, мавзолея, медресе, госпиталя, караван-сарая, строений для паломников и др. больших и не очень купольных строений. Мавзолей (Д купола 24,6 м, высота 52 м), будучи идейно-композиционным центром комплекса являет собой подлинный шедевр мирового

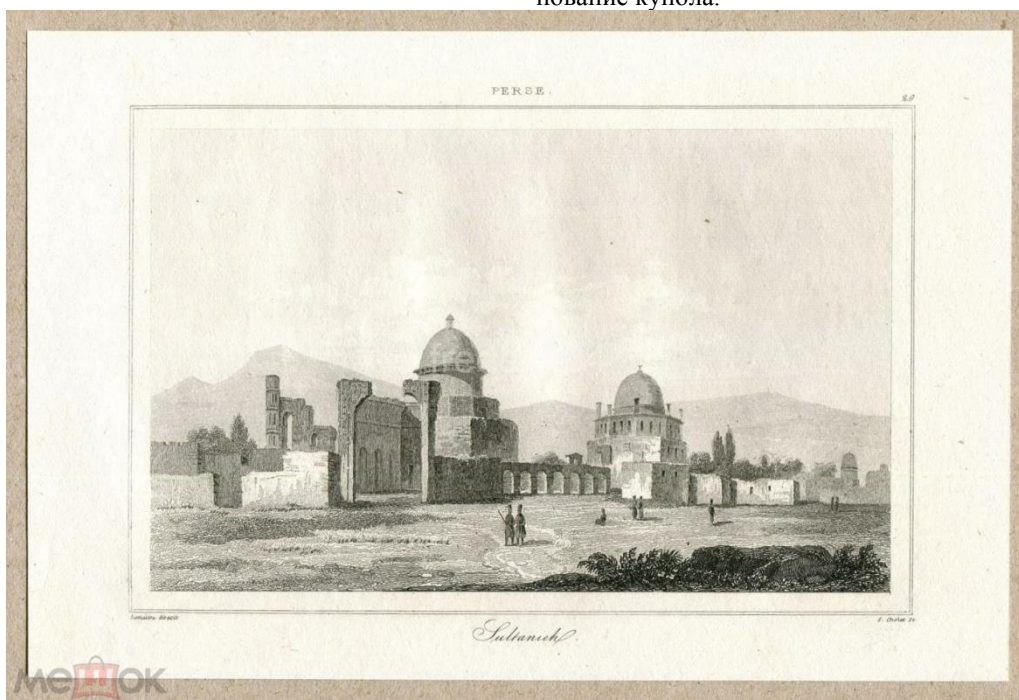
зодчества, он горделиво высится и сегодня как главная вертикальная доминанта города.

Иосафат Барбаро посетил немало городов и населенных пунктов Азербайджана. В своем произведении, касаясь Султание, он указывает на большие торговые обороты «...здесь сходятся каждый год, особенно летом большие караваны верблюдов привозящие товары», «...в Солтанию, что на нашем наречии значит Императорская. Этот город представляется знаменитейшим и принадлежит упомянутому синьору. Она не имеет стен, а только замок со стенами, он в руинах. Поскольку разрушен уже четыре года назад неким синьором... Окружность замка – одна миля. Внутри нее [Султании] имеется высокая и большая мечеть с 4 сводами, 4 высоких куполов, из них большой купол еще больше, чем таковой у [церкви] Святых Иоанна и Павла в Венеции, втрое по ширине.. Город очень велик, составляет в окружности 4 мили, он хорошо обеспечен водой... В настоящее время он плохо населен, от 7000 до 10000 душ» [7, с.635, 636].

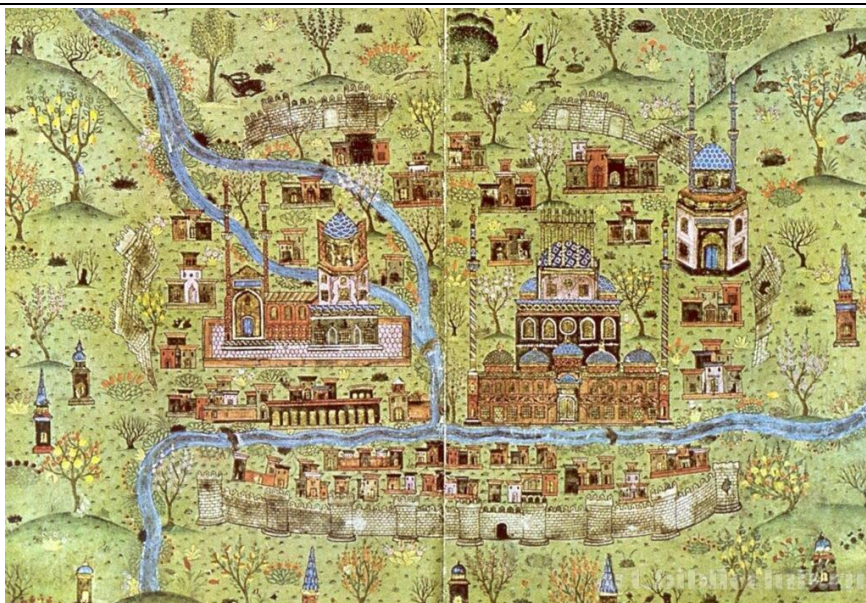
Здесь передовые архитектурно-художественные достижения достигают вершин творческого вдохновения. Преемственность традиционных связей как в пространственном решении, так и в конструкциях и художественной разработке очевидна, вместе с тем здесь явственно проступают ростки технических новшеств и остроумных приемов, которые позже займут прочные позиции в монументальных строениях.

Толщина стен мавзолея достигает 7,40м, сюда вписаны не плоские, но глубокие стрельчатые ниши со сталактитовым заполнением конх. По сути здесь решена двойная задача – пространственная и конструктивная. Венчающая корпус строения сквозная сводчатая галерея соответствует ярусу подкупольных конструкций в интерьере. Последние разработаны посредством горизонтальных сталактитовых колец, обеспечивших пластику перехода от 8 – мигранника к куполу. Вытянутость пропорционального строя строения остро ощутима в интерьере, увлекая взгляд снизу, на тактильном уровне, с обступающими со всех сторон стрельчато-арочными нишами вверх – к башнеобразному куполу, воспевая вечную славу его гениальным создателям.

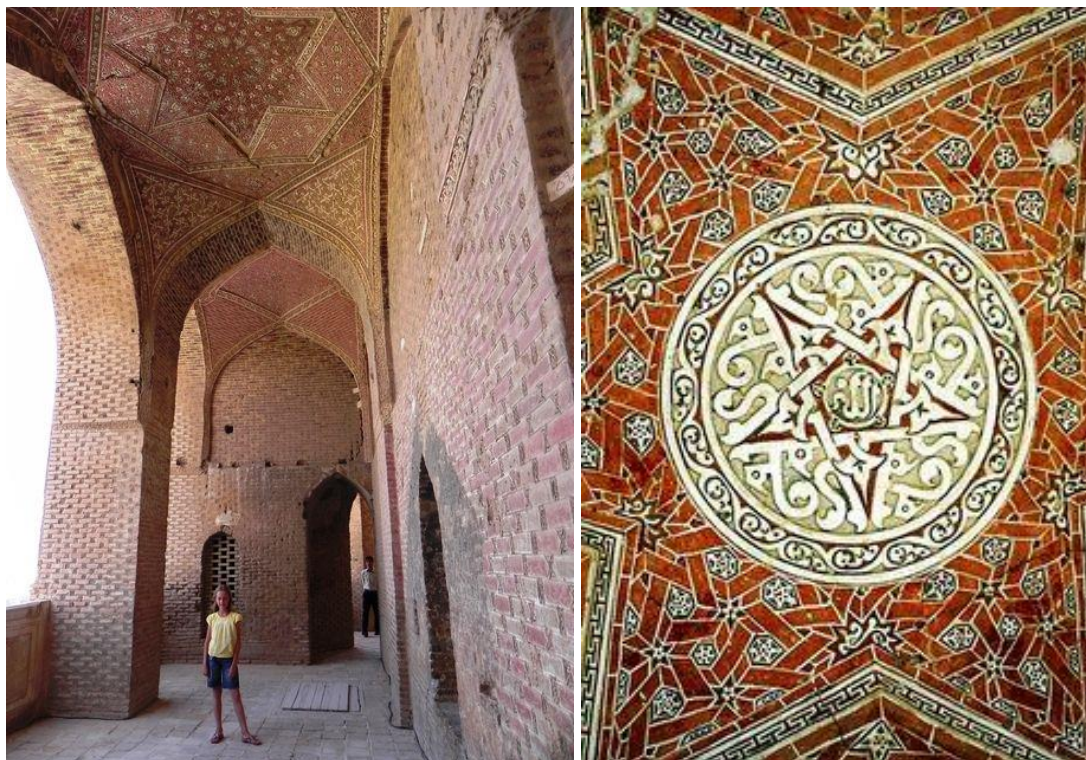
Огромный бирюзовый купол мавзолея Олджайту-хана, выражающий идею религиозно-этического порядка и сегодня продолжает вызывать восторг очевидцев. Высокие прочностные качества купола с высотой более 20 м, диаметром, равным 24,40 м обеспечиваются сложной конструктивной системой, состоящей из 2-х оболочек и «мембраны» с легким, но жестким кирпичным заполнением. Четыре световых проема обеспечивают в частности освещение интерьера, что, в свою очередь способствует удобочитаемости эпитафии; полоса эта (высота 3,60м) с эпитафией из священного Корана расположена несколько ниже, под основание купола.



Панорама комплекса Олджайту



Миниатюра Насуха Матракчи «Султание». Фрагмент



Фрагмент галереи Перекрытие галереи

Яйцевидный профиль купола и сама его конструкция наталкивают на мысль, что зодчий в решении архитектурной задачи руководствовался гениальным изобретением природы - яйцом, скорлупа которой среди биологических структур занимает особое место [3, с. 89]. Погашению сил распора способствует самая форма яйцевидного купола, его остроумное техническое решение, а также устройство в подкупольной части корпуса мавзолея роскошной сводчатой галереи, которая обнимающая весь корпус по всему периметру. Высокие прочностные качества купола, состоящего из двух тонких оболочек и «мембраны», запрограммированы в виде сложной конструктивной системы за-

долго до купола Флорентинского собора Санта Мария делла Фьоре [1, с. 152]. Погашению сил Последняя приобретает в конструктивной системе мавзолея исключительную значимость, Роль установленных на углах корпуса пинаклей, решенных в виде минаретов велика; они имеют диаметр, равный примерно 1 м, внутри вьется узкая спиральная лестница, шириной в 0,70 м и высотой в 5,3 м, Исключительно важна их конструктивная цель - они уравновешивают распор купола, и это, в свою очередь усиливает динамику всей композиции, ее вертикальную устремленность [6, с. 96; 4 с. 166]. К южной грани мавзолея пристроено так наз. «Тюрбет хана», которая, возможно служила своего рода поминаль-

ным залом (17,60x7,80), высотой ,доходящей примерно до 18м. Стену обращенную к Кыбле центрирует михраб, завершенный сталактитовым полукуполом, с китабе, с эпиграфическими выкладками на стенах, в верхней части которых имеются световые проемы. Под ним расположено подземелье, склеп ,сложное по планировке, хотя и небольшое помещение.. Это целый лабиринт , имеющий несколько извилистых входов с крохотными сводчатыми помещениями. Именно сюда Олджайту хан планировал перенести сюда останки Имам Али и Имам Хусейна.

Международный Комитет Всемирного Наследия (ЮНЕСКО), в июле 2005 г. внес мавзолей Олджайту хана в репрезентативный список объектов Всемирного Наследия.

СПИСОК ЛИТЕРАТУРЫ:

1. Амензаде Райха. Композиционные закономерности монументальных сооружений Азербайджана XI- XVII веков. Баку, 2007
2. Andre Godard. Islamic architecture. The mausoleum of Oljeitü at Sultaniya/SPA, v.III, Tokyo,1964-5
3. Андреев Л.В. В мире оболочек. М.,1986
4. .Всеобщая история архитектуры. Т.8. М.,1969
5. Nasuhüs –Silahi (Matrakçı).Beyan-i menazil-i sefr-i irakeyn-i Sultan Süleyman han. Ankara,1976
6. Партина А.С. Архитектурные термины. М.,2000
7. Волков И. Путешествие Иосафата Барбаро в Персию в 1473-1478гг.(текст, примечания, комментарии).Сб.статей «Генуэзская Газария и Золотая Орда». Казань, Симферополь, Кишинев, 2015

BIOLOGICAL SCIENCES

EVALUATION OF MUSHROOMS EXPOSED TO ANTHROPOGENIC FACTORS BY SOIL MOISTURE PROPERTIES

Balakhanova G.

*Doctoral student, teacher
Azerbaijan State Pedagogical University
Baku, Azerbaijan*

Abstract

The scientific article used the lands contaminated with industrial products, irrigated lands, oil and oil products, areas polluted by vehicles and crops planted there, urban lands, areas used for waste disposal. It was found that depending on the anthropogenic impacts, the ecological and trophic structure of each biotope-specific mycocomplex also changed, which was reflected in the reduction of the specific gravity of saprotrophy in the microcomplex of relatively clean soils and the increase in polytropy. No significant difference was observed when characterizing the fungi recorded in the studies according to the soil moisture in which they spread in nature. However, the specific gravity of the individual groups of the microcomplex due to moisture, which is characteristic of relatively clean soils, has changed to some extent due to hydrophils and mesohydrophils.

Keywords: anthropogenic, soil moisture, microscopic fungi, hydrophiles, xerohydrophytes, mesohydrophiles.

Microorganisms that spread in the soil, including microscopic fungi, are inevitably found in each of the earth's biocenoses. Fungi in this group play a key role in performing a number of functions in the ecosystem. They mainly play a role in the decomposition of organic matter and the circulation of biogenic elements, in the process of soil formation, in the regulation of the species structure and functional activity of other soil fungi, as well as in influencing plants. Soils, as well as ecosystems with both physical, chemical and biological properties, are characterized as the most populated areas of living things, and it is no coincidence that the vast majority of living things on Earth have a way of life, all the functions they perform (production, destruction, regulation and indication) are related to lands. It is important to pay constant attention to the lands, to conduct a comprehensive study of the processes taking place there and to identify the changes that occur as a result of this or that man-made and anthropogenic impact, which are usually negative, and is an important issue to address. Thus, the formation of mycobiota in areas with the same soil type exposed to different anthropogenic influences is characterized by a wide variety of fungi, and this diversity is reflected in their ecological-trophic relationships, distribution in different anthropogenically affected areas, as well as frequency and ecological manifests itself in the manifestations of trophic specialization. The results obtained also provide a basis for the negative characterization of these differences, which in most cases depend on the nature of anthropogenic impacts. The next stage of research is aimed at clarifying how this diversity is reflected in the ecophysiological characteristics of fungi recorded in research, both from a scientific and practical point of view, and today this issue is not sufficiently studied. In addition, the constant updating of human technologies is reflected in the impact on the environment, and as a

result, it is important to pay attention to what is happening, to determine the response of living organisms to anthropogenic impacts.

Anthropogenic environment means, first of all, those that are formed as a result of human activities and are under the influence of their various activities. More precisely, it is logical to call the places where people live, work, rest, receive medical treatment, and at one time or another, anthropogenic environment. These environments can also be called anthropogenic environments, which are formed as a result of direct or indirect influence of human activities in modern times, mainly to satisfy economic interests, and in our opinion, this approach more comprehensively reflects anthropogenic environments. For this reason, in our research, we have tried to clarify the processes that take place there in the example of fungi, considering the areas of land that have fundamentally changed their natural state as a result of direct human activities as an anthropogenic environment.

Environmental factors are primarily a number of indicators of the environment in which living things live, commonly referred to as biotic and abiotic factors. Because the effects of these factors are multifaceted and complex, it is not possible to specify all of them at once. For this reason, it is expedient to study how environmental factors, first of all humidity, temperature, pH, molecular oxygen, affect the activity of fungi in anthropogenic environment. Some of the research was carried out under natural conditions (attitude to moisture and molecular oxygen), and the rest were carried out in the laboratory. Among the environmental problems of modern times, global climate change caused by the direct impact of human activities on nature is also considered, and the result is that the condition of a number of ecosystems, primarily those related to land, is ecologically critical. For this reason, a number of cases arising from the impact of this problem, primarily the

observation of manifestations of desertification, are associated with changes in soil moisture, more precisely, the violation of the water balance. The ratio (in percent) of the total mass of water in the soil to the mass of the solid components of the soil is called the soil moisture. The amount of water is not the same in different soil types and at different times. When there is a lot of gravity water, the soil regime is close to the water regime. Only closed water remains on dry land. However, even in the driest soil, the humidity is higher than the humidity at the surface. Therefore, soil organisms are less susceptible to drying than surface organisms. [2, p.45] In general, moisture is characterized as one of the environmental factors that play an important role in the formation of soil fertility and is one of the necessary steps to take into account when using soils. Therefore, there is no doubt that clarifying the importance of the role of moisture in the soil and preventing its reduction is one of the important tasks facing research in this area. Given the importance of this, it was considered expedient to clarify how the natural moisture content of the areas selected for the study in the course of the study affected the fungi.

It became clear from the research that, depending on the nature of anthropogenic impacts, the changes recorded in a certain sense manifest themselves in different shades. Thus, when characterizing the recorded fungi in terms of soil moisture in nature, it became clear that most of the recorded fungi belong to xerohydrophiles and do not change depending on anthropogenic influences. However, depending on the anthropogenic impact, there are also differences in the attitude of fungi to moisture, as the specific gravity of different groups of the myco-complex, which is characteristic of relatively clean soils, varies due to hydrophils and mesohydrophils. When grouping the fungi recorded in the sampled areas according to the sources of contamination, it became clear that the hydrophilic group was in the most irrigated and used for landfilling, even higher than the control soils. This is normal, because irrigated lands are more suitable for their survival. The lowest number was in samples from oil-contaminated areas. Fungi belonging to the xerohydrophilic group are found in the areas most used for waste disposal, and least in areas contaminated with industrial products, and in all cases this figure was below control. Substances with different physical and chemical properties are obtained and used in production. Therefore, the waste released into the atmosphere differs in chemical composition [8, p.95]. As mentioned above, most of the fungi recorded in general belonged to xerohydrophiles. As for mesohydrophils, we can say that the number of mesohydrophils recorded in the samples taken from the areas polluted by vehicles and plants, as well as from the areas used for waste disposal, was lower than the control, but found in other sources of pollution.

It is clear from the results that the moisture factor plays a role in the spread of fungi and is important, but it is less important than other living things, such as plants. The reason for this, in our opinion, should be sought in the specifics of the heterotrophic nutrition of fungi. Thus, when fed heterotrophically like animals, fungi can absorb water and water-soluble minerals not

from a specific area of the body, but from the entire body surface. Any soil also has moisture, and therefore the moisture factor in the spread of fungi does not cause significant changes. However, the moisture factor should always be considered as a factor that plays an important role in the sustainability of this or that ecosystem. Thus, the decrease in humidity leads to a change in the number and species composition of living things, and in most cases, to a decline, and a relative simplification of the relationship between living things. The indicators of the sustainability of this or that ecosystem are the richness of species diversity of living things, the complexity of the relationships between them. The reason for this fact is that the fungi belong to aerophiles, which is why it is difficult to circulate air in places with high humidity. Like all living things, the vast majority of fungi are aerobic in relation to oxygen. Oxygen factor is one of the leading factors in the continuation and circulation of their life activities in a normal sequence. From this point of view, in order to determine the effect of pollution on the spread of fungi in those sources, or rather on the oxygen factor and the spread of fungi depending on it, the distribution of fungi was studied by taking samples from relatively deep and two different sources of pollution. Thus, samples were taken from depths of 0-20, 20-40, 40-70 and 80-100 cm. As can be seen, the number of fungi was higher on the upper surface of all three soils than in the deeper layers, and is most pronounced in these relatively clean soils. However, when comparing these figures between the two sources of pollution, it was found that the number of fungi was more prevalent in irrigated lands. Thus, the number of fungi in the deeper layers of irrigated soils has been declining, and areas contaminated by road traffic have been relatively high. Even in samples taken from depths of 40-70 cm, the number of fungi in irrigated soils was 11 CFU / g, in the areas contaminated by traffic it was 34 CFU / g, and in relatively clean soils it was 36 CFU / g. In the deeper layers, fungi are almost non-existent, and in some km 0-3 fungal colonies are found, which is characteristic of relatively clean soils. Given the fact that it is interesting both scientifically and practically to determine which fungi it consists of, it was considered expedient to determine in which samples the fungal-forming units belong to which fungal species. In this regard, it became clear that only 3 species are found in relatively clean soils, which include fungi such as *Actinomucor elegans*, *Mucor mucedo* and *Trichoderma hamatum*. These fungi can also be described as facultative anaerobes. At the same time, it can be said that the amount of oxygen in the depths of the soil decreases, which limits the development of oxygen-sensitive fungi. This is the case in the most irrigated lands. As can be seen from the table, fungi are more abundant on the upper surface of irrigated soils and less on the lower layers. This is due to the abundance of oxygen and nutrients in the upper part, the swelling of the soil under the influence of water and the weakening of oxygen permeability, and the leaching of nutrients on the upper surface. However, fungi that require less oxygen in the deeper layers have also been found. Despite all this, fungi are anaerobic

organisms, and in order for them to continue their life activities, they need oxygen in their environment.

Thus, it became clear from research that the moisture factor plays a role in the spread of fungi, and this is important. When the fungi were characterized by the moisture content of the soils in the study, it became clear that most of the fungi were xerohydrophilous and did not cause significant changes due to anthropogenic impacts. The specific gravity varies due to hydrophils and mesohydrophils. Any soil also has moisture, and therefore the moisture factor in the spread of fungi does not cause significant changes. However, the moisture factor should always be considered as a factor that plays an important role in the sustainability of this or that ecosystem. Thus, the decrease in humidity leads to a change in the number and species composition of living things, and in most cases, to a decline, and a relative simplification of the relationship between living things. The indicators of the sustainability of this or that ecosystem are the richness of species diversity of living things, the complexity of the relationships between them. It is worth mentioning that the specific gravity of hydrophils in all cases is lower than in other groups. The reason for this fact is that the fungi belong to aerophiles, which is why it is difficult to circulate air in places with high humidity.

REFERENCES:

1. Ibrahimov A.SH., Abdulova Z.A., Mehdiyeva L.N. Mycology Baku: Baku University, 2008, 324 pages.
2. Mammadov Q.Sh., Khalilov M.Y. "Ecology, environment and man" Baku, "Elm" publishing house - 2006, 608 p.
3. Namazov N.R. The world of mushrooms and mushroom-like creatures. Sumgayit: Sumgayit 2019, № 2, 469 pages.
4. Sutin I.A., Zelenskaya L.N., Finn Q.R. Microbiology. Baku: Maarif Publishing House, 1968, 368 pages.
5. Zeynalli K.S., Karimov Z.M., Jabrayilzade S.M., Gahramanova F.X. Mycobiota of residential buildings and objects of various purposes.// Scientific works of the Institute of Microbiology of ANAS. Baku: Elm Publishing House, 2009, p.29, p.693-697.
6. Antropova A.B., Bilanenko E.N., Mokeeva V.L., Chekunova L.N., Jeltikova T.M. Mycobiota domashney pili g.Sofii (Bulgaria) // Uspexi mediüinskoy mikologii. Moscow: National Academy of Mycology, 2007, vol.9, p.34-35.
7. Antropova A.B., Kazanueva Q.V., Mokeeva V.L., Chekunova L.N. and dr. Micromutiosis of bone marrow - a source of allergens.//Immunology, Allergology, Infectology, 2009, № 2, p.41.
8. Shirokova NV, Serdyukova YP / Industrial ecology: textbook / Persian: Don GAU, -2019. - 193 p.

BIOTECHNOLOGIES OF NITROGEN-FIXING BACTERIA IN THE FIELDS OF SOME REGIONS OF AZERBAIJAN

Abdullayeva Sh.

Ph.d. teacher

Azerbaijan State Pedagogical University, Azerbaijan

Abstract

The research was conducted in some regions of Azerbaijan. Purpose of work to study of research bacterial strains p. Azotobacter in the conditions of open and closed soil. Tasks: To learn the peculiarities of the soil from which the bacteria p. Azotobacter. To determine the cultural and morphological properties of strains, isolated from soil samples and to establish their dependence on the type of soil (closed / open).

Keywords: azotobacter, soil, nitrates.

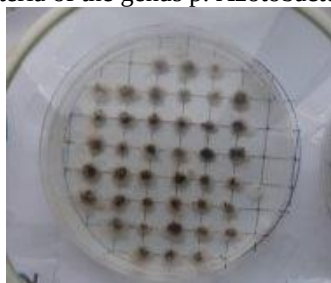
The soil is the main means of agricultural production, the economic basis for the existence of people, but do not forget that human health depends on the quality of plant products [1]. Modern fertilizers used for growing agricultural plants contain an excessive amount of chemicals, they are able to transform the biochemical composition of plant foods: the amount of vitamins and microelements in them is sharply reduced, and if there are too many chemicals, all useful substances can be completely replaced by nitrates. With the regular use of such products, instead of the expected benefits, a person gets a headache, dizziness, heart failure, tachycardia, muscle numbness, hearing and vision impairment [2]. Despite this, nitrates are necessary for plants as a source of nitrogen for growth and development. Plants cannot absorb nitrogen from the air. This process is carried out only by bacteria. The transfer of nutrients into

a form accessible to plants, in particular nitrogen, is one of the important functions of the Azotobacter of the river. Biological nitrogen is the safest for humans, since there is no accumulation of nitrates. In addition, these bacteria, developing near the roots of plants, stimulate their growth [1].

The purpose of the work: the study of strains of bacteria p. Azotobacter in open and closed ground conditions. Tasks: Find out the features of the soil from which the bacteria of the river were extracted p. Azotobacter. Determine the cultural and morphological properties of strains isolated from soil samples and establish the dependence of their occurrence on the type of soil (closed / open). Establish the stimulating activity of isolated strains of nitrogen-fixing bacteria.

The first stage of the work was the study of the state of soils, namely, the determination of the mechanical composition, the pH of the medium, and the presence of carbonates. Soil sampling was carried out from two different vegetable gardens and greenhouses located at a distance of 2600 meters. Will affect the diversity of strains of nitrogen-fixing bacteria. The sites are remote from a major highway, so the probability of settling particles of vehicle exhaust gases on the soil is low.

Conclusion: soil samples have similar characteristics: mechanical composition - medium loamy, medium pH = 6 (slightly acidic), an insignificant amount of carbonates. The second stage of work is the identification of microorganisms of the river. *Azotobacter* in these soil samples. For this, lumps 3–4 mm in diameter were taken from the sifted and moistened soil. and placed in Petri dishes on Ashby nutrient medium [3]. Observation and microscopic analysis of the obtained colonies of microorganisms showed that all soil samples contain cells of bacteria of the genus *p. Azotobacter* (pic.1).



Picture 1

The following regularity was revealed: under conditions of closed ground from soil samples taken at a depth of 20 cm, the percentage of fouling was 100% and 94%/95% on the surface. In open ground conditions: at a depth of 20 cm - 98% / 94%, on the surface - 99% / 96%. We assume that under closed ground conditions, the soil surface quickly loses moisture and there is no natural source of it, therefore, bacteria are concentrated in deeper moist layers (in addition, the soil is bulk, it is quite loose and saturated with oxygen). The total amount of fouling on the fourth day was 100% in all soil samples. At the same time, some of the soil lumps were overgrown with light colonies, some with dark ones.

The ratio of light and dark colonies from different places differs both in closed and open ground: in closed ground, dark colonies predominate, which indicates a protective reaction of cells to adverse conditions, in open ground, light colonies with yellow or light brown pigmentation predominate. All cells of the isolated samples are spherical and have formations in the form of capsules. The presence of cysts was not found in all cultures.

At the third stage of the work, we studied the stimulating activity of the isolated strains of bacteria *p. Azotobacter*. To do this, we chose the seeds of red and white beans grown in our own garden. The seeds intended for the experiments are of the same size and have not been subjected to any chemical treatment. As a substrate, cotton wool moistened with the same amount of tap water with the addition of isolated strains of bacteria *p. Azotobacter* (50 ml of water took a mucous film of light yellow bacterial colonies the size of a pea (regardless of the type of soil (closed / open))).

From above, the seeds were covered with a cotton wool substrate moistened with tap water. Germination took place under room conditions at a temperature of 22–25°C. For control samples, the substrate was moistened with tap water. To establish the stimulating activity of the isolated strains of bacteria *p. Azotobacter*, set up three parallel experiments. Three days later, the results of observations were recorded. Germination of red bean seeds on a substrate moistened with water with the addition of bacteria *r. Azotobacter* is higher than control samples by 9%, white seeds - by 5%. The total length of the roots that emerged from the germinal root of red bean seeds on a substrate moistened with water with the addition of bacteria *r. Azotobacter* is longer than the length of the roots of control samples by 7.2 cm, white seeds - by 1.3 cm. In addition, we noticed that the seeds germinated in the presence of bacteria had a growth force - the lids of the Petri dishes were noticeably raised, the roots rested against the substrate (no such phenomenon was observed in the control samples). Conclusion: bacteria *r. Azotobacter* stimulate seed germination and accelerate plant development.

As a result of the study, we came to the following conclusions: The studied soil has properties suitable for the habitation of bacteria of the river. *Azotobacter*. All cells of the isolated samples are spherical and have formations in the form of capsules. The presence of cysts was found not in all cultures. Our hypothesis about the dependence of the occurrence of bacteria on the type of soil (closed/open) was not confirmed. Our hypothesis about the stimulating activity of the bacterium *p. Azotobacter* was confirmed.

REFERENCES:

1. Звягинцев Д. Г., Бабьева И. П., Зенова Г. М. Биология почв: Учебник. — 3-изд., испр. и доп.— М.: Изд-во МГУ, 2005. — 445 с.,
2. (Классический университетский учебник) О вреде нитратов. Источник: <http://04.rospotrebnadzor.ru/index.php/san-nadzor/43-san-ottel/4739-22052015.html>
3. Охотник за микробами. Методические рекомендации и инструкции по применению набора.

CHEMICAL SCIENCES

PHASE FORMATION IN THE $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ SYSTEM AND THE PHYSICO-CHEMICAL PROPERTIES OF THE OBTAINED PHASES

Aliyev I.,

Institute of Catalysis and Inorganic Chemistry named after M.F.Nagiyev of the National Academy of Sciences of Azerbaijan

Ahmedova C.,

Adiyaman State University, Faculty of Arts and Sciences, Department of Chemistry, Turkey.

Rzaev R.,

Azerbaijan State University of Economics

Gashimov Kh.

Azerbaijan State University of Economics

Abstract

Chemical interactions and glass formation in the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system were studied by the methods of physicochemical analysis: differential thermal analysis (DTA), X-ray phase analysis (XRD), microstructural analysis (MSA), as well as the determination of microhardness, density, and a T-x phase diagram was constructed. It has been established that the state diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system is partially quasi-binary, of the eutectic type. In the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system, a new quaternary compound $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ is formed. The $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound melts with an open maximum at 548 K. In the system $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ based on the As_2Se_3 compound, a solid solution is formed up to 3.5 mol % Tl_2S_3 . Taking into account the peritectic character of the formation of the Tl_2S_3 compound, the region of the solid solution at its base is practically not established. As a result, during normal cooling in the system, the glass formation region reaches 65 mol % Tl_2S_3 , and in the mode of quenching in liquid nitrogen, all alloys are obtained in a glassy state.

Keywords: system, glass, microhardness, quasi-binary, solid solution.

Introduction

Glassy arsenic chalcogenides and alloys based on them have attracted close attention of researchers in recent years. With the participation of arsenic chalcogenides, the obtained ternary phases have photoelectric [1–8], acousto-optic [9–11], and luminescent properties [12, 13].

Numerous systems of chemical interactions with thallium, arsenic, and other metal chalcogenides have been studied [14–20]. Due to photosensitivity, compounds and solid solutions based on thallium chalcogenides are materials with electrophysical properties [21–24].

The creation of physical and chemical bases for obtaining multicomponent complex chalcogenide glassy phases of variable composition with desired characteristics requires the study of phase equilibria in the corresponding systems.

This work is devoted to the study of physical and chemical studies of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system, in order to obtain new glassy semiconductor phases of complex composition with desired properties.

Experimental part

Alloys of the system were synthesized from alloys $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ in quartz ampoules evacuated to 0.133 Pa at 873–973 K. Alloys of the system are low-melting and compact, black. The alloys were cooled slowly. The synthesized samples of the system were annealed at 210 and 353 K for 800 h. The physicochemical study of the system was carried out before and after annealing (Tables 1 and 2).

The DTA of the alloys of the system was carried out on an NTR-73 instrument at a rate of 10 deg/min.

XRF was performed on a D2 PHASER X-ray machine with $\text{CuK}\alpha$ radiation and a Ni filter. MSA of the alloys of the system was studied using a MIM-8 microscope on pre-etched sections polished with GOI paste. The microhardness of the system alloys was measured on a PMT-3 microhardness tester. The density of the alloys of the system was determined by the pycnometric method; toluene was used as a filler.

Results and its discussion

DTA of cast samples shows that alloys of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system in the concentration range 0–65 mol % Tl_2S_3 are obtained in a glassy form. On the thermograms of these alloys, there are two types of softening temperatures. The value of $T_g = 443\text{--}453$ K corresponds to the softening temperature of glasses based on As_2Se_3 , and the value of $T_g = 403\text{--}438$ K corresponds to the softening temperature of glasses based on $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$. To determine the area of glass formation, DTA, XRF, MSA measurements of microhardness and determination of the density of alloys of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system were carried out before and after annealing.

The effect of heat treatment on the coefficient of expansion is particularly pronounced when comparing the expansion curves of well-annealed glass and glass tempered from a molten state. Hardened glass in the solid state has a slightly higher coefficient of expansion than annealed glass, and their microhardness and density also differ sharply.

MSA casting alloys show that in the concentration range of 0–65 mol % Tl_2S_3 samples are glassy. As a result, in the mode of quenching into liquid nitrogen, all alloys of the system are obtained in a glassy form. MCA

annealed alloys shows that in addition to alloys containing 0-3.5 and 50 mol % Tl_2S_3 are single-phase, the other alloys are two-phase.

Tab. 1.

Composition, DTA results, microhardness measurements and density determination of alloys of the As_2Se_3 - Tl_2S_3 system before annealing (glassy)

Composition, mol %		Thermal effects, °C	Density, 10 ³ kg/m ³	Microhardness, MPa		
As ₂ Se ₃	Tl ₂ S ₃			α	Tl ₂ As ₂ S ₃ Se ₃	Tl ₂ S ₃
				P=0,15 H	P=0,10 H	
100	0.0	185,380	4,62	1300	-	-
97	3,0	180.370	4,70	1370	-	-
95	5,0	180,310,365	4,76	1380	-	-
90	10	175,250,355	4,92	1340	-	-
85	15	170.220.340	5,07	1390		
80	20	165.220,315	5,23	1390	-	-
70	30	60.220.275	5,51	1390	-	-
60	40	150.220	5,70	-	-	-
55	45	145,220,255	5,85	-	1170	-
50	50	140.275	5,95	-	1170	-
45	55	140.80.270.160	6,25	-	1150	-
40	60	130,80,160.260	6,42	-	1160	-
30	70	130.80.160.220	6,70	-	1150	-
20	80	130.80.150,170	7,00	-	-	-
12	88	130.80,195	7,17	-	-	-
10	90	80.90.205	7,32	-	-	610
5,0	95	80.95.220	7,40	-	-	610
3,0	97	80.95.225	7,50	-	-	600
0.0	100	100,230	7,60	-	-	580

Tab. 1.

Composition, DTA results, microhardness measurements and density determination of alloys of the As_2Se_3 - Tl_2S_3 system after annealing (crystalline)

Composition, mol %		Thermal effects, °C	Density, 10 ³ кг/м ³	Microhardness, MPa		
As ₂ Se ₃	Tl ₂ S ₃			α	Tl ₂ As ₂ S ₃ Se ₃	Tl ₂ S ₃
				P=0,15 H	P=0,10 H	
100	0.0	380	5,10	1300	-	-
97	3,0	370	5,17	1370	-	-
95	5,0	310,365	5,20	1380	-	-
90	10	250,355	5,30	1340	-	-
85	15	220.340	5,38	1390	-	
80	20	220,315	5,50	1390	-	-
70	30	220.275	5,60	1390	-	-
60	40	220	5,72	-	Эвтек.	Эвтек.
55	45	220,255	5,82	-	990	-
50	50	275	6,10	-	970	-
45	55	80.270.160	6,48	-	950	-
40	60	80,160.260	6,62	-	950	-
30	70	80.160.220	6,80	-	950	-
20	80	80.150,170	7,10	-	-	-
12	88	180,195	7,25	-	Эвтек.	Эвтек.
10	90	80.90.205	7,32	-	-	610
5,0	95	80.95.220	7,40	-	-	610
3,0	97	80.95.225	7,52	-	-	600
0.0	100	100,230	7,60	-	-	580

Three rows of microhardness values were obtained in the system: the first of them corresponds to the microhardness of α -solid solutions based on As_2Se_3 , the second to $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$, and the third to Tl_2S_3 .

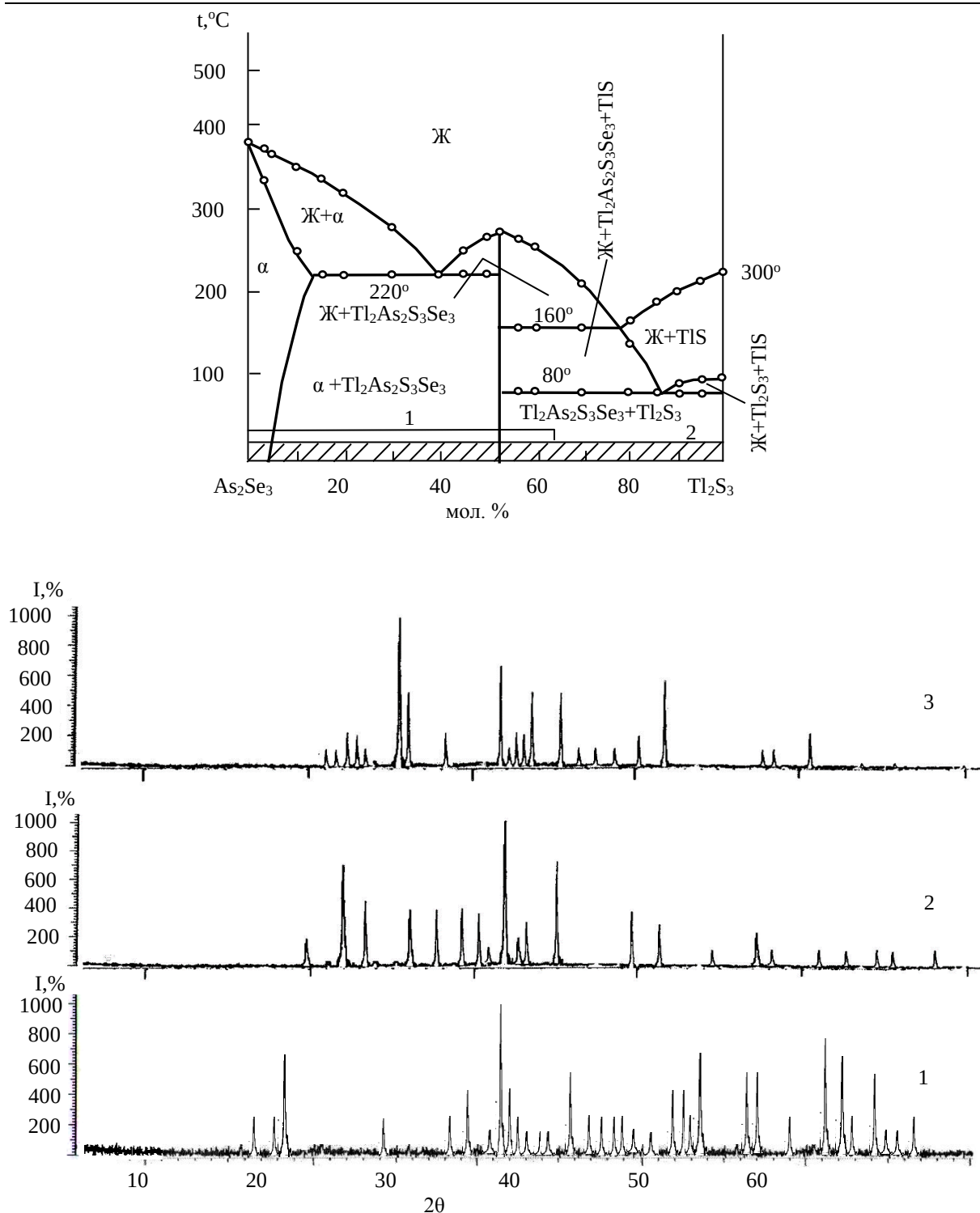


Fig. 1. State diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system. Glass formation area in the slow cooling mode 1, and in the quenching mode in liquid nitrogen 2.

Rice. 2. Diffractograms of alloys of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system.

1- As_2Se_3 , 2- $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$, Tl_2S_3 .

As can be seen from Table. 1.2, the values of microhardness of alloys from the region of glasses before and after annealing differ. For glasses based on As_2Se_3 before annealing, the microhardness varies within (1300–1390) MPa, and for $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ glasses, within (1150–1170) MPa. After annealing, for As_2Se_3 glasses H_μ =(760–820) MPa, and for $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ glasses H_μ =(950–990) MPa.

On the basis of DTA, XRD, MCA, a state diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system was constructed (Fig. 1). The state diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system is partially quasi-binary. The system is a diagonal section of the ternary reciprocal system As,Tl//S,Se. The cuts $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ and $\text{As}_2\text{S}_3\text{-Tl}_2\text{Se}_3$ intersect at a component ratio of 1:1. A congruent $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound is formed at the intersection point. Therefore, both cuts

are quasi-binary. The $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound is obtained in a glassy form and melts at 548 K, the glass transition temperature is $T_g=413$ K.

To confirm the $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound, DTA, MSA, XRD, as well as microhardness measurements and density determinations before and after annealing were carried out. The XPA data (Fig. 2) showed that the X-ray diffraction pattern of the alloy with a composition of 50 mol. % Tl_2S_3 , reflections are observed that are not associated with the initial components, which makes it possible to attribute these reflections to the new $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ phase.

As a result of X-ray diffraction analysis, it was found that the $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound crystallizes in the hexagonal system with lattice parameters: $a=10.69$ Å; $c=9.54$ Å, $z=4$, $\rho_{\text{pyc}}=5.95 \cdot 10^3$ kg/m³, $\rho_{\text{x-ray}}=5.98 \cdot 10^3$ kg/m³. Crystallographic data of the compound are given in table. 3.

The liquidus of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system consists of three branches of primary crystallization: α -phase (solid solutions based on As_2Se_3), $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ and TlS. α -phases and the $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound form a eutectic with a composition of 40 mol % Tl_2S_3 at a melting point of 493 K. In the concentration range of 3.5-50 mol % Tl_2S_3 below the solidus line, the alloys of the system are a mixture of two phases $\alpha + \text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$. Part of the state diagram of the $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ - Tl_2S_3 system is partially quasi-binary.

In this region, eutectic equilibrium and peritectic transformation take place. The Tl_2S_3 compound melts incongruently at 373 K. Above a temperature of 373 K, the Tl_2S_3 compound decomposes according to the reaction: $\text{Tl}_2\text{S}_3 \leftrightarrow \text{L} + \text{TlS}$. Consequently, three-phase alloys $\text{L} + \text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3 + \text{Tl}_2\text{S}_3$ and $\text{L} + \text{TlS} + \text{Tl}_2\text{S}_3$ exist above the solidus line.

Below the solidus line, the reverse reaction occurs, i.e., a peritectic reaction occurs: $\text{W} + \text{TlS} \leftrightarrow \text{Tl}_2\text{S}_3$. Therefore, two-phase $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3 + \text{Tl}_2\text{S}_3$ alloys crystallize below the solidus line. Thus, the state diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system is presented as a stable section of the ternary reciprocal system As, Tl/S, Se .

Conclusion

Thus, the state diagram of the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system has been constructed. The nature of the interaction of the components is identical with the $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system; they are diagonal sections of the As, Tl/S, Se ternary mutual system. One chemical compound $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ is formed in the system, which melts congruently at 548 K. X-ray indexing revealed that the $\text{Tl}_2\text{As}_2\text{S}_3\text{Se}_3$ compound crystallizes in the hexagonal syngony with lattice parameters: $a=10.69$ Å; $c=9.54$ Å, $z=4$, $\rho_{\text{pyc}}=5.95 \cdot 10^3$ kg/m³, $\rho_{\text{x-ray}}=5.98 \cdot 10^3$ kg/m³. It has been established that solid solutions based on As_2Se_3 extend up to 3.5 mol % Tl_2S_3 , and solid solutions based on Tl_2S_3 are practically not found.

The $\text{As}_2\text{Se}_3\text{-Tl}_2\text{S}_3$ system has extensive areas of glass formation. It was found that in the mode of slow cooling, the glass-forming regions reach 65 mol. % Tl_2S_3 , and in the mode of quenching in liquid nitrogen, all alloys are obtained in a glassy form.

REFERENCES:

1. Lovu M., Shutov S., Rebeja S., Colomeyco E., Popescu M. Effect of metal additives on photodarkening kinetics in amorphous As_2Se_3 films // *Journal of Optoelectronics and Advanced Materials* 2000. V. 2, Issue: 1. P 53-58.
2. Кириленко В.В., Дембовский С.А., Поляков Ю.А. Оптические свойства стекол в системах $\text{As}_2\text{S}_3\text{-TlS}$ и $\text{As}_2\text{Se}_3\text{-TlSe}$ // *Известия АН СССР. Неорганические материалы*, 1975, т.11, №11, с.1923-1928.
3. Алиев И.И., Бабанлы М.Б., Фарзалиев А.А. Оптические и фотоэлектрические свойства тонких пленок стекол $(\text{As}_2\text{Se}_3)_{1-x}(\text{TlSe})_x$ ($x=0,05-0,10$) // *XI Международная конференция по физике и технологии тонких пленок. Иваново-Франковск, Украина, 7-12 мая, 2007*, с. 86.
4. Hari P., Cheneya C., Luepkea G., Singha S., Tolka N., Sanghera J.S., Aggarwal D.. Wavelength selective materials modification of bulk As_2S_3 and As_2Se_3 by free electron laser irradiation // *Journal of Non-Crystalline Solids* 270 (2000) . p.265-268.
5. Hineva T., Petkova T., Popov C., Pektov P., Reithmaier J. P., Funrmann-Lieker T., Axente E., Sima F., Mihailescu C. N., Socol G., Mihailescu I. N. Optical study of thin $(\text{As}_2\text{Se}_3)_{1-x}(\text{AgI})_x$ films // *Journal of optoelectronics and Advanced Materials*. 2007.V. 9. No. 2. February. P. 326 – 329.
6. Andriesh A.M., Verlan V. I.. Donor- and acceptor-like center revealing by Photoconductivity of amorphous thin As_2Se_3 films // *Journal of Optoelectronic and Advanced Materials* 2001. V. 3. No. 2, June. P. 455 – 458.
7. Bhawana Dabas and R. K. Sinha Dispersion Properties of Chalcogenide As_2Se_3 Glass Photonic Crystal Fiber // *ICOP 2009-International Conference on Optics and Photonics Chandigarh, India, 30 Oct.-1 Nov.2009*. P. 123-127.
8. Slusher R.E., Lenz G., Hodelin J., Sanghera J., Shaw L.B., and Aggarwal I.D. Large Raman gain and nonlinear phase shifts in high-purity As_2Se_3 Chalcogenide fibers // *J. Opt. Soc. Am.* 2004. B. 21. P. 1146-1155.
9. Seema Kandpal, Kushwaha R. P. S.. Photoacoustic spectroscopy of thin films of As_2S_3 , As_2Se_3 and GeSe_2 // *Indian Academy of Sciences. PRAM ANA journal of physics*. 2007. V. 69. No. 3. P. 481-484.
10. Бабаев А. А., Мурадов Р., Султанов С. Б., Асхабов А. М.. Влияние условий получения на оптические и фотолюминесцентные свойства стеклообразных As_2S_3 // *Неорган. материалы*. 2008. №11. Т.44. С. 1187-1201.
11. Fu L.B., Rochette M., Ta'eed V., Moss D., and Eggleton B.J., Investigation of self-phase modulation based optical regeneration in single mode As_2Se_3 Chalcogenide glass fiber // *Opt. Express* 2005. V.13. P. 7637-7642.
12. Jackson S.D. and Anzueto-Sánchez G. Chalcogenide glass Raman fiber laser // *Appl. Phys. Lett.*, 2006. V.88. P. 221106.
13. Fu L.B., Fuerbach A., Littler I.C.M., and Eggleton B.J. Efficient optical pulse compression using

Chalcogenide single-mode fibers // Appl. Phys. Lett. 2006. V.88. P. 081116.

14. Джафаров Я.И., Бабанлы М.Б. Квазитройная система $\text{Tl}_2\text{S}-\text{Sb}_2\text{S}_3-\text{Bi}_2\text{S}_3$ // Журн. Неорганической химии. 2009. Т. 54. №11. С. 1920-1924.

15. Велиев Дж.А., Алиев И.И., Мамедова А.З. Фазовое равновесие в системе $\text{As}_2\text{S}_3-\text{TlSe}$ // Журн. неорган. химии. 2007. Т.52. № 2. С. 312-315.

16. Фарзалиев А.А., Алиев И.И., Алиев О.М., Алиев И.Г. Фазообразование в системе $\text{As}_2\text{Se}_3-\text{TlSe}$ // Химические Проблемы. 2006. № 2. С. 284-287.

17. Заргарова М.И., Мамедов А.Н., Аждарова Дж.С., Ахмедова (Велиев) Дж.А., Абилов Ч.И. Справочник: Неорганические вещества, синтезированные и исследованные в Азербайджане. Баку. Изд. Элм. 2004. 462 с.

18. Кириленко В.В., Дембовский С.А., Поляков Ю.А. Оптические свойства стекол в системах $\text{As}_2\text{S}_3-\text{TlS}$ и $\text{As}_2\text{Se}_3-\text{TlSe}$ // Известия АН СССР. Неорганические материалы. 1975. Т.11. №11. С. 1923-1928.

19. Кириленко В.В., Никитин В.К., Дембовский С.А. Стеклообразование и особенности хими-

ческого взаимодействия в халькогенидных системах $\text{As}_2\text{X}_3-\text{Tl}_2\text{X}$ // Известия АН СССР. Неорганические материалы. 1975. Т.11. №11. С. 1929-1935.

20. Кириленко В.В., Дембовский С.А., Поляков Ю.А. Оптические свойства стекол в системах $\text{As}_2\text{S}_3-\text{TlS}$ и $\text{As}_2\text{Se}_3-\text{TlSe}$ // Известия АН СССР. Неорганические материалы. 1975. Т.11. №11. С. 1923-1928.

21. Андриеге А.М., Коломиец Б.Т. Электропроводность и термо-эдс стеклообразных полупроводников в системе $\text{Tl}_2\text{Se}-\text{As}_2(\text{Se},\text{Te})_3$ // ФТТ. 1964. Т. 6. № 4. С. 3317-3320.

22. Катилене Е.Р., Регель А.Р. Электропроводность теллурида таллия в твердом и жидком состояниях // ФТТ. 1964. Т. 6. № 9. С. 2869-2872.

23. Alexander K Fedotov, M.I.Tarasik, T. G. Mammadov, Ivan Svito et.al. Elektrical properties of the layered single crystals TlGaSe_2 and TlInS_2 // Przeglad Elektrotechniczny. 2012. V. 88(7a). P. 301-304.

24. Panich A.M. Electronic properties and phase transitions in low-dimensional semiconductors // Journal of Physics: Condensed Matter. 2008. V.20. P. 203-31.

MEDICAL SCIENCES

TREATMENT OF PATIENTS WITH UMBILICAL HERNIA WITH MINI-INVASIVE HERNIOPLASTY

Krivoshchekov E.,

M.D., professor, surgeon

Federal State Budgetary Educational Institution of Higher Education «Samara State Medical University» of the Ministry of Healthcare of the Russian Federation 443099, Russian Federation, Samara, st. Chapaevskaya, 89,

Molchanov M.,

surgeon

State budgetary health care institution "Samara Regional Clinical Hospital named after V. D. Seredavin" 443095, Russian Federation, Samara, st. Tashkentskaya, 159,

Yakovlev R.,

resident physician

Federal State Budgetary Educational Institution of Higher Education «Samara State Medical University» of the Ministry of Healthcare of the Russian Federation 443099, Russian Federation, Samara, st. Chapaevskaya, 89

Grigor`eva T.

Ph.D, surgeon

State Budgetary Institution of Healthcare "Samara Regional Clinical Oncology Center" 443031, Russian Federation, Samara, st. Solnechnaya, 50

Abstract

The technique of mini-invasive umbilical hernia repair with the creation of elastic decompression in a one-day surgical hospital is described. The role of desquamation and peritoneodesis of the hernial sac in the process of hernioplasty is considered. The results of treatment of patients with umbilical hernias by the above method are presented. The use of this technique gives good results by reducing the invasiveness of the intervention, intraoperative prevention of wound complications, and increasing the reliability of fixation of the endoprosthesis.

Keywords: hernioplasty, umbilical hernia, peritoneodesis, desquamation, mini-invasive.

Introduction. Umbilical hernias are the third most common after inguinal and postoperative ones and account for up to 5% of all external abdominal hernias. The ratio of men and women is 1:10. This is due to their reproductive function. Other factors include heavy physical exertion, anatomical features of the formation of the umbilical ring, and obesity. Treatment of umbilical hernias is only surgical. Classical operations according to Sapezhko, Mayo, Lexer are accompanied by a significant number of relapses and reach 20%. Modern plasty methods allow performing operations without tissue tension, but their technologies do not provide for a decompression factor. Tension-free plasty has become decisive in the choice of surgical tactics in the treatment of patients with umbilical hernias in a one-day hospital.

Material and methods. Operations of minimally invasive tension-free umbilical hernia repair were performed in 119 patients. Women accounted for 84.3%, men - 15.7% of patients. Of these, 19.1% of people had recurrent umbilical hernias. Age ranged from 16 to 69 years. In 52.8% of patients, umbilical hernias occurred after childbirth, in 31.4% they were diagnosed in the period before pregnancy. Reducible hernias were identified in 57.3%, irreducible - in 26.9% of women. Recurrent hernias were diagnosed in 9% of patients. The size of the hernial defect varied from 4 cm² to 48 cm². Operations were performed in a one-day surgical hospital.

Operations were performed in accordance with the concept of tension-free plastics. An intraperitoneal approach was chosen, which allows during the operation to create conditions for damper decompression along the line of fixation of the endoprosthesis. It should be noted that with umbilical hernias, the anatomical and morphological structures form two contours of the hernial orifice - a false and a true contour. The muscular aponeurotic tissues of the deep contour of the hernial orifice do not undergo significant morphological changes. Their strength qualities are high. They are due to the composite structure of the tissue containing two sheets of aponeurosis and the contracted edge of the rectus muscle located between them. Fixation of the implant to them makes it possible to use not only high strength qualities, but also the elastic properties of muscle tissue, which reduce the mechanical load on the sutures and increase the reliability of fixation of the endoprosthesis.

Operation technique. A bordering elliptical incision was made along the upper contour of the navel 3-4 cm in the immediate vicinity of the umbilical depression. The resulting skin flap with an umbilical corolla in the center was retracted downward. The operation was performed without removal of the hernial sac. Mobilization of the hernial sac up to the neck and its removal are associated with surgical actions in scarred tissues, high bleeding and the appearance of a cavity in the umbilical tissue at the site of the removed hernial sac. In response to injury, edema, hemorrhage, exuda-

tion, formation of poorly drained spaces, and accumulation of fluid in the wound occur. This traumatic stage was completely excluded from the operation protocol. The upper dome of the hernial sac was found, the upper wall was dissected, the contents were set into the abdominal cavity, and the hernial orifice was freed from fixed organs. The aperture of the dissected hernial sac was used as an entrance to the abdominal cavity and to perform further stages of the operation.

A polypropylene implant was inserted into the abdominal cavity and fixed from the inside of the abdominal cavity along the perimeter of the deep contour of the hernia orifice with through U-shaped sutures with fixation of the node on the side of the aponeurosis of the rectus muscles. Between the surface of the implant and the intestinal loops, a greater omentum was placed and fixed with sutures as a biological protective pad.

Polypropylene implant was installed with slight tension, but the rectus muscles were not allowed to come close to each other. The rectus abdominis muscles with umbilical hernias are in a state of diastasis. Their reduction in a local area can lead to an X-shaped muscle deformity with the apex of the deformity in the umbilical region. With muscle contraction and tension of the abdominal press, the area of X-shaped deformity and the area of rectus muscles begin to experience additional tensile stress. Additional load on the lateral fixation line of the prosthesis increases the risk of suture failure and recurrence. Their tight convergence with the formation of a local deformation of the abdominal wall violates the principle of tension-free plasty. The sides of the fixed implant begin to experience a significantly greater tensile load, unlike all other parts of the abdominal wall.

Taking into account the observance of the principle of tension-free plasty, the fixation of the endoprosthesis was performed in a state when the rectus muscles retain their functionally advantageous position that does not violate their biomechanics - they must remain in a position strictly parallel to each other. The principle of tension-free plasticity in this case remains intact. The forces of intra-abdominal pressure and lateral traction of the broad abdominal muscles become uniform throughout the entire abdominal wall, and the zone of lateral fixation of the implant does not experience additional tensile stress. The reliability of the plastic is increased.

Upon completion of the plastic stage, the sheets of the preserved hernial sac were sutured over the surface of the fixed implant so as to cover the prosthesis with them and prevent contact with the subcutaneous tissue.

Taking into account the properties of the peritoneum, a surgical technique has been developed. It is formulated in terms of "desquamation" and "peritoneodesis" of the hernial sac.

Desquamation is the destruction and desquamation of the epithelial cover from the surface of organs and tissues. A mechanical method was used - the peritoneal surfaces of the hernial sac were treated with a gauze tupfer. The effect was assessed by the appearance of bright hyperemia and the disappearance of the characteristic luster of the peritoneum. Desquamation and

its de-epithelialization suppress the ability of the peritoneum to secrete fluid and activate the formation of connective tissue adhesions. The formulated concept of "peritoneodesis" of the hernial sac means a tight connection of its peritoneal surfaces with the underlying tissues. The sheets of the hernial sac were sewn together and fixed in such a way that the entire surface of the implant became covered with the sheets of the hernial sac sewn over it with their tight contact. The subcutaneous tissue is not subjected to trauma and does not come into contact with the surface of the implant. She was sutured separately.

Upon completion of the plasty, the implant is located between the surfaces covered with the peritoneum. The location of the prosthesis between the peritoneum of the hernial sac and the greater omentum is of clinical importance, the produced fluid is absorbed by the peritoneum and does not accumulate in the wound. Desquamation and peritoneodesis of the hernial sac acquire a preventive value in the development of wound complications.

Deepithelialized peritoneal surfaces of the hernial sac occupies a wide area of contact over the entire area of the fixed prosthesis. This zone is closely adjacent to the surface of the endoprosthesis. As a result, the formation of primary adhesions and the further course of the regenerative process occur not only along the edge of the fixation of the synthetic prosthesis, but also along the entire zone of its adjunction to the tissues. This process involves both the support-bearing structures of the hernia orifice - the musculoaponeurotic ring, and the de-epithelialized sheets of the hernial sac superimposed on the surface of the implant, the tissues of the scar ring, and the fixed tissues of the greater omentum located under the endoprosthesis. The germination of connective tissue formations between the prosthesis and the tissues connected to it occurs on a large area of their direct contact. Under these conditions, connective tissue cellular elements freely penetrating through the cellular structure of the implant on both sides and fusing with it, create a strong frame. Subsequently, vascularization and innervation of newly formed cell sprouts and the creation of strong connective tissue adhesions occur. As a result, the synthetic prosthesis becomes the basis and a single whole of the general connective tissue regenerate, which has a high mechanical stability. The mechanical load on the sutures fixing the prosthesis decreases with multipoint connective tissue ingrowth and becomes uniform over the entire area of the implant. This increases the reliability of the plasty and creates additional fixation during wound healing. A synthetic implant, the mesh structure of which serves as a framework, sprouts with connective tissue elements, forming a strong "prosthetic aponeurosis".

The technique of intraperitoneal hernioplasty, subject to the preservation of the hernial sac and the use of desquamation and peritoneodesis of the hernial sac, provides for the stimulation of regenerative processes over the entire area of the fixed implant with the participation of elements of the preserved hernial sac and tissues of the greater omentum in the regenerative-recovery process. The operation takes on the character of combined plasty. Mechanical stability is created by the

fixation of the implant to the strong tissues of the muscular-aponeurotic ring of the hernial orifice, while the tissues of the hernial sac and greater omentum have a stimulating effect on the regeneration processes and actively participate in it. The use of the peritoneum plays an extremely important role. Its deepithelization and direct adjacency to the surface of the prosthesis create favorable conditions for the early formation of connective tissue adhesions and active ingrowth of the implant into the surrounding tissues.

These sequentially performed surgical techniques reduce the volume of intraoperative trauma, are preventive measures for the development of wound complications and factors that contribute to the active ingrowth of the mesh prosthesis by connective tissue cellular elements.

At the final stage of the intervention, the navel and umbilical cavity were formed. The elongated umbilical pedicle was shortened by applying a corrugated suture and fixing it to the tissues in the depth of the wound. This avoids the formation of a "flat" umbilicus and creates an adequate umbilical cavity. The skin corolla of the navel was straightened and separate skin sutures were placed along the line of the elliptical incision. The stitching line is located along the edge of the umbilical cavity and is hidden by a skin-fat fold hanging from above. The postoperative scar after wound healing becomes less noticeable and increases the aesthetic result of the operation.

Results and its discussion. 119 patients were operated. Operations were performed in a one-day surgical hospital. Wound complications occurred in 2.3% of patients: with the help of ultrasound, an infiltrate of the umbilical region was diagnosed in 1.2% of people. Hernia recurrence was noted in 2.2% of patients. The postoperative period proceeds with mild pain, the patients were activated 2-3 hours after the intervention, the next day they were transferred to outpatient treatment. No pronounced edema was observed. Ultrasound scanning on days 3 and 5 after surgery did not reveal residual cavities and fluid accumulation in the area of postoperative intervention.

Mini-invasive prosthetic repair is designed for use in the category of inpatient replacement interventions. The tasks set included reducing the invasiveness of the intervention, intraoperative prevention of wound complications, and increasing the reliability of fixation of the endoprosthesis. These tasks are implemented by the following provisions.

- Applied small access 3-4 cm long. In abdominal surgery, operations performed from an incision no larger than 5 cm are considered open mini-invasive interventions. One of the most traumatic stages of the operation to mobilize and remove the hernial sac is completely excluded, which is accompanied by surgical actions in scarred tissues, wide detachment of the subcutaneous tissue and the formation of a cavity at the site of the removed hernial sac. The opened hernial sac was used as a wound aperture and an entrance to the abdominal cavity.

- The prerequisites for choosing an intra-abdominal plasty method were the advanced provisions on the anatomical and morphological features of the hernia ring in umbilical hernias. In the hernial orifice, a muscular-aponeurotic contour was identified, the composite structure of which is highly resistant to mechanical stress and has muscular elastic unloading along the line of the fixing sutures of the prosthesis. The combination of these qualities increase the reliability of fixation and reduce the manifestations of postoperative pain syndrome.

- New surgical techniques - "desquamation and peritoneodesis of the hernial sac" - demonstrate exceptionally rare opportunities for using the natural, biologically formed in the body protective and adaptive mechanisms of the operated patient during hernioplasty. In their implementation, the main role belongs to the peritoneum and sequentially performed stages of the operation. The use of through U-shaped sutures along the perimeter of the musculoaponeurotic ring of the hernial orifice excludes edge-to-edge fixation of the prosthesis.

References

1. The method of mini-invasive intraperitoneal umbilical hernia repair with the creation of elastic decompression along the endoprosthesis fixation line corresponds to the modern concept and can be used as a hospital replacement technology.
2. The use of natural protective and adaptive mechanisms formed in the human body during the operation creates conditions for intraoperative prevention of wound complications and has a stimulating effect on the course of reparative processes.

REFERENCES:

1. Baulin V.A. Etiology, prevention, treatment of wound complications after hernioplasty. Almanac of Surgery. A.V. Vishnevsky. Moscow. - 2011. - T5 No. 1 (1). - P. 177-178.
2. Grigoriev S.G. Surgical treatment of abdominal hernias and their complications. (Bratiychuk A.N., Krivoshchekov E.N., Grigorieva T.S.). Samara. - 2007. - 300 p.
3. Grigoriev S.G., Krivoshchekov E.P., Ivanov S.A., Grigorieva T.S. Groin hernias. Monograph. OOO "Kniga"; Samara.- 2013.-160 p.
4. Zhebrovsky V.V. Surgery of abdominal hernias and events. - M.: MIA, 2009, - 440 p.
5. Toskin K.D. The method of muscular-aponeurotic plastics of complex abdominal hernias. // Clinical surgery.- 1993.- No. 2.- P.9-10.
6. Shevchenko K.V. The choice of the method of plastic surgery of the anterior abdominal wall in postoperative ventral hernias. Candidate's abstract. diss. ; Krasnoyarsk.- 2015.-24p.
7. Yurasov A.V., Abovyan L.A. The method of surgical treatment of umbilical hernias, combined with diastasis of the rectus abdominis muscles // "Topical issues of herniology". / Mat. X conference on herniology. Moscow.- 2013.- P.184-185.

PEDAGOGICAL SCIENCES

THE EVOLUTION OF THEORETICAL ISSUES ON MULTILINGUAL EDUCATION

Zhubaigaliyeva Zh.,

*Master student of the University of International Business
TAMOS Education school, 129/4, Abisha Kekilbayeva Street*

Zhacheva Y.

*Senior teacher of the language center of the University of International Business. Specialist
8A Abay avenue, Almaty*

Abstract

Multilingualism is a functional reality in modern society. These realities call into question traditional concepts of language education, in which each language is taught sequentially as the first and subsequent foreign languages. In modern society, there is a need to develop and educate a multilingual personality capable of fully interacting with representatives of many cultures. This article examines the most important works of foreign scientists researching multilingualism and working in the subject of multilingual education. The evolution of theoretical concerns of multilingualism and multilingual education is presented, together with a study of their influence on the field of language education.

Keywords: multilingualism, multilingual education, multilingual competence

The issues of multilingualism were increasingly pertinent in the second half of the twentieth century, contributing to an increase in study in many fields of knowledge. Until that time, many experts held a negative view on multilingualism, and the presence of more than one language in a child's life during his growing up was thought to be hazardous.

Linguist Simon Laurie's 1893 book "Lectures on Language and Linguistic Method in the School" is frequently cited by researchers. It advocated that a child's intellectual and spiritual growth in a bilingual setting does not double, but rather reduces by half [2; 4, pp.91-103; 5, pp.357-369].

Based on research performed among bilingual pupils in Wales, David John Saer, a well-known educator in the United Kingdom, proposed in 1924 that bilingualism is the cause of a fall in the IQ of rural children [3; 7]. F. Goodenough, a psychologist, assisted him. She addressed the view that there is a clear relationship between bilingualism and mental impairment in infants in her book "A novel method to the testing of intellect of young children," published in 1926 [2;3;7]. As a result, children raised in multilingual homes were regarded inferior and to have "language issues." They were referred to as "incompetent users" (incompetent speakers) or "children with language difficulties" [2; 6, p. 17].

Only in 1962, owing to the work of Canadian psychologists E. Pearl and W. Lambert on "The Relation of Bilingualism to Intelligence," did multilingualism undergo a revolution. Scientists have proved cognitive and socio-cultural benefits of having more than one language in a child's childhood based on experimental study. This prompted a rethinking of previously held attitudes, resulting in a considerable rise in proponents of a favorable attitude toward multilingualism [6, pp. 22-25].

The creation of contrastive analysis in the process of acquiring a second language, advocated in the 1960s by R. Lado in the book "Linguistics across Cultures,"

had an essential part in the growth of views toward multilingualism. The use of contrast analysis enabled us to comprehend why some aspects of language acquisition need a large amount of time and effort. The R. There was a notion that the source of all faults in the course of learning a second language is interference with the student's original language. As a result, potential problems might be identified, leading to the development of more effective content-based training courses [6, p. 18].

Despite the fact that more study and practice have proven the falsity of several of the approach's postulates, it has had a considerable positive influence on the process of school language instruction in Europe.

The introduction of the notion of second language acquisition was an important milestone (SLA). Stephen D. Krashen, an American linguist and language learning researcher, described his own concept of the process of teaching a non-native language in his book "Second Language Acquisition and Second Language Learning." Five assumptions comprise the theory's components: "assimilation and learning," "natural order," "internal mechanisms of control," "incoming information," and "emotional filter" [1].

According to this theory, language acquisition happens as a result of receiving information, and subconscious assimilation takes precedence over conscious assimilation. As a result, the training course should be built on incoming information, with pupils focusing on the substance rather than the grammatical structure of the speech. The learning process should take place in a pleasant setting with knowledge that is fascinating and, for the most part, intelligible to pupils. The theories discussed have laid the groundwork for more successful assimilation of a non-native (foreign) language by pupils of various ages. The hunt for techniques to establish bilingualism in the process of school education got even more vigorous in the 1990s.

Among the theoretical studies, M. Swane's "hypothesis of starting information," often known as the "Output hypothesis," released in 1995, stands out. It is

founded on the three major functions of the creation and reflection of students' own statements: comment (noticing), formulation (formulation), and testing (testing), during which students grasp the language samples that they make [5, p.357]. This concept described the mechanism of linguistic skill development throughout the process of learning languages and had an influence on the field of school language instruction. The number of languages studied has substantially risen, although they were studied individually.

F. Grosjean's significant book "Another View on Bilingualism" was published in 1992. Until then, several scholars highlighted the problem of multilingualism by studying the detrimental implications of touching two languages in the mind of a bilingual, emphasizing the importance of excluding the native language from the learning process. Grosjean explained the fallacy of treating bilinguals as "monolinguals with a lack of language knowledge, skills, and abilities" (deficit monolinguals) and proposed a new approach called "Bilingual view of Bilingualism," in which he compared a bilingual's personality to an athlete who is equally successful in two sports [4, p.94]. From that moment on, the role of the native language in the process of learning one or more non-native languages is considered from a positive perspective and it is used as a basis for analogy, and the principle of comparison is considered an effective way to avoid interference.

The importance of V. Cook in the creation of multilingual education theory cannot be overstated. According to the book "Universal Grammar by Noam Chomsky. A Brief Overview", which came out in 1993. V. Cook presented a comprehensive approach to the study of the phenomena of multilingualism, expanding on the concepts of F. Grosjean. He defined multicompetence as a distinct type of linguistic competence of a person who speaks two languages, which does not necessarily correspond to the linguistic competence of two persons who each speak just one language.

The term multicompetence should be understood as one person's knowledge of more than one language (knowledge of more than one language in the same mind) and should be considered as the norm potentially unequal level of competence in reading, writing, producing oral and written statements due to different levels of activation. V. Cook also proposed that the monolingual brain differs markedly from the bilingual or multilingual brain. A multilingual individual, according to the researcher, has a significantly greater degree of cognitive development, a broader worldview, and a deeper communication experience than a monolingual [5, p.362].

Since the early 1990s, a well-known researcher in the field of multilingual education, Professor U. Jessner of the University of Innsbruck, has seen a trend of integration in European education of the key conceptual notions of multilingualism and multicompetence. The following clauses define the primary and most distinguishing characteristics of this trend:

1) attaining competence at the level of a native speaker is no longer the goal of learning second and

subsequent languages; recognition of the value and significance of partial competence in several languages;

2) a native speaker is not always the best language teacher; and

3) the complete removal of the ban on students using their native language in class [6].

W. Jessner argues that until the end of the 1980s, the SLA (Second Language Acquisition) and TLA (Third Language Acquisition) orientations coexisted. However, with the publication in 1987 of X. Ringbom's article "The function of L1 in foreign Language learning," based on research performed in Finland among bilingual students studying English, there was a shift in focus. For the first time, X. Ringbom illustrated the differences and benefits of acquiring a third language. Another notable paper on this issue, "The function of metalinguistic awareness in second and third language learning," was published in 1988. Its originator, J. John Thomas, scientifically shown that bilingual youngsters outperformed their monolingual classmates in cognitive development and the process of acquiring a third (English) language. However, as U. Jessner points out, both writers insisted on distinct language education in order to minimize interference [6, p. 17].

Simultaneously, there is a growing interest in understanding the characteristics of learning a third language, namely the possibilities of lexical transfer (lexical transfer phenomena) from the second to the third. In 1993, W. Schweers publishes "Variation in Cross-Linguistic Influence on the Interlanguage Lexicon," and in 1997, V. Levis publishes "Implementing the Lexicon Approach." At the turn of the century, research on multilingual education focused on learning a third language (TLA) and the establishment of trilingualism. They found that there are considerable variations in the methods of learning a third language (L3) vs learning a second language (L2) (L2).

V. Hufeisen, N. Marx, U. Jessner, J. Cenoz, S. Stratilaki, and other scientists agree. They think that the distinctions between these two processes are due to a variety of reasons, but the following are the most essential in the research of L3:

1) the student has conscious and unconscious experience learning a non-native language;

2) the ability to use the knowledge gained through the already existing foreign language competence in the process of interlanguage, the essence of which is to transfer information from one language to another; and

3) the student's awareness of the existence of his own style of studying language constructions [6, p. 24].

Some scientists, notably M. Sherwood Smith and S. Gass, disagree. They think that the study of any language after the native (L1) occurs in line with the mechanics of learning a non-native language, according to S. Krashen's hypothesis (L2). As a result, no matter how many languages a person learns, they must all be compared to L2.

U. Herdina and Ulrike Jessner created a conceptual model of multilingualism in the form of a system with which they demonstrated and commented on the abilities and qualities of a multilingual personality in

their joint work "A Dynamic Model of Multilingualism: Changing the Psycholinguistic Perspective," published in 2002.

1) elasticity, defined as the ability to adapt to transient environmental changes;

2) plasticity, defined as the ability to create new qualities in response to changing environmental conditions.

The "Dynamic Model of Multilingualism" is the name given to this model. According to the experts, the speaker's communication demands are influenced by psychological and social factors. They are the driving force underlying the process of learning and applying the language. The authors supported the notion of multilingual competency as a cumulative way of evaluating contacting psycholinguistic systems (cumulative measure of psycholinguistic systems in touch) created throughout the learning process of several languages [4, p. 94].

According to U. Jessner, in European language education, the traditional isolated study of one or two non-native (foreign) languages has been replaced by a new cross-linguistic approach, a distinguishing feature of which is the comparative-contrastive study of several languages based on knowledge gained in the native language. This cognitive principle promotes the development of metalinguistic consciousness in pupils and, as a result of interlanguage and intersubject interaction, has a synergistic impact [4, p.96].

Sofia Stratilaki discovered a link between the social standing of the languages being studied and the usage of learning mechanisms in the educational process. This was demonstrated by the example of trilingual French-German schools with English studies in France and Germany. The method is based on the contrastive use of languages, which leads to the formation of metalinguistic consciousness as a process of awareness of the interdependence and equivalence of languages, and meta-cognitive consciousness as a process of control by an individual over his own cognitive processes, such as perception, evaluation, memorization, forgetting, and so on [9]. The primary need for this is that multilingual education will only be effective if the cognitive potential of multilingualism is adequately recognized at the social level [8].

According to I. Senoz and F. Genesi, the term "multilingual education" refers to educational programs in which, in addition to the native language (L1), other languages (L2, L3, Ln) are used as educational tools, which students study as subjects, but the goal of training is to achieve communicative competence in two or more languages. To achieve such a goal, detailed planning and the application of educational methodologies to synchronize both language objectives and subject matter study within the constraints of the school curriculum are required [6, p.33].

Multilingual education is a burgeoning sector with a wide range of offerings. It is based on the premise that personality multilingualism develops as a result of increasing language exposure. A person with knowledge of numerous languages might utilize that knowledge to comprehend an oral or written text in a previously unknown language by identifying words with a similar

sound or spelling in several languages in a "new form" [8]. Numerous European initiatives are researching novel techniques within the scope of multilingual education with the objective of producing individuals' multilingualism (native language Plus two foreign languages). EuroCom (European Comprehension) - European mutual understanding - is one of the key projects.

This initiative aims to provide European individuals with the foundations for mutual understanding by developing the ability to converse in multiple language families (Romance, Germanic, Slavic) [www.Euro-com-frankfurt.de].

Based on the foregoing, we may reach the following conclusions:

1. The evolution of multilingual education is influenced by historical and sociocultural factors. Simultaneously, the primary dynamics of the creation of theoretical underpinnings of multilingual education occurred in the second half of the twentieth century. The 1990s and the first decade of the twenty-first century were exceptionally fruitful, as theoretical research was applied in schools in Germany, Spain, France, and Sweden.

2. The process of building the theoretical underpinnings of multilingual education was built on the traditions of learning foreign languages, although many previously held beliefs were challenged and altered as a result of experimental study.

3. Based on scientific research in many fields of knowledge, the individual's attitude toward multilingualism has evolved from considering the shortcomings and uncompromising statements of deficient states in multilingual people to studying the advantages and recommendations for the most effective formation of multilingualism.

The development of multilingual education's theoretical underpinnings and the findings of experimental research have had a considerable influence on the whole field of language education in European nations, namely:

1) Interlanguage isolation, which has long been a hallmark of the linguistic acquisition process, has been eliminated. It was replaced by a comparative-contrastive study of various languages based on native language knowledge, which allows for the transfer of information and abilities from one language to another.

2) The aim of learning a non-native language has shifted; attaining the level of a native speaker is no longer a goal, as it is sufficient to obtain partial competence depending on needs.

3) The socio-cultural relevance of the language under study is a significant determinant in its success.

REFERENCES:

1. Hakuta, K. (1985). Cognitive Development in Bilingual Instruction
2. Hakuta, K., & Diaz, R. M. (1985). The Relationship between Degree of Bilingualism and Cognitive Ability: A Critical Discussion and Some New Longitudinal Data. In K. E. Nelson (Ed.), *Children's Language* (Vol. 5). Erlbaum.
3. Jessner, U. (2008) Multicompetence Approaches to Language Proficiency Development in

Multilingual Education. In J. Cummings and N.H. Hornberger (eds) Encyclopedia of Language and Education 2nd Edition, Volume 5: Bilingual Education, © Springer Science +Business Media LLC, - P. 91-103.

4. Jessner, U. (2008) Language Awareness in Multilinguals: Theoretical Trends In J. Cenoz and N.Hornberger (eds). Encyclopedia of Language and Education, 2nd Edition. - Volume 6: Knowledge about Language, © Springer Science +Business Media LLC - P. 357- 369.

5. Jessner, U. (2008) Teaching Third Languages: Findings, Trends and Challenges / Language Teaching. - 41: 1, P.15-56.

6. Krashen, S. D. (1982) Principles and Practice in Second Language Acquisition / First Printed Edition by Pergamon Press 1982. - Copyright © 1982. - First Internet Edition 2009

7. Pavlenko, A. (2011) Thinking and Speaking in Two Languages /Aneta Pavlenko. Multilingual Matters Copyright ©2011, 257p.

8. Plurilingual Education in Europe. 50 Years of International Cooperation [Council of Europe. - Language Policy Division. - February, 2006.- 17 p.

9. Stratilaki, S. (2006) Representations of Plurilingual Competence and Language Use in Dynamic Trilingual Education: The Case of French-German Schools in Buc and Saarbrücken

PEDAGOGICAL EXPERIMENTS CONDUCTED IN THE FRAMEWORK OF RESEARCH AIMED AT DEVELOPING STUDENTS' PROFESSIONAL COMPETENCIES ON THE BASIS OF AN INTEGRATIVE APPROACH, THEIR RESULTS AND STATISTICAL ANALYSIS

Ismoilov E.

master, Tashkent State Pedagogical University named after Nizami

Lecturer at the Department of General Mathematics, Faculty of Physics and Mathematics

Abstract

The article describes the pedagogical experiments conducted in the framework of research aimed at developing students' professional competencies on the basis of an integrative approach, their results and statistical analysis. Based on the statistical analysis of the results of pedagogical experiments, teachers were recommended to teach mathematics and specialty subjects on the basis of an integrative approach in the formation of professional competencies in students.

Keywords: competence, professional competence, integration, integrative approach, pedagogical experiment, McNamara criterion.

Competence in terms of the requirements for the level of professional training of graduates of higher education institutions means the ability of the future specialist to apply a set of knowledge, skills and abilities, methods of activity in certain situations. Competence in terms of pedagogical activity is the ability to establish a link between knowledge and situation, or in a broad sense, to show the process (action and knowledge) needed to solve a problem. Integration is the process by

which the different parts of a system, the whole organism, are interconnected and cause the same thing. Integrated science teaching allows for the simultaneous and interdependent study of related topics [1; p.35-36]. Integration in the educational process is a specific and interdisciplinary approach, and its implementation in the classroom is an integrative approach. An integrative approach is used to integrate content that is relevant, relevant, logically interdependent, and deepens and expands.

Model of development of professional competence of students on the basis of integration of mathematics with general and specialized disciplines in higher education institutions

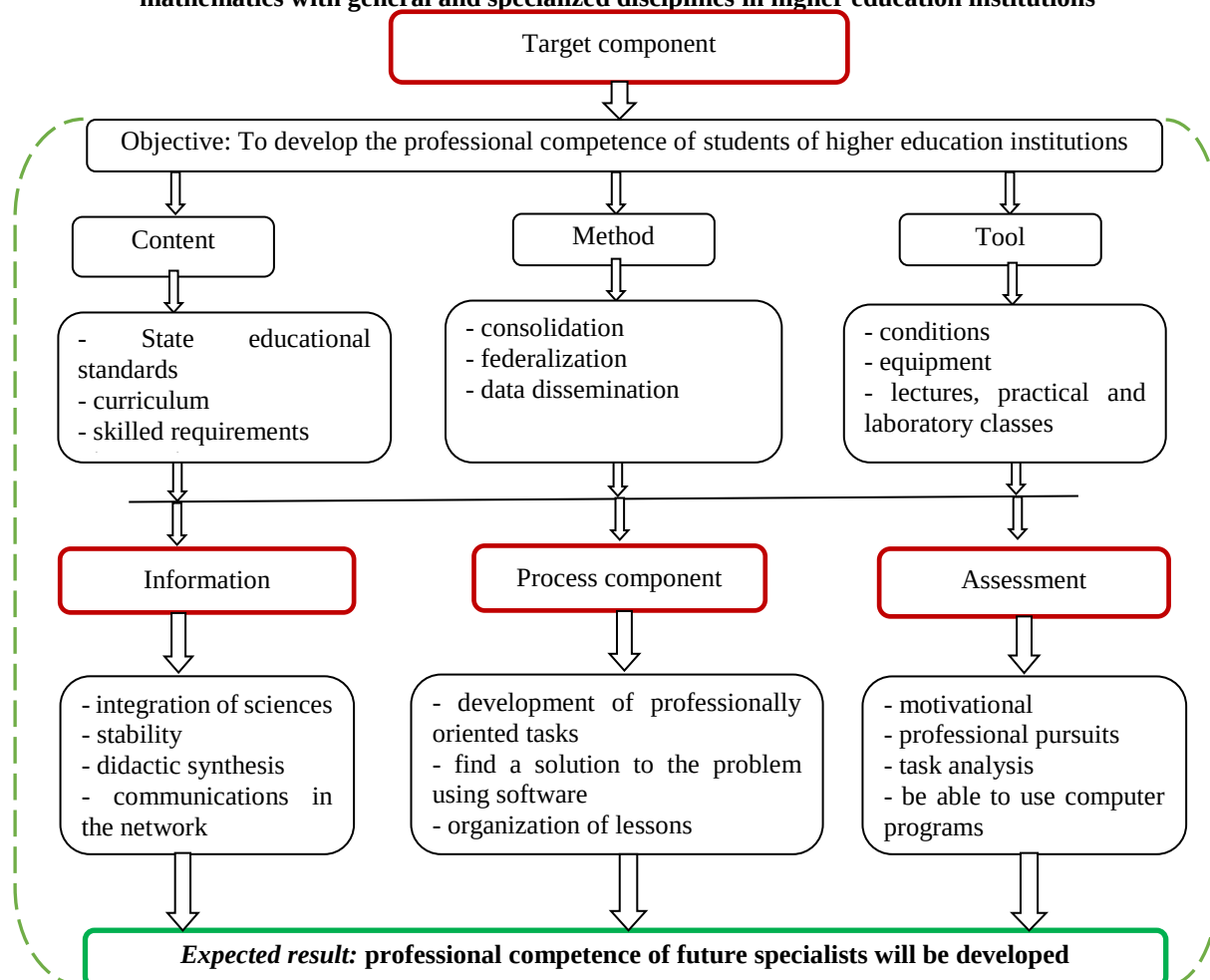


Figure 1. Structural-functional model of developing students' professional competence.

In the implementation of the integration of mathematics and specialty sciences, pedagogical experiments were conducted to quantitatively and qualitatively assess the methodology we have developed. The purpose of pedagogical experiments is to improve the theoretical methodology of developing students' professional competencies on the basis of career-oriented tasks. Pedagogical experiments were carried out in three stages in 2018-2021 at Samarkand State University, Bukhara State University and Tashkent State Pedagogical University. The first phase of pedagogical experiments was an important experiment in 2018-2019. Its main responsibilities are:

1. Identify non-traditional methods of teaching mathematics to students and their shortcomings, create a level of mathematical training for junior students.
2. Defining the integration of mathematics with the specialty sciences as a teaching subject.
3. Selection of research methods.

In order to find possible ways and means to increase the effectiveness of the process of teaching mathematics, the structure and content of curricula in physics, physics and astronomy teaching methods were studied, and the State Education Standards for these areas were analyzed. Interviews and tests of students and students of 1-2 levels participating in preparatory courses for admission to universities in the defining

stage of pedagogical experiments, observation and analysis of lessons in higher mathematics, interviews with students, written work, analysis of their results, research methods such as interviews with higher mathematics and specialty science teachers. During the pedagogical experiment, we conducted a survey of students of Samarkand State University, Bukhara State University and Tashkent State Pedagogical University, and the survey questions included:

1. What made you choose a specialty?
2. How do you assess the reputation of your future profession?
3. What do you know about your future career?
4. Is there a future for your profession? (Reserves for growth)
5. What do you mean by "professional activity"?
6. Why did you choose this university?
7. What is the purpose of being highly educated?
8. How interesting are math materials to you?
9. Do you need math in your chosen career (job) in life?
10. Can math knowledge help you gain a professional qualification? (Please explain)

The survey involved 237 first-year students of selected higher education institutions in 2018-2019. 22% of respondents who answered the first question noted that family traditions influenced career choice. At

the same time, it has become clear that students are increasingly listening to their parents' advice when choosing a university. When asked how they assess the reputation of their future profession, the majority of respondents, or 53%, answered "good". Therefore, it can be said that the profession of teacher of physics, physics and astronomy has a high status among young people. When asked what they know about their future careers, 51% of learners said they had no idea about their future careers. 10% of the participants answered "yes or no". When asked if their profession is promising, 57% of those surveyed said that their chosen profession is promising and that the society needs qualified personnel in this specialty. This is not surprising, as the field of teaching physics, physics and astronomy is a more stable and promising direction. 43% of those surveyed believe their chosen profession has no future. When asked what they mean by professional activity, 49% of respondents said that they understand the idea of sharing new ideas in the first place, 28% of respondents gaining leadership in the second place, and 23% of respondents mastering professional skills in the last place. When asked what the goal of higher education is, 34% of respondents said that financial security, 26% want to achieve the desired social status, 17% want to learn, be an educated, qualified professional, 23% are interested in (social development standards, family traditions, etc.) gave. The first place corresponds to the first two positions. When asked how interesting math materials are for you, 54 percent of respondents said they were interested, 27 percent said yes, no, 16 percent said they weren't interested, and 3 percent said they didn't know. According to the survey, 37% of students consider their knowledge of mathematics to be necessary in their future careers, 24% accept mathematics knowledge only as an element of general education, and 39% believe that knowledge of mathematics is not required at all. According to these data, the official presentation of a higher mathematics course leads to a decrease in the level of motivation to study this subject and has a negative impact on the quality of knowledge. For students, the acquisition of knowledge that is not immediate or related to a prospective activity does not meet the requirement. 67% of third-year students who had the opportunity to get acquainted with the application of mathematics in the teaching of special sciences in the teaching process answered in the affirmative to the question about the role of mathematics in the teaching of special sciences. Nevertheless, 58% of the students had difficulty learning of the specialty subjects using their knowledge of the mathematics course. At the same time, 83% of

the surveyed junior and senior level students stressed the need to focus higher mathematics courses on future specialization. In the second research phase of the pedagogical experimental work, the formation of hypotheses and research tasks, the general classification of the theoretical model and the search for ways to solve research problems were carried out. The object, subject, purpose, specific tasks and hypotheses of the research were improved and defined, teaching materials were developed for lectures and practical exercises. At this stage, the following tasks were solved:

1. The study of higher mathematics concepts, which is the most appropriate form of competence based on the integration of mathematics and specialty sciences.
2. Selection and formulation of tasks for practical content.
3. Forming a set of practical problems.
4. Preparation of methodical developments.

Students learned that the concepts they are learning are of great practical importance, and that the concepts of function and its derivatives, integrals, and the like are related to the problems of the specialty sciences in the classroom [2; p.111-112]. They were invited to find solutions to problems and use information technology in the study of mathematics. At this stage of the experiment, career-oriented tasks were developed by understanding the solution of practical problems in the field of specialty sciences. In the process of teaching mathematics, the professional competencies of students were developed through career-oriented tasks. The experiment was conducted under natural conditions, in natural time measurements during the learning process. At the third stage of training, the development of professional competencies in students was carried out, the effectiveness of the developed methodology was confirmed. The purpose of the pedagogical experiment is to test the methodology of developing professional competencies based on the integration of mathematics and specialty sciences in the learning process, to test its effectiveness in solving problems and improving professional competencies [3; p.39-40]. The effectiveness of the method was tested on parameters such as improving the quality of mathematical data and the level of the learning process, encouraging learners to learn mathematics. We used the formed control tasks to determine the results. 293 students of Samarkand State University, Bukhara State University and Tashkent State Pedagogical University (12 groups in total: 6 experiments and 6 control groups) took part in pedagogical experiments (see Table 1):

Table 1.

Number of students in the experimental and control groups of higher education institutions where pedagogical experiments were conducted

№	Educational establishments	Number of students in the experimental group	Number of students in the control group	Total number of students
1.	Samarkand State University	48	45	93
2.	Bukhara State University	50	51	101
3.	Tashkent State Pedagogical University	48	51	99
	General	146	147	293

The results of tests, examinations and written tests were used to assess the quality of mathematical data. The training in the pedagogical experimental groups was conducted in accordance with the experimental technique, the basic rules of which are reflected in the research. The objectivity of the results of pedagogical experiments mainly depends on the correct selection of experimental and control groups. When they were selected under experimental conditions, the initial

preparation in all groups and other features that affected the observed parameters were approximately equal. In the pedagogical experiment, at the beginning of the 1st semester from the control and experimental groups were conducted preliminary tests to test the level of knowledge and mastery of students. The test results were evaluated on a five-point scale. Their results are presented in the following table by educational institutions (see Table 2):

Table 2.

Test results

Test Results							
№	Educational establishments	Groups	Number of students	Levels of assessment			
				«2»	«3»	«4»	«5»
1.	Samarkand State University	Experimental group	48	12	25	10	1
		Control group	45	12	23	8	2
2.	Bukhara State University	Experimental group	50	14	24	10	2
		Control group	51	13	25	11	2
3.	Tashkent State Pedagogical University	Experimental group	48	13	23	10	2
		Control group	51	14	24	11	2
General		Experimental group	146	39	72	30	5
		Control group	147	39	72	30	6

The method developed by P.I.Tretyakov was used to determine the level of learning in the educational process. Taking into account all the indicators listed above, the level of knowledge of students is reflected as follows (see Table 3):

Table 3.

Students' levels of knowledge

№	Knowledge level	Description of education level
1.	Lower	the student learns the information after a long training and then does not know it completely, it is difficult to highlight the necessary information, after the general exercise with the whole group, the task is performed mainly on samples. It takes a long time to understand the information
2.	Medium	students learn new information after a certain training, distribute it immediately as needed, and see it in a private setting after the necessary exercises. It takes more time to master knowledge and work methods, to transfer them to new situations, to reach a higher level of knowledge
3.	High	the student learns the material freely, has mental operations, knows how to distinguish the main thing, in general, can independently develop the positions described in the lesson, easily transfers knowledge to new situations, achieves high levels of knowledge and methods of acquiring them in a short time has

According to this technique, the following generalized scheme was used to diagnose the level of education:

1. The teacher selects a small amount of basic material.
2. Before teaching new material, the teacher repeats the previous material, which is necessary for the acquisition of new information, and then explains the new material.

3. Shows an example of applying new material in a similar and modified situation.

4. Conducts independent work among students, which includes the following tasks:

- a) write down what you just learned;
- b) answering questions on the content of the new material;
- c) perform the task according to the sample;
- d) performance of a task in a changed situation;
- e) apply the knowledge gained in a new situation.

The generalized tasks outlined above should be used by us in the preparation of independent work on any topic and topic [4; p.250-252]. During the pedagogical experiments, independent work was carried out for control and experimental groups on various topics (see Table 4):

Table 4.

Results of independent work carried out during pedagogical experiments

№	Educational establishments	Groups	Number of students	Levels of assessment		
				«3»	«4»	«5»
1.	Samarkand State University	Experimental group	48	5	30	13
		Control group	45	19	19	7
2.	Bukhara State University	Experimental group	50	9	26	15
		Control group	51	22	21	8
3.	Tashkent State Pedagogical University	Experimental group	48	9	24	15
		Control group	51	23	19	9
General		Experimental group	146	23	80	43
		Control group	147	64	59	24

To determine and assess the level of mathematical knowledge of students, the method defined by V.P.Simonov was used. In the pedagogical experiment, a ten-point measurement structure was used to assess students' knowledge (see Table 5):

Table 5.

Existing and changing relationships in the ten-point measurement structure

Recommended measurement	Modified measurement	Available measurements
1 point - very weak	Professional competence minus	3 points
2 points - weak	Three minus	
3 points - unsatisfactory	Three	
4 points - satisfactory	Three plus	
5 points - not good enough	Four minus	4 points
6 points - good	Four	
7 points - very good	Four pluses	
8 points - excellent	Five minus	5 points
9 points - great	Five	
10 points - perfect	Five plus	

The existing and changing relationships of the ten-point scale formally allow the teacher to make a final assessment in accordance with the State Education Standards on a five-point scale and in fact on a three-point scale. Based on this assessment criterion, the composition of the assessment of students' levels of education was determined (see Table 6):

Table 6.

The structure of the assessment of the level of education

10-point scale	The main indicators of the level of education of students	Acquired knowledge	
		In percent	Degree
1 point, very weak	He attends classes under the dictatorship of teachers and students, tries to enter the algorithm to implement the practical part of the material	Up to 1%	Separation, recognition (level of acquaintance)
2 points, weak	With the help of a teacher or students, he or she remembers and repeats some of the basic concepts and concepts of the theory, distinguishing the object from similar things only when presented in a finished form. By applying this theory, one cannot perform any practical tasks independently	2% to 4%	
3 points, unsatisfactory	He remembers most of the theoretical material, but cannot explain anything, he is confused in the answers. In practice, it cannot solve the problem. Spontaneity reigns in the decision	5% to 9%	Forgetting (reprocessing)
4 points, satisfactory	He remembers all the theoretical material, unable to do practical work on the subject. Practical exercises with the help of teachers and students allow for many calculation errors	10% to 16%	
5 points, not good enough	He can explain some theoretical concepts, sometimes thinking operations, only the algorithm solves known operations. Allows for calculation errors	17% to 25%	Comprehension (conscious repetition)

6 points, good	Demonstrates the ability to answer a wide range of questions, understand theoretical knowledge, and draw independent conclusions. Without hesitation solves problems with a certain algorithm	26% to 36%	
7 points, very good	Unequivocally and logically presents theoretical material without external assistance, is able to generalize and draw conclusions. Applies theory to practice. Uses the actions taken in the decision	37% to 49%	Basic skills (reproductive level)
8 points, excellent	A complete understanding of the essence of the theory, its application in practice, in particular, demonstrates thinking. In the time allotted for this, he performs practical tasks, sometimes correcting mistakes himself	50% to 64%	
9 points, great	Easily performs practical tasks, independently develops new skills. Uses theory freely. Solves non-standard tasks. Prevents calculation errors	65% to 81%	Transfer (creative degree)
10 points, perfect	Applies scientific, creative, non-standard knowledge in practice. He is able to study independently, work with additional literature, textbooks, computers	82% to 100%	

Comparing the experimental and control groups of students, the following results were obtained (see Table 7):

Table 7.

Results of a comparison of students' experimental and control groups

Educational levels	Distribution of appropriate points	For all universities	
		Experimental group	Control group
Separation, recognition (level of acquaintance)	1 point	3	7
Forgetting (reprocessing)	2 points	3	9
Comprehension (conscious repetition)	3 points	41	70
Basic skills (reproductive level)	4 points	72	49
Transfer (creative degree)	5 points	27	12
General		146	147

Two control studies were conducted at the end of the first semester and in the middle of the second semester to determine the level of mathematical knowledge of students in the experimental and control groups (see Table 8):

Table 8.

Levels of students' mastery of mathematical knowledge

Evaluation indicators	Experimental group		Control group	
	first control	second control	first control	second control
2 points	10	3	13	11
3 points	72	30	70	70
4 points	51	81	50	52
5 points	13	32	14	14

At the end of the experiment, the final control work was carried out (see Table 9):

Table 9.

Results of final control work

Results of final control work				Evaluation levels			
№	Educational establishments	Groups	Number of students	«2»	«3»	«4»	«5»
1.	Samarkand State University	Experimental group	48	1	9	29	9
		Control group	45	4	21	17	3
2.	Bukhara State University	Experimental group	50	1	11	28	10
		Control group	51	4	26	18	3
3.	Tashkent State Pedagogical University	Experimental group	48	1	11	28	8
		Control group	51	4	26	18	3
General		Experimental group	146	3	31	85	27
		Control group	147	12	73	53	9

The nature of the effect of the developed methodology on the study of mathematics, which increases the activity and independence of students,

was studied using the McNamar criterion. To apply the criterion, 75 students were randomly selected from 146 students in the experimental group. The results of the

answer to the question twice (before applying the test method and at the end of the experiment) were evaluated according to the names that had 2 categories. It was necessary to ensure that the members of the experimental group did not interfere with each other in the process of answering the questions, and that the samples were self-contained in the first and second surveys (same students answered twice).

During the experiment, while answering the question of whether mathematical knowledge can help to acquire professional skills, students were introduced to the motivations manifested in acknowledging the need to learn more about mathematics and use mathematics for professional activities. Student responses were rated in two categories - "0" (no) or "1" (yes). Before the start of the pedagogical experiment,

30 people (40% of respondents) answered the proposed question in the affirmative, and at the end of the experiment, 58 people (77.3% of respondents) answered in the affirmative.

The initial responses of the students in this survey were defined as the x (first query) values of the variables $x_1, x_2, x_3, \dots, x_{22}$, and the results of the experiment were marked as the y (second query) values of the variables $y_1, y_2, y_3, \dots, y_{22}$. If we define the answers of each student to the question as pairs, respectively, then the answers of one student can be of the following four types: (0;0), (0;1), (1;0) and (1;1). The number of these pairs is denoted by (0; 0) -a, (0; 1) -b, (1; 0) -c, (1; 1) -d (see Table 10):

Table 10.

The results of the experiment conducted twice

(x_i, y_i)	"0" (no)	"1" (yes)
"0" (no)	$a = 17$	$b = 28$
"1" (yes)	$c = 0$	$d = 30$

$H_0: P(x_i = 0; y_i = 1) = P(x_i = 1; y_i = 0)$ is obtained for any value as the hypothesis of zero. The laws of X and Y distribution are the same and the teaching methodology used does not affect students' interest in learning mathematics.

If $b > c$, the alternative hypothesis has a value, for any value of which is $H_1: P(x_i = 0; y_i = 1) \neq P(x_i = 1; y_i = 0)$. The X and Y distribution laws are different, differing essentially the same before and after applying the new teaching method. Since $N = b + c = 28$ the criterion statistic will be $T2 = \min(28, 0) = 0$.

If the hypothesis H_0 is true, the statistics of the criterion $T2$ are distributed by $p = 0.5$. Therefore, the probability of the appearance of the value of $P - T2 < T2$ for $b = 28$ in the table is 0. $P(T2 < 0) = 0.001$. The probability obtained was $0.001 < 0.025 = \frac{0.05}{2}$ so at the level of meaning $\alpha = 0.05$ the hypothesis H_0 was rejected and the alternative hypothesis H_1 was accepted.

That is, students' interest in learning mathematics is significantly different before and after the proposed methodology, and the dynamics of the changing motivational attitudes are positive. Given the positive dynamics of this motivational attitude, we present a statistical analysis of the results obtained in pedagogical experiments using the χ^2 criterion. In order to calculate the results of pedagogical experiments and compare the mastery of the experimental and control groups, we determine the average value of the mastering score in groups with $X = \frac{\sum_{i=1}^k x_i m_i}{N}$.

In this case, x_i is an indicator of mastery achieved as a result of pedagogical experience, which can take values such as 2,3,4,5; m_i is the number of repetitions of the grades obtained in the process of mastering; N the number of students participating in the pedagogical experiment. The efficiency coefficient $\eta = \frac{x_E}{x_C^*}$ is determined based on the ratio of the arithmetic mean

values of the assessments of the experimental and control groups that assess the effectiveness of the training.

Where X_E^* is the experimental group and X_C^* is the arithmetic mean of the control group mastery values. The obtained results were analyzed on the basis of K .

Pearson's χ^2 (xi square) criterion and appropriate conclusions were drawn. In applying this criterion, there is no significant difference between the two sampling taken as the H_0 hypothesis, i.e., the learning process in the control groups does not affect the learning process in the experimental groups.

There is a significant difference between the samplings obtained as an alternative hypothesis H_1 , i.e. there is a significant difference in the teaching process in the experimental groups from the teaching process in the control groups. According to the H_0 hypothesis, the expected probability in the control and experimental groups is equal ($p_{11} = p_{21}, p_{12} = p_{22}, \dots, p_{1c} = p_{2c}$), and according to the H_1 hypothesis, the expected probability in the control and experimental groups is not equal ($p_{11} \neq p_{21}, p_{12} \neq p_{22}, \dots, p_{1c} \neq p_{2c}$).

Here we find the observed value of the Pearson criterion: $\chi_{obs.}^2 = \sum (n_i - n_i')^2 / n_i'$. Where $\chi_{obs.}^2$ is a static value. n_i and n_i' are the number of students in the control and experimental groups who participated in pedagogical experiments on the types of assessment, the value of $\chi_{obs.}^2$ is compared with the value of $\chi_{crit.}^2$. If $\chi_{obs.}^2 > \chi_{crit.}^2$, the H_0 hypothesis is rejected and the H_1 hypothesis is accepted.

Here $\chi_{crit.}^2$ is determined on the basis of the probability of normalized confidence p . The degree of freedom is found by the formula $K = C - 1$. C indicates the types of assessments. The results of the χ^2 criterion are equal to $C = 4$, as they were conducted on the basis of 4 types of assessments in the selected control and experimental group students. In this case, if we assume that $p = 0.05$, then $K = C - 1 = 4 - 1 =$

3, and $\chi^2_{crit.}$ obtained from the table χ^2 is equal to 7.815.

Table 2 shows the test results obtained from students at the beginning of the experiment. Based on the data in this table, we examine whether there are differences between the experimental and control groups and whether there is a difference in the knowledge levels of the selected groups. To do this, we calculate the values corresponding to the results obtained by the groups selected at Samarkand State University.

1. In order to compare the mastery of the experimental and control groups, we find the average value of the mastering score in the groups:

For the experimental group:

$$X_E^* = \frac{\sum_{i=1}^k x_i m_i}{N} = \frac{12 \cdot 2 + 25 \cdot 3 + 10 \cdot 4 + 1 \cdot 5}{48} = \frac{144}{48} = 3.00.$$

For the control group:

$$X_C^* = \frac{\sum_{i=1}^k x_i m_i}{N} = \frac{12 \cdot 2 + 23 \cdot 3 + 8 \cdot 4 + 2 \cdot 5}{45} = \frac{135}{45} = 3.00.$$

2. Based on the ratio of the arithmetic mean values of the experimental and control group assessments, the coefficient of effectiveness that assessed the increase in teaching effectiveness was determined:

$$\eta = \frac{X_E^*}{X_C^*} = \frac{3.00}{3.00} = 1.00.$$

3. To test the hypotheses, we find the observational value of the Pearson criterion (see Table 11):

Table 11.

Pearson criterion					
I	n_i - control group	n_i' - experimental group	$n_i - n_i'$	$(n_i - n_i')^2$	$(n_i - n_i')^2/n_i'$
2	12	12	0	0	0.00
3	23	25	-2	4	0.16
4	8	10	-2	4	0.40
5	2	1	1	1	1.00
Σ	45	48			1.56

From this table we find the observed value of the Pearson criterion $\chi^2_{obs.} = 1.56$ and $\chi^2_{crit.} = 7.815$. Since $\chi^2_{obs.} < \chi^2_{crit.}$, there is no reason to reject the H_0 hypothesis. Therefore, there is no significant difference between the two sampling obtained as the H_0 hypothesis, i.e., the results obtained in the control

groups do not differ from those obtained in the experimental groups, and based on the results, it can be concluded that the students' knowledge levels are the same. Now we present the statistical calculation based on the results obtained in all educational institutions in the following table (see Table 12):

Table 12.

Statistical calculation based on the results obtained in all educational institutions							
№	Educational institutions	Groups	Average value	Efficiency	$\chi^2_{crit.}$	$\chi^2_{obs.}$	Summary
1.	Samarkand State University	Experimental group	3.00	1.00	7.81	1.56	H_0
		Control group	3.00				
2.	Bukhara State University	Experimental group	3.00	0.99	7.81	0.21	H_0
		Control group	3.04				
3.	Tashkent State Pedagogical University	Experimental group	3.02	1.00	7.81	0.22	H_0
		Control group	3.02				
	General	Experimental group	3.01	1.00	7.81	0.20	H_0
		Control group	3.02				

According to the result of the statistical values in the table and the conclusion of the criterion $\chi^2_{obs.} = 0.20$ and $\chi^2_{crit.} = 7.81$. Therefore, the fact that $\chi^2_{obs.} < \chi^2_{crit.}$ leads to the conclusion that students in both groups have the same level of knowledge, the method is not effective, and the hypothesis H_0 is accepted. During the pedagogical experiment, independent work was carried out for control and experimental groups on various topics (see Table 4). In Table 13, we present the calculations on the results of independent work performed during the pedagogical experiment on the

Pearson criterion. In the evaluation of independent work, there are 3 types of assessment, that is, the results of the criterion χ^2 are made on the basis of 3 types of assessment in students of the selected control and experimental group, so $C = 3$. In this case, if we assume that $p = 0.05$, then $K = C - 1 = 3 - 1 = 2$, and $\chi^2_{crit.}$ obtained on the basis of the table χ^2 is equal to 5.99. The calculations on the results of independent work performed during the pedagogical experiment are given in the following table (see Table 13):

Table 13.

The effectiveness of independent learning conducted during a pedagogical experiment							
№	Educational institutions	Groups	Average value	Efficiency	$\chi^2_{crit.}$	$\chi^2_{obs.}$	Summary
1.	Samarkand State University	Experimental group	4.17	1.12	5.99	46.00	H_1
		Control group	3.73				
2.	Bukhara State University	Experimental group	4.12	1.11	5.99	23.01	H_1
		Control group	3.73				
3.	Tashkent State Pedagogical University	Experimental group	4.13	1.11	5.99	25.22	H_1
		Control group	3.73				
	General	Experimental group	4.14	1.11	5.99	89.99	H_1
		Control group	3.73				

Hence, according to the statistical calculation of the results obtained from the organization and conduct of independent work in groups participating in the pedagogical experiment, $\chi^2_{obs.} = 89.99$ and $\chi^2_{crit.} = 5.99$. Since $\chi^2_{obs.} > \chi^2_{crit.}$, it is efficient to organize and

conduct independent work in experimental groups, which leads to the rejection of the H_0 hypothesis and the acceptance of the H_1 hypothesis. The diagram of the average values in the experimental and control groups on these calculations takes the following view (see Figure 2):

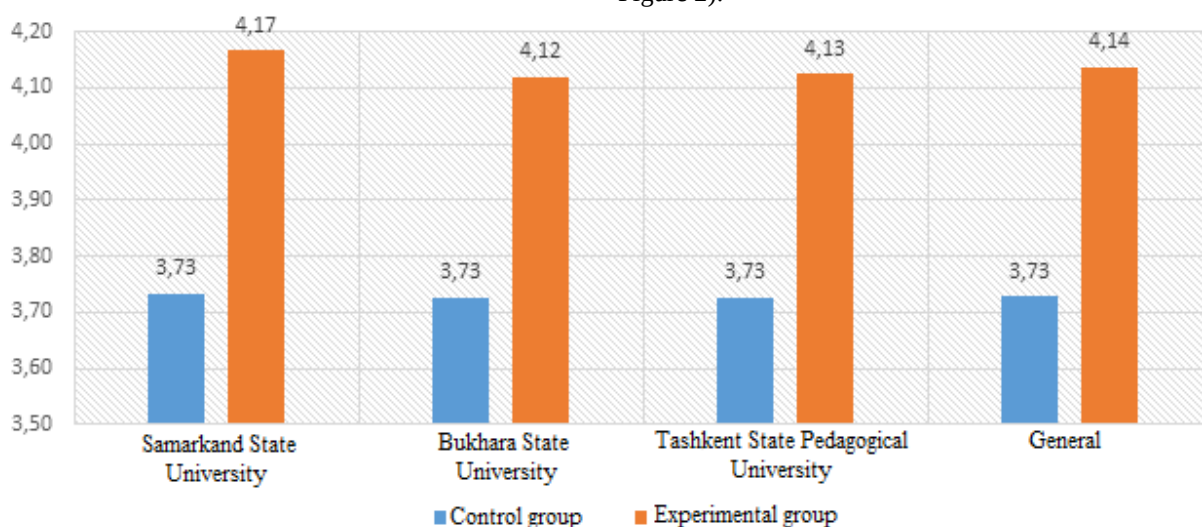


Figure 2.

Diagram of average values of experimental and control groups on the organization of independent work.

Based on the data in Table 8 we consider a statistical analysis of the results obtained from the main indicators of the level of education of students (see Table 8). Since there are five types of assessments in this table (there is also a 1-point indicator), the χ^2 criterion was conducted on the basis of 5 types of assessments in the selected control and experimental

group students, i.e., $C = 5$. In this case, if we take $p = 0.05$, $K = C - 1 = 5 - 1 = 4$, and $\chi^2_{crit.}$ obtained on the basis of the table χ^2 is equal to 9.49. The following table shows the calculations made during the pedagogical experiment to determine the main indicators of the level of education of students (see Table 14):

Table 14.

Basic indicators of students' education levels							
№	Educational institutions	Groups	Average value	Efficiency	$\chi^2_{crit.}$	$\chi^2_{obs.}$	Summary
1.	Samarkand State University	Experimental group	3.77	1.13	9.49	12.49	H_1
		Control group	3.33				
2.	Bukhara State University	Experimental group	3.86	1.14	9.49	25.43	H_1
		Control group	3.37				
3.	Tashkent State Pedagogical University	Experimental group	3.77	1.14	9.49	21.07	H_1
		Control group	3.31				
	General	Experimental group	3.80	1.14	9.49	53.53	H_1
		Control group	3.34				

Hence, according to the statistical calculation of determining the main indicators on the level of education in the groups participating in the pedagogical experiment, $\chi^2_{obs.} = 53.53$ and $\chi^2_{crit.} = 9.49$. Since

$\chi^2_{obs.} > \chi^2_{crit.}$, the results obtained are effective in determining key indicators of education levels in the experimental groups, which leads to the rejection of the H_0 hypothesis and the acceptance of the H_1 hypothesis.

The number of grades given to these students by level of education takes the form of the following diagram (see Figure 3):

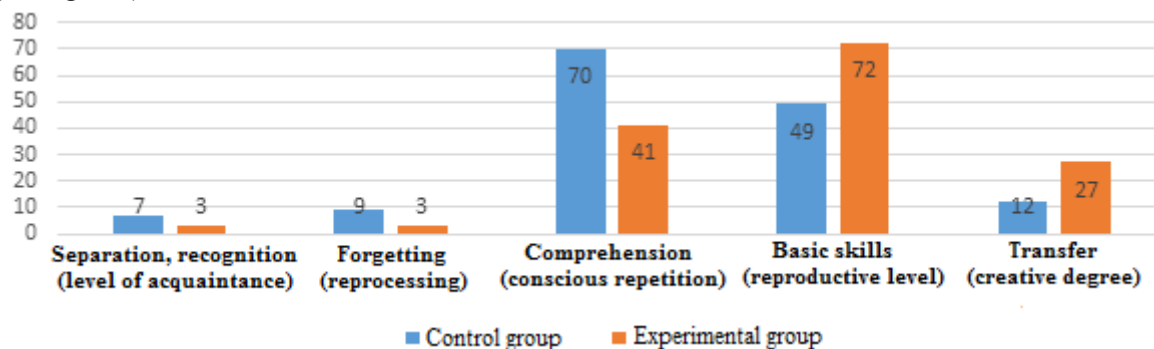


Figure 3. Number of assessments by education level.

It can be seen from this diagram that the fourth and fifth level knowledge indicators of the experimental groups are higher than those of the control groups, which indicates that the quality of knowledge acquisition of the experimental groups is high. This means that the statistical observation value is greater than the critical value. In turn, this proves that the

effectiveness of teaching in experimental groups is high.

Table 8 shows the results of the control work conducted to determine the level of mathematical knowledge of students in the experimental and control groups. Its statistical analysis is presented in the following table (see Table 15):

Table 15.

The level of mastery of mathematical knowledge by students of experimental and control groups

№	Educational institutions	Groups	Average value		Efficiency		$\chi^2_{crit.}$	$\chi^2_{obs.}$		Summary	
			Control 1	Control 2	Control 1	Control 2		Control 1	Control 2	Control 1	Control 2
1.	Samarkand State University	Experimental group	3.50	4.04	1.01	1.14	7.81	0.74	29.79	H_0	H_1
		Control group	3.47	3.53							
2.	Bukhara State University	Experimental group	3.42	3.92	1.01	1.15	7.81	0.25	32.64	H_0	H_1
		Control group	3.39	3.41							
3.	Tashkent State Pedagogical University	Experimental group	3.46	3.96	1.00	1.14	7.81	0.25	34.10	H_0	H_1
		Control group	3.47	3.47							
	General	Experimental group	3.46	3.97	1.00	1.15	7.81	1.05	95.17	H_0	H_1
		Control group	3.44	3.47							

Hence, according to the statistical calculation of the indicators of control type 1 according to the obtained results, since $\chi^2_{obs.} = 1.05$ and $\chi^2_{crit.} = 7.81$, $\chi^2_{obs.} < \chi^2_{crit.}$, knowledge indicators in the experimental and control groups are almost indistinguishable. There is therefore no basis for rejecting the H_0 hypothesis. According to the statistical calculation of the indicators

of the control type 2, since $\chi^2_{obs.} = 95.17$ and $\chi^2_{crit.} = 7.81$, $\chi^2_{obs.} > \chi^2_{crit.}$, in the experimental and control groups there is a difference in cognitive indicators, which leads to the rejection of the H_0 hypothesis and leads to the acceptance of the H_1 hypothesis. It shows that its efficiency is on average 15% higher (see Figure 4):

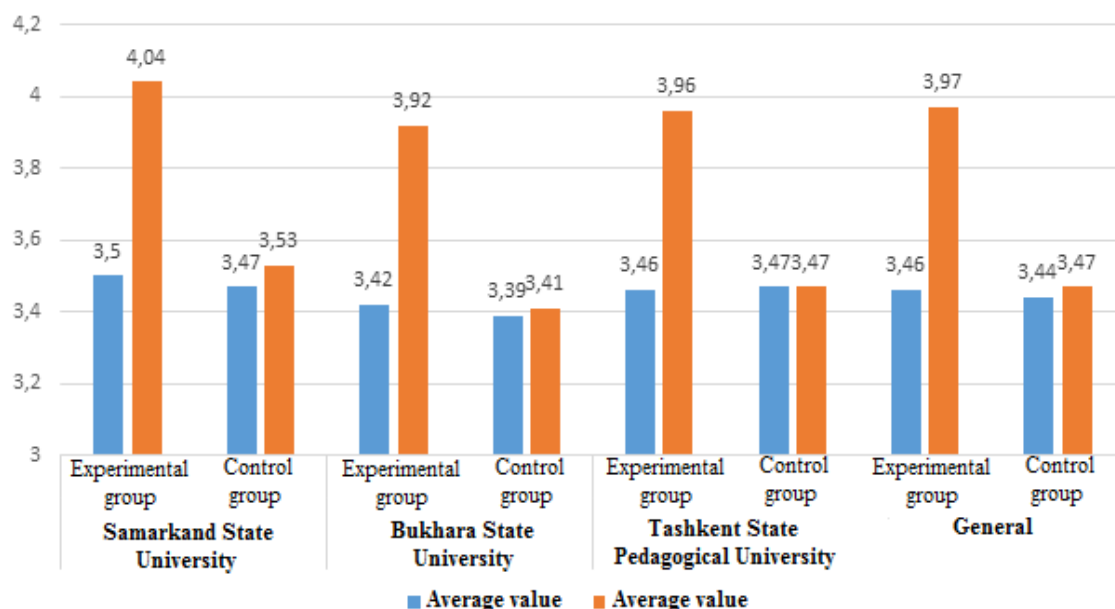


Figure 4. Analysis of the results obtained on control work.

At the end of the experiment, we look at the calculations based on the results of the final control work presented in Table 9 (see Table 16):

Table 16.

Calculations on the results of the final control work

№	Educational institutions	Groups	Average value	Efficiency	$\chi^2_{crit.}$	$\chi^2_{obs.}$	Summary
1.	Samarkand State University	Experimental group	3.96	1.16	7.81	33.97	H_1
		Control group	3.42				
2.	Bukhara State University	Experimental group	3.94	1.16	7.81	37.93	H_1
		Control group	3.39				
3.	Tashkent State Pedagogical University	Experimental group	3.90	1.15	7.81	36.15	H_1
		Control group	3.39				
	General	Experimental group	3.93	1.16	7.81	107.95	H_1
		Control group	3.40				

Therefore, according to the results obtained, since $\chi^2_{obs.} = 107.95$ and $\chi^2_{crit.} = 7.81$, $\chi^2_{obs.} > \chi^2_{crit.}$, the difference in knowledge in the experimental and control groups existing, which leads to the rejection of the H_0 hypothesis and the acceptance of the H_1 hypothesis. It shows that its efficiency is on average 16% higher (see Figure 5).

The positive results of the pedagogical experience helped us to conclude that the developed methodology contributes to the development of professional competencies, ie the formation of professional knowledge based on the integration of mathematics and specialty sciences.

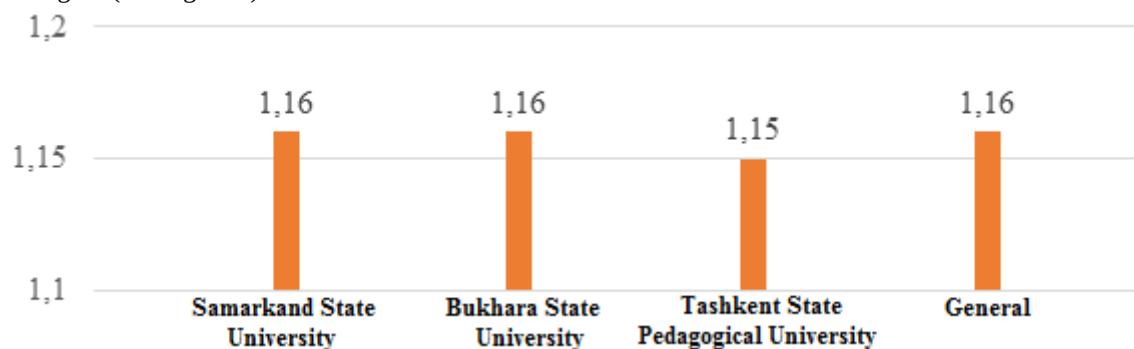


Figure 5. Effectiveness of knowledge indicators in experimental and control groups.

The following conclusions can be drawn from research on the teaching of mathematics based on its integration with the special disciplines:

- The role and importance of career-oriented tasks in the development of professional competencies of students is enormous.

- It is necessary to develop a set of career-oriented tasks that combine mathematics and specialty sciences in each specialty. Based on them, the methodology for developing students' professional competencies should be improved through consolidation (consolidation), federalization (generalization) and data dissemination methods.

- The use of computer programs (MathLAB, MathCAD, MapleV, AutoCAD and S++) in career-oriented tasks and their solution in practical training is the basis for students to consciously understand the need for in-depth study of mathematics and information technology to acquire professional competencies.

REFERENCES:

1. Ismoilov E.O. Tools aimed at developing students' professional competence on the basis of an integrative approach // *European Journal of Humanities and Educational Advancements (EJHEA)* (ISSN 2660-5589) (Journal impact factor 7.223). – Spain, 2022. Volume 3, № 4, April 2022. – p. 34-42.

2. Ismoilov E.O. The content and methodological features of an integrated approach to the formation of professional competencies in students // *Eurasian Scientific Herald* (ISSN 2795-7365)

(Journal impact factor 8.225). – Belgium, 2022. Volume 7, April 2022. – p. 109-114.

3. Ismoilov E.O. Development of students' professional competence on the basis of career-oriented tasks formed on the basis of an integrative approach // *World Conference on e-Education, e-Business and e-Commerce*. – Coimbatore, India. 19th March 2022. – p. 38-41.

4. Ismoilov E.O. Fundamentals of developing professional competencies using an integrative approach // *International Conference on Developments in Education*. – Toronto, Canada. April 15th -16th 2022. – p. 250-253.

5. Ismoilov E.O. The content and methodological features of an integrative approach to career guidance of students // *International Conference on Developments in Education*. – Amsterdam, Netherlands. April 30th 2022. – p. 30-35.

6. Ismoilov E.O. Development of students' professional competencies on the basis of integrative tasks // *International Conference on Developments in Education, Sciences and Humanities*. – Hamburg, Germany. May 4th - 5th 2022. – p. 137-145.

7. Ismoilov E.O. Teaching mathematics on the basis of an integrated approach is an important criterion for the development of professional competence // *Republican scientific-practical conference on the problems, solutions, teaching methods of modern physics and astronomy*. – Tashkent, Uzbekistan. April 12, 2022. – p. 579-582.

PHILOLOGICAL SCIENCES

STRUCTURAL ELEMENTS OF LINGUISTIC PERSONALITY IN A MONOLOGUE (BY THE EXAMPLE OF SPEECH OF POLITICIAN MARTIN LUTHER KING "I HAVE A DREAM")

Najaryan A.

3rd year master student of Kaluga State University named after E.K. Tsiolkovsky

СТРУКТУРНЫЕ ЭЛЕМЕНТЫ ЯЗЫКОВОЙ ЛИЧНОСТИ В МОНОЛОГЕ (НА ПРИМЕРЕ РЕЧИ ПОЛИТИЧЕСКОГО ДЕЯТЕЛЯ МАРТИНА ЛЮТЕРА КИНГА «I HAVE A DREAM»)

Наджарян А.Ю.

Магистрант 3 курса Калужского государственного университета имени Э.К. Циолковского

Abstract

The article analyzes the structure of a linguistic personality in a monologue. The issue is considered on the basis of the popular and one of the best oratorical speeches of the last hundred years. This is Martin Luther King's speech called "I have a dream". The article analyzes the biography and political portrait of the speaker, after which the analyzes of the speech itself is carried out. Speech analysis is carried out according to three levels of Karaulov, including verbal-semantic, cognitive and pragmatic analysis. The cognitive analysis also includes a converse analysis according to the Toulmin model.

Аннотация

В данной статье проводится анализ структура языковой личности в монологе. Рассматривается данный вопрос на основе популярной и одной из лучшей ораторской речи за последние сто лет- речи Мартина Лютера Кинга «У меня есть мечта». В статье проводится анализ биографии и политического портрета оратора, после чего проводится анализ самой речи. Анализ речи проводится по 3 уровням Ю.Н. Караулова, а именно вербально-семантический, когнитивный и прагматический анализ. В когнитивном анализе также проводится конвинсивный анализ по модели Тулмина.

Keywords: structural elements of linguistic personality, speech analysis, levels of linguistic personality, political portrait of Martin Luther King, biography of Martin Luther King, a verbal-semantic analysis of Martin Luther King's speech "I have a dream", a cognitive analysis of Martin Luther King's speech "I have a dream", a pragmatic analysis of Martin Luther King's speech "I have a dream", a converse analysis of Martin Luther King's speech "I have a dream".

Ключевые слова: структурные элементы языковой личности, анализ речи, уровни языковой личности, политический портрет Мартина Лютера Кинга, биография Мартина Лютера Кинга, вербально-семантический анализ речи М.Л. Кинга «У меня есть мечта», когнитивный анализ речи М.Л. Кинга «У меня есть мечта», прагматический анализ речи М.Л. Кинга «У меня есть мечта», конвинсивный анализ речи М.Л. Кинга «У меня есть мечта».

Анализ речи американского правозащитника и публициста Мартина Лютера Кинга

1. Биография Мартина Лютера Кинга

Мартин Лютер Кинг является одним из великих деятелей Америки, кто боролся за права и свободу человека. Он был прирожденным оратором. Его борьба и идеи равенства стали значимыми для современного общества. Он стал лауреатом Нобелевской премии мира.

В 1865 году рабство было отменено в следствие гражданской войны. Однако, в обществе все так же было предрассудочное отношение к представителям цветного населения из-за того, что государство не предпринимало никаких законных действий, чтобы защитить часть своего народа, а именно представителей цветного населения.

Права цветного населения постоянно ущемлялись и к ним относились как к представителям второго сорта. Устроиться на работу было абсолютно невозможным для них. Они были лишены всякого права выбора. После гражданской войны в Америке

действовал неофициальный закон Джона Кроу, согласно которому цветной человек не имел права стоять наравне с белым. Даже если человек обладал незначительной долей негритянской крови, его приписывали к цветному населению и также ограничивали его права и свободу.

М.Л. Кинг родился 15 января 1929 года в городе Атланта, который расположен в штате Джорджия в южной части Америки.

Он был из образованной семьи, где отец был пастором в баптистской церкви, а мать до замужества работала учительницей. Отца звали Мартин Лютер Кинг старший, а мать –Альберта Уильямс Кинг. Отца изначально называли Майклом, но, когда М.Л.Кингу исполнилось 6 лет, то его отец изменил свое имя и имя сына.

В семье М.Л. Кинга было двое детей, и он был младшим. Его семья жила в достатке и относилась к классу выше среднего.

М.Л. Кинга родители воспитывали очень строго по религиозным устоям. Иногда за проступки даже могли применить физическое наказание, но при этом родители делали все, чтобы не допустить зарождения расистской ненависти у сына. Как-то раз, во дворе, один из друзей М.Л. Кинга сказал ему, что его родители запрещают ему дружить и играть с М.Л. Кингом из-за того, что он черный. Это очень сильно расстроило мальчика. Когда мать узнала об этом, она старалась утешить его и твердила, что он ничем не хуже других.

пипипипипипипипипипипипипипипипипи

М.Л. Кинг с отличием учился в негритянской школе и был развит не по годам. 9-12 классы он даже не посещал, так как самостоятельно изучил всю школьную программу и ему удалось сразу поступить в Морхауз, будучи 15 летним мальчиком. В 1944 в Джорджии состоялся конкурс ораторов среди цветного населения. М.Л. Кинг одержал победу в этом конкурсе.

В 1948 году М.Л. Кинг оканчивает университет, получив степень бакалавра в области социологии. В студенческие годы, М.Л. Кинг параллельно с учебой помогал своему отцу, который был Пастором в церкви Эбенезер. М.Л. Кинг он часто приходил сюда и, однозначно, все его очень любили. А позже, в 1947 году он принял сан помощника церкви.

В 1951г. М.Л. Кинг получает степень доктора богословия. Учеба его проходила в городе Честер теологической семинарии. А в 1955 году он становится обладателем степени доктора философии, оканчивая аспирантуру в Бостоне.

В 1954 году политик становится пастором в баптистской церкви. Идеи свободы и равенства людей не покидали М.Л. Кинга на протяжении всей жизни. Он обладал невероятными способностями ораторского искусства, которые были направлены в правильное русло.

В 1955 году он становится руководителем ассоциации совершенствования в Монтгомери. [9, с. 56]

В жизни М.Л. Кинг был очень веселым и добрым человеком. Он был примером порядочного человека, который был отличным семьянином, мужем и отцом, который любил и воспитывал четверых детей.

Несмотря на то, что ему вместе с его семьей приходилось пройти через много испытаний, то он все равно оставался добрым и всех призывал так же не прибегать к насилию. Его жене поступали даже звонки с угрозами, чтобы М.Л. Кинг прекратил свою борьбу, но его желание добиться справедливости и любовь к людям было превыше всего.

2. Политический портрет Мартина Лютера Кинга

В 1955 году, по согласию, которое не являлось официальным, цветное население не имело право садиться в общественный транспорт, а именно в первые 4 автобуса, которые были предназначены для белого населения. Некоторые водители автобуса

при этом позволяли себе проявлять неуважительное отношение и оскорбление в адрес тех афроамериканцев, кто «нарушал» эту неофициальную договорённость. Безусловно М.Л. Кинг был против этой договоренности и считал этой общественной проблемой, и, именно поэтому организовал ненасильственный бойкот транспорта, в котором участвовали темнокожие. В акции участвовало около 6 тысяч человек и длительность протеста составила 382 дня, чуть больше года. Цветные люди категорически не пользовались общественным транспортом и ходили только пешком. Они требовали от государства свободу и равенство, своим протестом он призывали именно к этому. Порой темнокожие водители подводили тех, кто бойкотировал, но никто из них принципиально не пользовался общественным транспортом. [7, с. 113]

Акция была довольно-таки продолжающейся. И в конце концов, бойкотирующим удалось добиться своей цели, так как правительство США в 1957г. Постановило, ущемление прав каких-либо слоев населения является нарушением конституционного права и противоречит законам Америки. После чего фотография и интервью с М.Л. Кингом публикуется на обложке журнала Тайм.

Безусловно М.Л. Кинга поддерживали далеко не все. За это время ни раз совершались покушения на него, поступали звонки с угрозами его жене и даже пытались взорвать его дом. Но, все это никак не повлияло на то, чтобы его любили и считали кумиром. Для народа он был человеком, символизирующим борьбу за свободу, за равенство, за справедливость. М.Л. Кинг получил Нобелевскую премию мира за то, что он создал метод ненасильственной оппозиции. Но несмотря на то, что оппозиция носила ненасильственный характер, полиция мешала демонстрантам, а сам М.Л. Кинг неоднократно подвергался арестам.

В результате работы М.Л. Кинг в 1962 году происходит еще одно важное событие для темнокожих. Представителя цветного населения, Джеймса Мередита, принимают в университет штата Миссисипи. Мередит является первым темнокожим, которому удалось поступить в высшее учебное заведение. И поступление афроамериканского студента было прогрессом в обществе США, хотя не все приняли этот факт. Например, губернатор Джордж Уоллес закрыл дорогу студентам, которые были темнокожими, демонстрируя тем самым свое согласие на расовые предрассудки. Но именно акция

«Марш на Вашингтоне», состоявшаяся в 1963 году принесла наибольшую известность М.Л. Кингу и расширила его политическую биографию. Почти 300 тысяч жителей США пришли поддержать акцию. На этой акции М.Л. Кинг озвучил самую запоминающуюся речь, которая называется «У меня есть мечта». М.Л. Кинг показал, что важно то, каким человеком ты являешься, а не национальность, представителем которой ты являешься. В результате встречи лидеров марша с президентом США Кеннеди и обсуждение насущных проблем общества, в 1964 году закон, запрещающий ущемление

прав афроамериканцев, который звучал следующим образом «О гражданских правах». М.Л. Кинг добился своей цели, при этом сохранив свое доброе имя и авторитетность среди населения.

3. Конвинсивный анализ речи Мартина Лютера Кинга «I have a dream»

Конвинсивный анализ речи подразумевает аргументативно-функциональное представление речи. Проведем мы этот анализ по модели С. Тульмина. Данную модель можно отнести к Когнитивному уровню языковой личности по Ю.Н. Караулову.

В нашем исследовании текстово-аргументативная единица, формой которой является абзац, рассматривается как Аргументативный Ход, в состав которого входит доказательное содержание текста, в данном случае абзаца.

В состав Аргументативных Ходов входят Аргументативные Шаги, которые представляют собой доказательными элементами аргументативно, а не текстово-аргументативного уровня. В отличие от Ходов, Шаги не обладают какими-то определенными признаками внешней структуры, т.е. у них нет определенных границ в структуре, но при этом им характерно доказательное содержание и состав композиционных единиц. Эти единицы, как правило включают в себя несколько предложений, которые называются пропозициями и являются эти единицы экстра-сентенциональными.

Тезисы и Доводы представляют из себя аргументативные элементы, которые входят в состав Аргументативных Шагов. Если рассматривать их с позиции аргументативного содержания, то в них отсутствует форма аргументации и они не делятся на компоненты аргументации, но, при этом они выполняют функцию аргументации. [1, с. 186]

В нашем исследовании мы рассматриваем ключевые функциональные единицы, которые являются формальную структуру аргумента. К ним относятся Тезис, Данные, Основание. В нашей диссертационной работе приводится детальная характеристика функций единиц семантики, где подчер-

киваются разновидности Тезиса, Данных и Основания. Дополнительные единицы представлены в тех случаях, в которых они указывают какое-то влияние на подтверждение Тезиса.

Функции и их условные обозначения:

Т – Тезис; Д – Данные; Осн. – Основание

Птв. – Подтверждение; Кв. – Квалификатор;

Ог. – Оговорка.

Семантика функций:

Тезисы:

- Дес. - десигнативный;
- Деф. - дефиниционный;
- Оц. - оценочный;
- Адв. - адвокативный;

Данные:

- Факт. - фактуальные;
- Личн. - личные;
- Обст. - обстоятельственные;

Основания:

- Прич. — причины;
- Призн. - признака;
- Обобщ. — обобщения;
- Кл. - классификации;
- Парал. - параллелизма;
- Анал. - аналогии;
- Авт. - авторитета;
- Мот. - мотивационные.

«I am happy to join with you today in what will go down in history as the greatest demonstration for freedom in the history of our nation» - именно так начинает свою речь М.Л. Кинга. В этой части аргумент не представлен, так как на данном этапе текста отсутствуют требующее доказательства высказывание или Доводы. Аргументативный анализ мы начнем проводить с абзаца, который следует за этим. [2, с. 38]

1. «Five score years ago, a great American, in whose symbolic shadow we stand today, signed the **Emancipation** Proclamation. This momentous decree came as a great beacon **light of hope** to millions of Negro slaves, who had been seared in the flames of withering injustice. It came as a joyous daybreak to end the long night of their captivity».

ТЕЗИС	ОСНОВАНИЕ	ДАнные
Деф. («Emancipation»)	Прич.	Факт.
Дес. («...light of hope»)	Прич.	(«signed the Proclamation»)

Факт подписания манифеста об освобождении рабов является основанием для того, чтобы черное население имело такие же права, что и белые.

ТЕЗИС	ОСНОВАНИЕ	ДАнные
Дес. («...the Negro still is not free»)	Призн.	Факт. («...»segregation and the chains of discrimination»)

Но негры по-прежнему не свободны, их по-прежнему калечат, о чем говорит то, что повсюду можно увидеть разделение прав людей, дискриминация.

3. «One hundred years later, the Negro lives on a lonely island of poverty in the midst of a vast ocean of

2. «But one hundred years later, **the Negro still is not free**. One hundred years later, the life of the Negro is still sadly crippled by the manacles of segregation and the chains of discrimination».

material prosperity. One hundred years later, the Negro is still languished in the corners of American society and finds himself an exile in his own land. And so **we've come here today to dramatize a shameful condition**».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. («...we've come here today to dramatize»)	Кл.	Факт. («The Negro lives on a lonely island of poverty»)
Оц. («...a shameful condition»)	Кл.	Обст. («The Negro is still languished in the corners of American society»)

Факт безобразия, которое происходит в стране подтверждается тем, что черное население дискриминируется, и именно для того, чтобы не быть изгоями общества, черное население собралось, чтобы придать эту проблему огласке.

4. «In a sense we've come to our nation's Capital to cash a check. When the architects of our republic

wrote the magnificent words of the Constitution and the Declaration of Independence, they were signing a promissory note to which every American was to fall heir. This note was a promise that all men—yes, black men as well as white men—would be guaranteed the unalienable rights of life, liberty, and the pursuit of happiness».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. («...to cash a check»)	Анал.	Факт. («...the architects of our republic...signing a promissory note»)
	Анал.	Обст. («...to be guaranteed the unalienable of life, liberty, and the pursuit of happiness»)

Факт подписания векселя, которое дает право всему населению Америки, без исключения, даёт гарантии на неотъемлемые права на жизнь, свободу и стремление к благополучию, является основанием для того, чтобы потребовать от государства выполнения своих обязательств.

5. «It is obvious today that **America has defaulted on this promissory** note insofar as her citizens of color are concerned. Instead of honoring this sacred obligation, America has given the Negro people a bad check—a check which has come back marked "insufficient funds».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. («...America has default on this promissory»)	Кл.	Факт. («...a bad check»)

Факт того, что черное население до сих пор не может жить на законных правах населения Америки, говорит о том, что Америка не выполняет своих обязанностей.

6. «But we refuse to believe that the bank of justice is bankrupt. We refuse to believe that there are insufficient funds in the great vaults of opportunity of this nation. And so we've come **to cash this check** - a check that will give us upon demand the riches of freedom and the security of justice».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. («...to cash this check»)	Мот.	Личн. -«We refuse to believe that the bank of justice is bankrupt» -«We refuse to believe that there are insufficient funds in the great vaults of opportunity»

Черное население требует выполнения обязательств именно от правительства, так как они не верят, что оно (правительство) не может никак повлиять на ситуацию, которая сложилась в стране по отношению к неграм.

7. «We have also come to this hallowed spot to remind America of the fierce urgency of now. **This is no time to engage in the luxury** of cooling off or to

take the tranquilizing drug of gradualism. **Now is the time to make real the promises of democracy. Now is the time to rise from the dark and desolate valley of segregation to the sunlit path of racial justice. Now is the time to lift our nation from the quicksand's of racial injustice to the solid rock of brotherhood. Now is the time to make justice a reality for all of God's children».**

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. («This is no time to engage in the luxury»)	Мот.	Факт. («...the fierce urgency of now»)
Адв. («Now is the time to make real the promises of democracy»)	Мот.	
Адв. («Now is the time to rise from the dark and desolate valley of segregation to the sunlit path of racial justice»)	Мот.	
Адв. «Now is the time to lift our nation from the quick sands of racial injustice to the solid rock of brotherhood»	Мот.	
Адв. «Now is the time to make justice a reality for all of God's children»	Мот.	

Этот вопрос фактически является острым и важным для черного населения, и именно поэтому правительство должно обеспечить равноправие и братство населения, прекратить расовые предрассудки и восстановить справедливость для всех жителей Америки без исключения.

8. «**It would be fatal for the nation to overlook the urgency of the moment.** This sweltering summer

of the Negro's legitimate discontent will not pass until there is an invigorating autumn of freedom and equality. Nineteen sixty-three is not an end, but a beginning. Those who hope that the Negro needed to blow off steam and will now be content will have a rude awakening if the nation returns to business as usual».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «It would be fatal for the nation to overlook the urgency of the moment»	Мот.	Обст. «...this sweltering summer of the Negro's legitimate will not pass»
	Обобщ.	Личн. «...Nineteen sixty-three is not an end, but a beginning. Those who hope that the Negro needed to blow off steam and will now be content will have a rude awakening if the nation returns to business as usual»

Если вдруг, правительство, белое население будет пренебрегать вопросом, который так важен для черного населения, то это может привести к не очень хорошим последствиям, так как ущемленная часть населения страны не собирается останавливаться.

9. «**There will be neither rest nor tranquility in America** until the Negro is granted his citizenship rights. The whirlwinds of revolt will continue to shake the foundations of our nation until the bright day of justice emerges».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Дес. «There will be neither rest nor tranquility in America»	Призн.	Личн. «The whirlwinds of revolt will continue to shake the foundations of our nation until the bright day of justice emerges»

Факт пренебрежения этим вопросом, может привести к беспокойной обстановке, черное население не остановится до тех пор, пока их требования не будут выполнены.

10. «But there is something that I must say to my people, who stand on the warm threshold which leads into the palace of justice. In the process of gaining our rightful place, we must not be guilty of wrongful deeds».

Данный абзац не содержит собственной шаговой аргументации, в нем только утверждение нельзя совершать неправильные поступки, которое является адвокативным Тезисом Макро-Хода «**we must not be guilty of wrongful deeds**».

11. «Let us not seek to satisfy our thirst for freedom by drinking from the cup of bitterness and hatred. We must forever conduct our struggle on the high plane

of dignity and discipline. **We must not allow our creative protest to degenerate into physical violence.**

Again and again we must rise to the majestic heights of meeting physical force with soul force».

ТЕЗИС	ДОВОДЫ	ОСНОВАНИЕ	ДАННЫЕ
Адв. «Again and again we must rise to the majestic heights of meeting physical force with soul force».	Оц. -«We must forever conduct our struggle on the high plane of dignity and discipline».	Авт.	Личн. -«on the high plane of dignity and discipline»
Адв. «We must not allow our creative protest to degenerate into physical violence».	-«Let us not seek to satisfy our thirst for freedom by drinking from the cup of bitterness and hatred».		- «our creative protest»

Духовная сила превышает физической силы. Факт мирного протеста показывает, что черное население духовно развито, что они дисциплинированы, и их целью является лишь восстановление справедливости мирным путем.

distrust of all white people. For many of our white brothers, as evidenced by their presence here today, have come to realize that their destiny is tied up with our destiny. They have come to realize that their freedom is inextricably bound to our freedom. We cannot walk alone».

12. «The marvelous new militancy which has engulfed **the Negro community must not lead us to a**

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «The Negro community must not lead us to a distrust of all white people»	Мот. «...their freedom is inextricably bound to our freedom»	Обст. «We cannot walk alone»
Адв. «For many of our white brothers, as evidence by their presence here today»	Мот.	

Факт того, что на этом протесте присутствовали так же и белые люди, говорит о том, что черному населению удалось добиться того, чтобы белые люди приняли их как часть их же населения, и этот может привести в дальнейшем к действиям протеста не только со стороны черного населения, но к ним присоединятся и белые.

13. «And as we walk, we must make the pledge that **we shall always march ahead.** We cannot turn back. There are those who are asking the devotees of civil rights, "When will you be satisfied?" **We can never be satisfied** as long as the Negro is the victim of the unspeakable horrors of police brutality».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. «...we shall always march ahead»	Мот.	Факт. «The Negro is the victim of the unspeakable horrors of police brutality»
Дес. «We can never be satisfied»		

Факт того, что негры до сих пор ущемлены и подвергаются жестокости со стороны органов порядка, не может являться причиной для того, чтобы остановиться и принять эту ситуацию. Они должны идти до конца.

14. **We can never be satisfied** as long as our bodies, heavy with the fatigue of travel, cannot gain lodging in the motels of the highways and the hotels of the cities. We cannot be satisfied as long as the Negro's basic mobility is from a smaller ghetto to a larger one.

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Дес. «We can never be satisfied»	Прич.	Факт. -«...as long as our bodies, heavy with the fatigue of travel, cannot gain lodging in the motels of the highways and the hotels of the cities»
	Прич.	-«...as long as Negro's basic mobility is from a smaller ghetto to a larger one».

И до тех пор, пока черное население не может воспользоваться всеми благами и передвигаться так же свободно, как и белое население, они не успокоятся.

15. «**We can never be satisfied** as long as our children are stripped of their selfhood and robbed of their dignity by signs stating "For Whites Only." We

cannot be satisfied as long as a Negro in Mississippi cannot vote and a Negro in New York believes he has nothing for which to vote. No, no, we are not satisfied, and we will not be satisfied **until justice rolls down like waters, and righteousness like a mighty stream**».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «We can never be satisfied»	Мот.	
Дес. «...until justice rolls down like waters, and righteousness like a mighty stream».	Призн.	Факт.: - «...as long as our children are stripped of their selfhood and robbed of their dignity by signs stating "For Whites Only". - «... as long as a Negro in Mississippi cannot vote» - «Negro in New York believes he has nothing for which to vote».

Факт того, что для детей черного населения есть ограничения, а также тот факт, что черные не имеют право голосовать, не может оставить никого равнодушным и справедливость должна восторжествовать.

16. «I am not unmindful that some of you have come here out of great trials and tribulations. Some of

you have come fresh from narrow jail cells. Some of you have come from areas where your quest for freedom left you battered by the storms of persecution and staggered by the winds of police brutality. **You have been the veterans of creative suffering. Continue to work with the faith** that unearned suffering is redemptive».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «Continue to work with the faith»	Мот.	Факт. -«...some of you have come here out of great trials and tribulations» - «Some of you have come from areas where your quest for freedom left you battered by the storms of persecution and staggered by the winds of police brutality» - «Some of you have come fresh from narrow jail cells».
Дес. «You have been the veterans of creative suffering».	Призн.	

Факт того, что людям, присутствующим на протесте пришлось через многое пройти, чтобы добраться до этой точки, является основанием продолжать бороться дальше с верой и надеждой в лучшее.

17. «Go back to Mississippi, go back to Alabama, go back to South Carolina, go back to Georgia, go back to Louisiana, go back to the slums and ghettos of our Northern cities, knowing that somehow this situation can and will be changed. Let us not wallow in the valley of despair».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Адв. «Go back to Mississippi, go back to Alabama, go back to South Carolina, go back to Georgia, go back to Louisiana, go back to the slums and ghettos of our Northern cities»	Мот.	Личн. «...this situation can and will be changed».
Адв. «Let us not wallow in the valley of despair».		

Нельзя отчаиваться, потому что это ситуация может и будет изменена.

18. So I say to you today, my friends, so even though we face the difficulties of today and tomorrow,

I still have a dream. It is a dream deeply rooted in the American dream that one day this nation will rise up and live out the true meaning of its creed — we hold these truths to be self-evident, that all men are created equal.

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «It is a dream deeply rooted in the American dream»	Авт. «I still have a dream. It is a dream deeply rooted in the American dream that one day this nation will rise up and live out the true meaning of its creed»	Обст. «...that all men are created equal»

Мечта М.Л. Кинга, как говорит оратор, является мечтой и самой Америки, поскольку все происходящее показывает, что страна должна воплотить всеобщее равенство, что не требует никаких доказательств.

19. «I have a dream that one day on the red hills of Georgia the sons of former slaves and the sons of former slave-owners will be able to sit down together at the table of brotherhood».

М.Л. Кинг верит, что однажды белое и черное население смогут садиться за один стол вместе.

20. «I have a dream that one day even the state of Mississippi, a state sweltering with the heat of injustice, sweltering with the heat of oppression, will be transformed into an oasis of freedom and justice».

М.Л. Кинг верит, что даже штат Миссисипи, который является самым несправедливым и жестоким, однажды тоже будет свободным и справедливым.

21. «I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin but by the content of their character. I have a dream today!»

М.Л. Кинг верит, что его детей однажды будут судить не по цвету кожи, а по их человеческим качествам.

22. «I have a dream that one day, down in Alabama, with its vicious racists, with its governor having his lips dripping with the words of interposition and nullification, one day right there in Alabama little black

boys and black girls will be able to join hands with little white boys and white girls as sisters and brothers. I have a dream today!»

М.Л. Кинг верит, что в штате, где Губернатор лишь даёт голословные обещания, а на деле ничего не меняется, оратор верит и мечтает, что однажды и там наступит братство населения.

23. «I have a dream that one day every valley shall be exalted, every hill and mountain shall be made low, the rough places will be made plane and the crooked places will be made straight, and the glory of the Lord shall be revealed, and all flesh shall see it together».

М.Л. Кинг верит, что однажды не будет никаких ограничений для людей, в независимости от их расовой принадлежности.

24. «This is our hope. This is the faith that I go back to the South with».

М.Л. Кинг именно с этой надеждой и верой вернется домой.

С 19 по 24 абзацы не содержат аргументации на микроуровне и представляют собой призывы. Каждый абзац начинается с фразы «I have a dream». В 24 абзаце М.Л. Кинг подводит итог, что все, о чем он мечтает- это всеобщая мечта и надежда. Но эти абзацы являются личными данными к оценочному Тезису в 25 абзаце.

25. «**With this faith we will be able to hew out of the mountain of despair a stone of hope. With this faith we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood**».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «...we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood».	Обобщ. «With this faith»	Личн. абзацы 19-24

Всё вышесказанное (абзацы 19-24) является основанием, чтобы с огромной надеждой превратить это безобразие в братство населения.

26. «With this faith **we will be able to work together**, to pray together, to struggle together, to go to jail together, to stand up for freedom together, knowing that we will be free one day. This will be the day when

all of God's children will be able to sing with new meaning, "My country 'tis of thee, sweet land of liberty, of thee I sing. Land where my fathers died, land of the pilgrim's pride, from every mountainside, **let freedom ring**." And if America is to be a great nation, this must become true».

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Авт. «we will be able to work together»	Авт.	Личн. «knowing that we will be free one day»
Оц. «let freedom ring»	Мот.	Обст. «America is to be a great nation»

Факт того, что все смогут работать вместе и быть свободными, будет говорить о том, что Америка прекрасная страна.

27. «So let freedom ring from the prodigious hilltops of New Hampshire».

28. «Let freedom ring from the mighty mountains of New York».

29. «Let freedom ring from the heightening Alleghenies of Pennsylvania».

30. «Let freedom ring from the snowcapped Rockies of Colorado».

31. «Let freedom ring from the cerpaceous slopes of California».

32. «But not only that».

33. «Let freedom ring from Stone Mountain of Georgia».

34. «Let freedom ring from Lookout Mountain of Tennessee».

35. «Let freedom ring from every hill and molehill of Mississippi, from every mountainside, let freedom ring».

С 27 по 35 абзацы не содержат аргументации и представляют собой призывы, в которых он повторяет фразу «Да зазвонит свобода». Они являются обстоятельственными Данными к абзацу 36.

36. «And when this happens, when we allow freedom ring—when we let it ring from every village and every hamlet, from every state and every city— we will be able to speed up that day when all of God's children, black men and white men, Jews and Gentiles, Protestants and Catholics, **will be able to join hands and sing in the words of the old Negro spiritual, "Free at last! Free at last! Thank God almighty, we are free at last!"**»

ТЕЗИС	ОСНОВАНИЕ	ДАННЫЕ
Оц. «will be able to join hands and sing in the words of the old Negro spiritual, "Free at last! Free at last! Thank God almighty, we are...!"»	Обобщ. «...free at last»	Обст. Абзацы 27-35

Всё вышесказанное (абзацы 27-35) будет являться фактом того, что в стране действует равноправие и что все население страны свободно.

Таким образом, абзацы, которые имеют Аргументативное наполнение, образуют Аргументативные Макро-Ходы, а именно абзацы с 1 по 18, 25, 26 и 36. Следовательно речь имеет следующий Аргументативный состав:

CX (вст.) + MX -> AX (1-18) + AX (19-24) + MX -> (25-26) + AX (27-35) + MX -> AX (36)

Где:

CX-супер Ход (вступление);

MX- макро Ход

AX- Аргументативный Ход

4. Анализ ораторской речи Мартина Лютера Кинга «I have a dream» по уровням языковой личности

4.1. Вербально-семантический анализ речи М.Л. Кинга «I have a dream»

Приведем основные количественные параметры ораторского дискурса «I have a dream».

Размер дискурса составляет 1666 слов, который включает в себя 30 абзацев и 7461 печатных знаков. Видеозапись речи длится 16 мин. 21 сек. Оптимальной продолжительностью речи является время в 10-15 минут, и при этом она не должна превышать 20 минут. Это было установлено в ходе исследований успешных опытных ораторов. Как мы видим, М.Л. Кинг выступил с речью, которая абсолютно точно соответствовала этому важному параметру ораторского искусства. Это действительно является одним из важных составляющих публичного красноречия, ведь при более длительном выступлении оратор рискует потерять внимание аудитории, а значит и цель будет не достигнута. [3, с. 297]

С точки зрения архитектоники, выступление М.Л. Кинга «I have a dream» делится на 2 неравные по размеру части.

Первая часть является обращением к собравшимся, которое носит социально-политического характер. А вот вторую часть оратор посвятил тому, что излагал свою мечту, сравнив ее с мечтой всей Америки.

Речь М.Л. Кинг - это митинговый монолог, который мотивирует и вдохновляет аудиторию. Это развернутое высказывание в лице одного человека осуществлялось в отношении как когнитивном, так и прагматическом. Целью выступления М.Л. Кинга являлся призыв народа к единству в борьбе за свободу и единства. И для того, чтобы достичь этой самой главной прагматической цели, оратор применял разные стилистические приёмы, элементы композиции, средства выразительности и т.д.

Ораторское выступление в форме монологе выполняет ряд функций:

-Информативная функция;

-Функция разъяснения;

-Функция убеждения;

-Функция призыва;

-Функция пробуждения к действию, которая подразумевает призыв аудитории оратором совершать конкретные действия, оказывая влияние на них посредством их чувств;

-Императивная функция, которая подразумевает формирование оратором задач для аудитории и потребность в их выполнении.

Цель оратора и его выступления заключается в том, чтобы повлиять на волю аудитории и побудить их к конкретным действиям, при этом важным фактором является авторитетность оратора у слушателей.

Как мы уже говорили, М.Л. Кинг был баптистским священником. Именно этот факт так же повлиял на религиозный характер оратора «У меня есть мечта». Его речь была неким наставлением, проповедью, но частично, конечно. Религиозная составляющая речи была очень близка для всех присутствующих. На митинге присутствовали около 300 тысяч человек, среди которых были не только афроамериканцы, но и представители белого населения.

М.Л. Кинга периодически подсматривал в свои записи, что говорит о том, что речь не была спонтанной и была заранее продумана. Благодаря этому М.Л. Кингу удалось произнести великолепную эмоциональную речь, без оговорок и запинок.

Практически каждое предложение М.Л. Кинг начинал с повторения фразы «I have a dream», которая с каждым разом звучала для людей как триггер и намекала на личную историю, на употребление не просто правильно подобранных слов, а на раскрытие глубоких чувств и переживаний оратора. [3, с. 163]

Несмотря на то, что речь была эмоциональной, она вместе с тем была выдержанной. М.Л. Кинг делал паузы и очень четко и отчетливо произносил каждое слово, чтобы они (слова) отпечатывались в голове каждого, кто пришел на площадь.

Рассматривая эмоциональную составляющую речи, мы можем отметить, что голос М.Л. Кинга звучал очень естественно и уверенно. Очевидно было то, что оратор сам искренне верил в слова, которые он говорил. Каждое его слово, каждая фраза пропитаны верой в счастливое будущее и в положительные перемены. Безусловно все присутствующие чувствовали, что М.Л. Кинга, как никого другого волнует тема выступления. Искренность и честность его выступления не оставляли никого равнодушными. Активная жестикуляция способствовала восприятию М.Л. Кинга слушателями как такого же живого человека, как и они, который затрагивал серьезные проблемы и волнующие темы всех присутствующих. Это показывало, что он такой же живой человек с чувствами и эмоциями, а не статуя или безразличный человек, который лишь выполняет роль оратора для передачи информации. Несомненно, помимо всех качеств оратора, как личности, произнести такую заразительную речь так же помогла тщательная подготовка речи заранее, где М.Л. Кинг продумал абсолютно каждую фразу, которую он произносил на митинге.

4.2. Когнитивный анализ речи М.Л. Кинга «I have a dream»

Количество публичных выступлений М.Л. Кинга достигает 2500. Им были написано 5 книг. М.Л. Кинг также несколько раз возглавил мирные протесты, которые были направлены против законов, лишающих афроамериканцев их гражданских прав. К сожалению, М.Л. Кинг прожил недолго, его убили в возрасте 35 лет. Но, несмотря на это, он оставил богатое словесное и письменное наследие,

которые до сегодняшнего дня вдохновляют множество людей по всему миру, его речь является одной из лучших за последние 100 лет.

Для того, чтобы убедить людей, побудить их к совершению действий, М.Л. Кинг применял в своей речи множество риторических приёмов, являясь искусным и страстным оратором. [7, с. 76]

Важным фактором для оратора является произведение «качественной речи». Но что же подразумевает «качественная речь» и какой она должна быть, вот в чем вопрос. Важнейшими задачами в такой науке, как общая риторика, являются проблемы, которые связаны с формой и техникой мысли, со средствами поиска истины, с умением убеждать, красиво говорить, украшать речь и т.д. М.Л. Кинг показал и доказал, что его слово, его язык является более эффективным оружием для достижения целей и каких-либо изменений в лучшую сторону, нежели насилие и вражда.

Как нами уже было сказано, речь М.Л. Кинга «I have a dream» состоит из двух неравных меж собой частей. Первая (вступительная) была неким обращением к народу, в которой он говорил о долге Америки перед народом. Вторая часть выступления он посвятил своей мечте, которая является всеобщей мечтой. Фразу «У меня есть мечта» он повторял постоянно, произнес ее почти после каждого предложения, и именно эта фраза «У меня есть мечта» и стала названием речи, которая закрепилась в истории и стала очень знаменитой.

Если рассматривать речь с позиции жанра, то мы можем увидеть, что она содержит перечень признаков, которые характерны для дискурса проповеди. В видеозаписях это феноменальной речи, мы видим, как оратор периодически заглядывает в записи, которые он подготовил заранее, соответственно речь была подготовлена заранее.

Вступительная часть является экспозицией, после которой начинается кульминационная часть выступления, которая настолько грамотно построена, что в ней исключена двусмысленность толкования дискурса. В первом абзаце преобладают особенные слова, с отсылкой на историю Америки:

«I am happy to join with you today in what will go down in history as the greatest demonstration for freedom in the history of our nation».

В последнем абзаце повторяется глагол «to join». Посредством этого глагола выражает значимость «братство» и «единство»: «When all of God's children, black men and white men, Jews and Gentiles, Protestants and Catholics, will be able to join hands...».

Во вступительной часто есть очень много высказываний политического характера, которые имеют вербальное оформление и оснащены разнообразием стилистических приёмов и стилистических средств. Совокупность всех этих факторов оказало значительное влияние на аудиторию, как в логическом, так и в эмоциональном плане. [3, с. 92]

В когнитивно-композиционном плане М.Л. Кинг говорит:

- о роли и значении «Прокламации об освобождении рабов». Прокламация была подписана Президентом А. Линкольном 30.12.1862 г. Для выделения

этой роли и значения оратор применяет эпитеты, сравнения, метонимию, развернутую метафору: «Five score years ago, a great American, **in whose symbolic shadow we stand today**, signed the Emancipation Proclamation. **This momentous decree came as a great beacon light of hope** to millions of slaves, who had been **seared in the flames of withering injustice**. It came as a **joyous daybreak to end the long night of their captivity**»;

- о многочисленных фактах сегрегации по цвету кожи. Оратор использует такие стилистические приёмы что и были перечислены выше, а также прибегает к лексико-семантическому повтору: «But one hundred years later, **the Negro still is not free**. One hundred years later, **the life of the Negro is still sadly crippled by the manacles of segregation and the chains of discrimination**. One hundred years later, **the Negro lives on a lonely island of poverty in the midst of a vast ocean of material prosperity**. One hundred years later, **the Negro is still languished in the corners of American society and finds himself an exile in his own land**. So we've come here today **to dramatize a shameful condition**»;

- о нищете, бесправии и социальной несправедливости в отношении афроамериканского населения страны. Для описания этой проблемы оратор использует невероятную по красоте и типичную американскую по духу развернутую концептуальную метафору, помимо таких стилистических приёмов как эпитет, метонимий, повтор и др. Этой метафорой он описывает борьбу против расового угнетения, свободу и демократию, обналичиванию чека и предъявлению векселя-долгосрочного обязательства перед каждым американцем – на основе знаменательных слов «зодчих» Конституции и Декларации независимости: «In a sense we have come to our nation's **capital to cash a check**. When the architects of our republic wrote **the magnificent words** of the Constitution and Declaration of Independence, they **were signing a promissory note** to which every American was **to fall heir**. **This note was a promise that all men, yes, black men as well as white men, would be guaranteed** to the unalienable rights of life liberty and the pursuit of happiness.

It is obvious today that **America has defaulted on this promissory note** insofar as her **citizens of color** are concerned. **Instead of honoring this sacred obligation, America has given the Negro people a bad check, a check that has come back marked "insufficient funds."** But we refuse to believe that **the bank of justice is bankrupt**. We refuse to believe that **there are insufficient funds in the great vaults of opportunity** of this nation. So **we have come to cash this check, a check that will give us upon demand the riches of freedom and the security of justice**. We have also come to his **hallowed spot** to remind America of **the fierce urgency of Now**. **This is not time to engage in the luxury of cooling off or to take the tranquilizing drug of gradualism**. **Now is the time to make real the promises of democracy**. **Now is the time to rise from the dark and desolate valley of segregation to the sunlit path of racial justice**. **Now is the time to lift our nation from the quick sands of**

racial injustice to the solid rock of brotherhood. **Now is the time to make justice a reality for all of God's children**».

– о необходимости неотступно и последовательно продолжать, и наращивать борьбу за свободу и демократию в Америке. Для характеристики и описания этой проблемы М.Л. Кинг использует такие стилистические средства как:

аллюзия: «sweltering summer of the colored people's legitimate discontent» и к *антонимическому использованию префиксального морфологического потенциала английского языка*: «to **overlook** the urgency of the moment and to **underestimate** the determination of its colored citizens»:

«It would be fatal for the nation **to overlook the urgency of the moment and to underestimate the determination of its colored citizens**. **This sweltering summer of the colored people's legitimate discontent will not pass until there is an invigorating autumn of freedom and equality**. Nineteen sixtythree is not an end but a beginning. Those who hope that **the Negro needed to blow off steam** and will now **be content will have a rude awakening** if the nation returns to business as usual. There will be neither rest nor tranquility in America until **the Negro** is granted his citizenship rights. **The whirlwinds of revolt will continue to shake the foundations of our nation until the bright day of justice emerges**».

–о мирном и ненасильственном характере действий всех сторонников в борьбе за освобождение от социального и политического угнетения. В этом вопросе оратор использует где метафорическое сравнение, развернутая метафора, эпитет, метонимия, повтор, аллитерация: «But there is something that I must say **to my people who stand on the warm threshold which leads into the palace of justice**. In the process of gaining our rightful place, we must **not be guilty of wrongful deeds**. Let us **not seek to satisfy our thirst for freedom by drinking from the cup of bitterness and hatred**.

We must forever conduct our **struggle on the high plane of Dignity and Discipline**. We must **not allow our creative protest to degenerate into physical violence**. Again and again we must **rise to the majestic heights of meeting physical force with soul force**. And the **marvelous new militancy** which has engulfed the **Negro community** must not lead us to a distrust of all white people; for many of **our white brothers**, as evidenced by their presence here today, have come to realize that **their destiny is tied up with our destiny, and they have come to realize that their freedom is inextricably bound to our freedom**. We cannot walk alone».

–о единении всех американцев, независимо от цвета кожи, национальной или религиозной принадлежности, где есть место свободе и достойной жизни. Для описания этой проблемы главными стилистическими средствами выступают фразеологический повтор, развернутая метафора и сравнение, а также риторический вопрос: «**And as we walk we must make the pledge that we shall always march ahead**. We cannot turn back. There are those who are asking the devotees of civil rights: "When will you

be satisfied?" We can never be satisfied as long as the Negro is the victim of the unspeakable horrors of police brutality. We can never be satisfied as long as our bodies, heavy with the fatigue of travel, cannot gain lodging in the motels of the highways and the hotels of the cities. We cannot be satisfied as long as the Negro's basic mobility is from a smaller ghetto to a larger one. We can never be satisfied as long as our children are stripped of their selfhood and robbed of their dignity by signs stating "for white only." We cannot be satisfied as long as the Negro in Mississippi cannot vote and the Negro in New York believes he has nothing for which to vote. No, no we are not satisfied and we will not be satisfied until justice rolls down like waters and righteousness like a mighty stream».

-о готовности встретиться с трудностями и поражениями на пути стояния за освобождение и демократические основания жизни нации, где, наряду с метафорическими сравнениями, развернутой метафорой, аллитерацией, весьма интересно использован стилистический потенциал двойного отрицания: «**I am not unmindful** that some of you have come here out of **great Trials and Tribulations**. Some of you have come from areas where your **quest for freedom left you battered by storms of persecutions and staggered by the winds of police brutality**. You have been **the veterans of creative suffering**. Continue to work **with the faith that unearned suffering is redemptive**».

-об объединении всех граждан страны во всех штатах и уголках США в противостоянии всеобщей несправедливости. Для характеристики данной проблемы оратор прибегает к помощи метафоры, повтора и аллитерации, которые в своем неразрывном взаимодействии способствуют логическому и эмоциональному усилению концептуального содержания ораторского дискурса: «**Go back to Mississippi, go back to Alabama, go back to South Carolina, go back to Georgia, go back to Louisiana, go back to the slums and ghettos of our northern cities, knowing that somehow this situation can and will be changed. Let us not wallow in the valley of despair**».

Практически в каждом абзаце своей речи М.Л. Кинг применяет метафору. Даже начало речи он начинает с метафоры, которой описывает манифест об освобождении как «Свет надежды для миллионов рабов-негров» [4, 258]

«This momentous decree as a great beacon light of hope to millions of slaves...»

В этом же месте он описывает рабов как жертв, которые были сожжены в пламени испепеляющей несправедливости. Конец рабства был радостным рассветом.

«... who had been seared in the flames of withering injustice. It came as a joyous daybreak to end the long night of their captivity».

Смысл метафоры-сравнить две разные вещи. Безусловно документ, который был историческим и был подписан много лет назад, не представлял из себя свет, да и рабов никто не сжигал, но именно, используя эти приёмы оратор показывает глубину

боли и переживаний, а также то, насколько важным является для цветного населения жить в дружбе и наравне с белыми.

Все эти метафорические изложения, которые М.Л. Кинг использует в своем выступлении, придают физические очертания таким абстрактным понятиям как «свобода», «бедность», «дискриминация», «сегрегация» и т.д.:

«...storms of persecution winds of police brutality heat of injustice heat of oppression the flames of withering injustice the manacles of segregation and the chains of discrimination».

А ведь по сути вся та физическая боль от оков, кандалов и пламени, неприятные ощущения от сильной жары, сильного шторма равносильны всем тем чувствам, которые испытывают представители цветного населения во время всех этих унижений и оскорблений на протяжении всего этого времени. Придание абстрактным вещам физической формы помогает говорящему лучше донести свою идею до аудитории, поскольку в таком случае налицо апелляция к конкретным физическим ощущениям.

«Справедливость- это денежные средства»- ещё одна яркая метафора, которую использует в своем дискурсе Кинг.

«In a sense we've come to our nation's **capital to cash a check**. ...the architects of our republic were signing a **promissory note**... It is obvious today that America has **defaulted** on this promissory note...America has given the Negro people a bad check, a check which has come back marked "**insufficient funds**". But we refuse to believe that the **bank** of justice is **bankrupt**. We refuse to believe that there are **insufficient funds** in the great vaults of opportunity of this nation. And so, we've come to **cash this check**, a **check** that will give us upon demand the riches of freedom and the security of justice».

Как мы видим, выделенные слова из речи относятся к теме финансов, они связаны с банковской тематикой. Эта метафора выбрана оратором специально для того, что сравнить равенство населения с «долговым обязательством», которое необходимо соблюдать абсолютно всем. И, тем самым, М.Л. Кинг показывает, что реальность не соответствует тому, что должно быть, и сравнивает государство с банком, в котором хранилась справедливость, с банком, который обанкротился.

В его речи он также использует синекдоху - использование названия части для обозначения целого или наоборот. Рассмотрим пример:

«**We** can never be satisfied, as long as our **bodies**, heavy with the fatigue of travel, cannot gain lodging in the motels of the highways and the hotels of the cities. I have a dream that one day every valley shall be exalted, every hill and mountain shall be made low, the rough places will be made plain, and the crooked places will be made straight, and the glory of the Lord shall be revealed, and **all flesh** shall see it together».

При помощи синекдохи, М.Л. Кинг описывает людей как плоть, как тела, что указывает на проблему цвета кожи, с которой столкнулось цветное население, и данная синекдоха очень хорошо по-

могла понять аудитории мысль оратора. Именно через сравнение людей с телом и плотью, М.Л. Кингу удалось ярко выразить концепцию расизма, потому что, если бы он использовал слово «люди», возможно эта концепция не была настолько обширной и интерпретируемой. В заключение он взял «людей» в целом и разбил их на части тела. Его общая речь - это форма синекдохи, поскольку общее понятие – расизм. [6, с. 174]

Анафора является ещё одним приёмом, который М.Л. Кинг применяет в своей речи. Анафора – систематический повтор начальных слов или словосочетаний в двух или более последовательных предложениях. Итак, фраза «I have a dream» повторяется в восьми последовательных предложениях. Еще один пример анафоры встречается в предложениях, приведенных ниже:

«**Now is the time** to make real the promises of democracy. **Now is the time** to rise from the dark and desolate valley of segregation to the sunlit path of racial justice. **Now is the time** to lift our nation from the quick sands of racial injustice to the solid rock of brotherhood. **Now is the time** to make justice a reality for all of God's children».

Также фразу «Сейчас время» он повторяет в четырех последовательных предложениях. Основной целью является закрепление определенной идеи и темы в памяти аудитории. Здесь он так же делает упор на важности сроков внесения изменений - изменения должны быть внесены не постепенно со временем, а именно «сейчас».

Как мы уже говорили оратор произносит речь, основываясь на религиозных началах, и М.Л. Кинг также очень эффективно использует анафору в конце своей речи, когда говорит о вере:

«**With this faith** we will be able to hew out the mountain of despair a stone of hope. **With this faith** we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood. **With this faith** we will be able to work together, to pray together, to struggle together, to go to jail together, to stand up for freedom together, knowing that we will be free one day».

Как мы видим, М. Л. Кинг постоянно повторяет фразу «с этой верой», которая связывает несколько длинных и сложных предложений. Но этой фразой оратор способствует тому, чтобы аудитория следовала ему, ведь их всех объединяет общая вера.

В речи «У меня есть мечта» мы можем также выделить параллелизм. Это способ описания повторяющегося синтаксиса. При использовании параллелизма, говорящий повторяет комбинации слов, предложения или грамматические основы. Приведем несколько примеров:

«**With this faith** we will be able **to work together, to pray together, to struggle together, to go to jail together, to stand up for freedom together**, knowing that we will be free one day».

Слова не совсем одинаковые, но строение одинаковое.

В самом последнем абзаце Кинг говорит:

«...**when** this happens... **when** we allow freedom ring... **when** we let it ring from every village and hamlet... **when** all of God's children...».

На первой взгляд может показаться, что слишком плотно оратор применяет повторение, но благодаря отраженной в ней свободе, повторение вовсе не кажется скучным и педантичным.

Благодаря этим повторениям оратору удается достучаться до сердец аудитории, его фразы проникают в голову слушающих и, в конце концов, люди запоминают эти фразы. Этот приём способствует тому, чтобы люди сами поверили и, в итоге, были вовлечены. Это и является основной причиной частых повторений М.Л. Кингом ключевых фраз, совокупность которых даёт нам четкое представление о содержании речи Мартина Кинга. Вот эти фразы:

- One hundred years later...
- Now is the time...
- We must...
- We can never be satisfied...
- I have a dream...
- With this faith...
- Let freedom ring...

Время выделяется оратором в данных фразах, что указывает на то, что хоть и столько времени прошло, но цветные продолжают оставаться ущемленными в своих правах. Для того, что побудить афроамериканцев не откладывать борьбу за свои права и приступить к ней немедленно, М. Л. Кинг использует фразу «Сейчас время». В этих фразах делает акцент на времени «Сто лет назад», показывая тем самым сколько прошло времени, но цветные люди до сих ущемлены в своих правах. Важно отметить, что это была борьба без насилия. Фразами «мы должны», «мы никогда не будем удовлетворены», «с этой верой» он показывал их общие цели и ценности. И фразой «У меня есть мечта» он также делал акцент на то, что его мечта является мечтой всех афроамериканцев. Вся идея речи «у меня есть мечта» является примером параллелизма.

Построение абзацев абсолютно одинаковое и, именно это помогает передать послание мечты. Повторение и выделение этих повторение способствует тому, что люди запомнили эти фразы, как, впрочем, и саму речь М. Л. Кинга. Читая эти фразы в определенной последовательности, можно многое узнать об истории Мартина Кинга.

Оратор также использовал аллитерацию - это многократное повторение одинаковых или сходных звуков, или звукосочетаний. Повторение звуков придает речи более броскость и делает ее более запоминающейся. Этот риторический прием делает фразу также более изящной. По сравнению с другими приемами, аллитерация не всегда так ярко выделяется. Она может быть тонкой уловкой оратора.

«I have a dream that one day the state of Mississippi, a state sweltering with racism...»

Повторяющийся звук «с»- это аллитерация.

Ещё один из приёмов, которые применяет М. Л. Кинг – это антитеза, стилистический прием, с помощью которого резко противопоставляются образы и понятия, чаще всего используются антонимы.

Рассмотрим следующие примеры из речи М. Л. Кинга:

«One hundred years later, the Negro lives on a **lonely island of poverty** in the midst of a **vast ocean of material prosperity...**»

«...Now is the time to rise from **the dark and desolate valley of segregation** to **the sunlit path of racial justice...**»

«...Now is the time to lift our nation from **the quicksand's of racial injustice** to **the solid rock of brotherhood...**»

«...This **sweltering summer of the Negro's legitimate discontent** will not pass until there is **an invigorating autumn of freedom and equality...**»

«...1963 is not **an end**, but **a beginning...**»

Мы можем увидеть, что оратор противопоставляет печальную действительность со счастливым будущим. Этот приём является прекрасным мотивирующим приёмом, он способствует побуждению к действиям для того, чтобы создать совместными усилиями прекрасное будущее. Эти примеры антитезы так же являются метафорами.

М.Л. Кинг использует такие эпитеты как «Symbolic shadow of America, a great beacon light of hope, magnificent words, closest friend и другие». Используя эти эпитеты оратор призывает людей отказаться от старых предрассудков и принципов, призывает открыться для нового мира, где есть место новому мышлению, новым отношениям.

Во время «У меня есть» мечта М.Л. Кинг постоянно обращается к Библии, к Декларации о независимости, которая была подписана уже около 100 лет в США, к Конституции и даже приводит речь Авраама Линкольна, которая была не менее популярна. Все эти источники являются глубокоуважаемыми для аудитории.

Аллюзия является мощным средством и, может быть, как явной (прямая цитата), так и неявной (намёк). Оратор часто использует этот приём, в котором он прибегает к словам известных выступающих или писателей, чтобы увеличить уровень значимости всех аргументов, приведенных им в речи.

Также М. Л. Кинг подогревает интерес слушателей к своей речи, приводя в пример многочисленные географические ссылки в речи, такие как Mississippi, Georgia, Alabama etc. Поскольку упоминание штата вызвало бурную реакцию у людей, то М. Л. Кинг упомянул этот штат аж 4 раза в отдельных случаях.

Начиная свою речь, М. Л. Кинг ссылается на историю, вспоминая Прокламацию об освобождении.

«Five score years ago, a great American, in whose symbolic shadow we stand today, signed the Emancipation Proclamation».

Прокламация об эмансипации официально освободила всех американских рабов. В истории США это было одним из ключевых моментов после революции. И слова оратора помогли почувствовать аудитории свою причастность к этой истории, зрители определенно почувствовали тяжесть момента, как будто были свидетелями истории.

М.Л. Кинг также намекает на постепенный исторический прогресс. Сначала было рабство, после отмены чего представители цветного населения сталкиваются с дискриминацией. И оратор намекает на то, что в итоге и расизм и дискриминация не будут иметь никакого значения. И, говоря об окончании рабства, М. Л. Кинг выделяет тот факт, что афроамериканцы продолжают сталкиваться с препятствиями, но, как и рабству, всему этому наступит конец.

В нашей диссертационной работе за основу мы взяли главные положения лингвистической стилистики, риторики, прагматики и когнитивистики. Применение этих положений позволяет охарактеризовать языковую личность, а также описать лингвистические признаки дискурса.

4.3. Прагматический анализ речи М.Л. Кинга «I have a dream»

М.Л. Кинг был борцом за расовое равенство в 50-х и 60-х гг. вв. В Вашингтоне, округ Колумбия, в августе 63-го года организовал массовое шествие. В своем выступлении «У меня мечта» он выделил слова Линкольна и основные проблемы, которые были в обществе. Это выступление привело к тому, что в 1964 г. Правительство США подписал «Закон о гражданских правах», который гласил о том, что недопустимо расовое ущемление прав цветного населения и, что это противоречит законодательству. Его метод ненасильственной оппозиции, удостоил оратора Нобелевской премии мира.

Речь М.Л. Кинг - это митинговый монолог, который мотивирует и вдохновляет аудиторию. Это развернутое высказывание в лице одного человека осуществлялось в отношении как когнитивном, так и прагматическом. Целью выступления М.Л. Кинга являлся призыв народа к единству в борьбе за свободу и единства. И для того, чтобы достичь этой самой главной прагматической цели, оратор применял разные стилистические приёмы, элементы композиции, средства выразительности и т.д.

Ораторское выступление в форме монологе выполняет ряд функций:

- Информативная функция;

- Функция разъяснения;

- Функция убеждения;

- Функция призыва;

- Функция пробуждения к действию, которая подразумевает призыв аудитории оратором совершать конкретные действия, оказывая влияние на них посредством их чувств;

- Императивная функция, которая подразумевает формирование оратором задач для аудитории и потребность в их выполнении.

Цель оратора и его выступления заключается в том, чтобы повлиять на волю аудитории и побудить их к конкретным действиям, при этом важным фактором является авторитетность оратора у слушателей.

В конце вступительной части, оратор подводит некий итог, которые вместе с тем является и переходом ко второй, кульминационной части: «I say to you today, my friends, so even though we face the

difficulties of today and tomorrow, **I still have a dream. It is a dream** deeply rooted in the American dream. Затем М.Л. Кинг убирает в сторону свои записи, которые были подготовлены заранее и продолжает свою речь, которая очень сильно вдохновляла и мотивировала аудиторию. Вторая часть речи является кульминацией выступления оратора. Речь, которую он произнес в тот день, не имеет аналогов до сегодняшнего дня. [5, с. 29]

В речи оратор применяет повтор фразы: «I have a dream» (здесь восемь раз), вместе с аллюзией на Конституцию США: «all men are created equal», аллюзией на Ветхий и Новый Заветы: «sisters and brothers; every valley shall be engulfed, every hill shall be exalted and every mountain shall be made low, the rough places will be made plains and the crooked places will be made straight and the glory of the Lord shall be revealed and all flesh shall see it together», эпитеты, метафоры, метонимии, сравнения. Эти средства, которые М.Л. Кинг применял очень мощно завершают кульминационную часть выступления.

В конце речи М.Л. Кинг, использует фразу «This is our hope», что придает религиозный характер дискурсу. Безусловно, такой приём очень вдохновлял аудиторию, ведь тема религии была очень близка слушающим. В своей речи оратор говорит о надежде на светлое будущее своего народа, говорит о свободе всего американского народа без исключений, говорит о том, что все они дети Бога и должны быть объединены духом, внимающих словам и мотиву известного афроамериканского гимна-спиричуэл «Free at last»:

This is our hope. This is the faith that I will go back to the South with. With this faith we will be able to hew out of the mountain of despair a stone of hope. With this faith we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood. With this faith we will be able to work together, to pray together, to struggle together, to go to jail together, to stand up for freedom together, knowing that we will be free one day. This will be the day... this will be the day when all of God's children will be able to sing with new meaning "My country 'tis of thee, sweet land of liberty, of thee I sing. Land where my father's died, land of the Pilgrim's pride, from every mountainside, let freedom ring!"

В финале речи на площади в центре столицы США, можно ощутить силу слова, которая заполнила все пространство. Эти ощущения придает речи глагол «to ring», который М.Л. Кинг постоянно повторяет при выступлении.

Цели и мотивы оратора, его установки и интересы являются характеристикой мотивационного или прагматического уровня языковой личности. В этом уровне рассматривается переход от отношения к речевой деятельности к пониманию действительности в мире. Этот переход является закономерным и обусловленным.

Этот уровень включает в себя вербально-семантический и когнитивный уровни, которые мы уже проанализировали выше, поэтому мы сейчас

проанализируем мотивы и цели речи М.Л. Кинга «I have a dream».

В начале речи, его целью было показать несправедливость, в которой они живут. И он говорил о том, что подписан манифест об освобождении, но при этом Америка не выполняет свой долг. «It is obvious today that America has defaulted on this promissory note insofar as her citizens of color are concerned» Фразой «One hundred years later, the Negro lives on a lonely island of poverty in the midst of a vast ocean of material prosperity» он хотел донести до аудитории, что народ страны, в которой они живут и к которой они относятся живут иначе и мы тоже не должны жить в нищете.

Он в своей речи использовал «Мы», тем самым показывая, что все его речи и убеждения являются убеждениями всех присутствующих, а также продемонстрировал, что проблема, которую она озвучивает-является общей, вера, с которой он живет также является общей, и, наконец, мечта, которой он посвятил вторую часть своей речи, также является всеобщей мечтой. Его цель заключалась в мотивировании народа не отступать, не бояться и идти к цели: «There will be neither rest nor tranquility in America until the Negro is granted his citizenship rights. The whirlwinds of revolt will continue to shake the foundations of our nation until the bright day of justice emerges». [4, с. 42]

Его цель была в том, чтобы народ боролся до конца, при этом он следовал своим принципам и хотел добиться поставленным целям мирным путём. М. Л. Кинг был против жестокости. «But there is something that I must say to my people, who stand on the warm threshold which leads into the palace of justice. In the process of gaining our rightful place, we must not be guilty of wrongful deeds». Нам кажется, что помимо его личных качеств, на это еще влияло его понимание, что жестокость может вызвать осуждения и их цель уже потеряет значимость в глазах тех белых людей, которые уже перешли на сторону цветного населения и поддерживали их. «For many of our white brothers, as evidenced by their presence here today, have come to realize that their destiny is tied up with our destiny». Именно поэтому в своей речи он также обращался к белым, показывая тем самым, что они один народ и что им нужно идти вместе к справедливости, показывая, что это общая цель «They have come to realize that their freedom is inextricably bound to our freedom. We cannot walk alone».

В своей речи он также говорит о том, что знает, что всем присутствующим пришлось через многое пройти и несмотря ни на что нельзя отступать. Его речь сопровождается возгласами одобрения и согласия людей, собравшихся на площади. И, безусловно, это придает уверенности М.Л. Кингу «Go back to Mississippi, go back to Alabama, go back to South Carolina, go back to Georgia, go back to Louisiana, go back to the slums and ghettos of our Northern cities, knowing that somehow this situation can and will be changed. Let us not wallow in the valley of despair».

И с середины речи М.Л. Кинг начинает говорить о мечте. Каждая его новая фраза начинается со слов «I have a dream», где он затрагивает все важные аспекты жизни, начиная свободой, работой, образованием заканчивая детей. Эти слова не оставляет равнодушными аудиторию, что можно увидеть на видео: восторженные взгляды, крики, возгласы говорят о том, что оратору удастся добиться той цели, с которой он собрал всех. Его речь звучит уверенно и медленно. И, как мы уже писали выше, он использует множество приемов, что повлиять на аудиторию. И, несомненно,

после такого выступления, народ, у которого такие же мечты, цели и желания, будет следовать и способствовать тому, чтобы цель оратора была достигнута, так как это является всеобщей целью.

Выводы

М.Л. Кинг. Следовал концепции пассивного сопротивления Махатмы Ганди. Именно эта концепция служила основой для всех акций, которые проводил М.Л. Кинг. Смысл этого учения заключался в том, что Махатма Ганди не признавал никакого насилия. На протяжении более 30 лет он настойчиво проповедовал проповедовал свою философию, в которой он отвергал насилие и в конечном итоге, доказал миру эффективность ненасильственной политики. Благодаря усилиям Ганди, в 1947 году Индия стала независимой от Британии. Эта же тактика помогла М.Л. Кингу в борьбе за гражданские права цветного населения в США. М.Л. Кинг боролся против расовой дискриминации. Проанализировав речь «У меня есть мечта» по уровням языковой личности, мы увидели, что речь оратора не являются агрессивными. Его речи наполнены любовью и добром. Он призывает бороться с ненавистью проявлением любви и милосердия. И эта тактика, в конечном счете помогла добиться цели, которая заключалась в переменах и равноправии населения среди населения Америки. Его речь не оставляла равнодушной никого. К словам М.Л. Кинга прислушивались миллионы людей по всему миру. Оратор был очень образованным человеком, который действительно осознавал остроту нравственной и социальной проблемы Америки.

В данной статье мы более подробно рассмотрели языковую личность Мартина Лютера Кинга, подробно проанализировали речь Мартина Лютера Кинга. Прежде чем анализировать саму речь, мы привели факты из его биографии и рассмотрели его политический и психологический портреты.

В нашем исследовании был проведен анализ языковой личности Мартина Лютера Кинга и рассмотрена роль стилистических средств в речи американского политика, а именно Мартина Лютера Кинга «I have a dream». Мы провели анализ по модели С. Тульмина, где разобрали речь на Аргументативные Ходы, а также провели анализ языковой личности по трём уровням Ю.Н. Караулова.

Сформулируем общие выводы, на основе проделанной работы: Проанализированная публичная речь Мартина Лютера Кинга подходит под стандарт публицистического стиля с примененным для

этого стиля речи определенным набором стилистических приемов. Речь М.Л. Кинга является уникальной и особенной. Это можно утверждать, основываясь на те или иные средства выразительности. Речь Кинга достаточно метафорична. В ней преобладают так же такие лексические средства, как антитеза, параллелизм и др.

Для того, чтобы заострить внимание слушателей на том или ином факте, навязать свое мнение, оратор употребляет синтаксические средства выразительности. Большой популярностью Кинга пользуются метафоры, повторы (анафора), параллельные конструкции, антитезы. Во второй главе мы более подробно рассмотрели эти приемы, привели примеры и проанализировали послание оратора, посредством этих приемов.

В данной статье мы рассмотрели уровни языковой личности в контексте афроамериканского политического дискурса. Для анализа языковой личности мы применили трехуровневую систему Ю.Н. Караулова, которая включает в себя три уровня: Вербально-семантический, когнитивный, прагматический. Проведя данное исследования и анализируя речь Кинга, которая вошла в историю как одна из лучших речей, мы видим, что на всех уровнях проявляются важнейшие черты языковой личности, что отражает совокупность интеллектуальных, морально-волевых, социальных, коммуникативных качеств, сформированных под влиянием образования, воспитания, отношения окружения, современных проблем равноправия и его личных человеческих качеств. Речь «У меня есть мечта» действительно является примерной речью, в которой соблюдены все правила ораторского искусства для влияния и побуждения к действиям аудитории. Не зря эта речь является одной из самых лучших и сильных выступлений за последнее столетие. Ниже в статье мы приложили саму речь Мартина Лютера Кинга «I have a dream».

Речь Мартина Лютера Кинга «I have a dream»

I am happy to join with you today in what will go down in history as the greatest demonstration for freedom in the history of our nation.

1. Five score years ago, a great American, in whose symbolic shadow we stand today, signed the Emancipation Proclamation. This momentous decree came as a great beacon light of hope to millions of Negro slaves, who had been seared in the flames of withering injustice. It came as a joyous daybreak to end the long night of their captivity.

2. But one hundred years later, the Negro still is not free. One hundred years later, the life of the Negro is still sadly crippled by the manacles of segregation and the chains of discrimination. One hundred years later, the Negro lives on a lonely island of poverty in the midst of a vast ocean of material prosperity.

3. One hundred years later, the Negro is still languished in the corners of American society and finds himself an exile in his own land. And so we've come here today to dramatize a shameful condition.

4. In a sense we've come to our nation's Capitol to cash a check. When the architects of our republic wrote

the magnificent words of the Constitution and the Declaration of Independence, they were signing a promissory note to which every American was to fall heir. This note was a promise that all men—yes, black men as well as white men—would be guaranteed the unalienable rights of life, liberty, and the pursuit of happiness.

5. It is obvious today that America has defaulted on this promissory note insofar as her citizens of color are concerned. Instead of honoring this sacred obligation, America has given the Negro people a bad check—a check which has come back marked "insufficient funds."

6. But we refuse to believe that the bank of justice is bankrupt. We refuse to believe that there are insufficient funds in the great vaults of opportunity of this nation. And so we've come to cash this check—a check that will give us upon demand the riches of freedom and the security of justice.

7. We have also come to this hallowed spot to remind America of the fierce urgency of now. This is no time to engage in the luxury of cooling off or to take the tranquilizing drug of gradualism. Now is the time to make real the promises of democracy. Now is the time to rise from the dark and desolate valley of segregation to the sunlit path of racial justice. Now is the time to lift our nation from the quicksands of racial injustice to the solid rock of brotherhood. Now is the time to make justice a reality for all of God's children.

8. It would be fatal for the nation to overlook the urgency of the moment. This sweltering summer of the Negro's legitimate discontent will not pass until there is an invigorating autumn of freedom and equality. Nineteen sixty-three is not an end, but a beginning. Those who hope that the Negro needed to blow off steam and will now be content will have a rude awakening if the nation returns to business as usual.

9. There will be neither rest nor tranquility in America until the Negro is granted his citizenship rights. The whirlwinds of revolt will continue to shake the foundations of our nation until the bright day of justice emerges.

10. But there is something that I must say to my people, who stand on the warm threshold which leads into the palace of justice. In the process of gaining our rightful place, we must not be guilty of wrongful deeds.

11. Let us not seek to satisfy our thirst for freedom by drinking from the cup of bitterness and hatred. We must forever conduct our struggle on the high plane of dignity and discipline. We must not allow our creative protest to degenerate into physical violence. Again and again we must rise to the majestic heights of meeting physical force with soul force.

12. The marvelous new militancy which has engulfed the Negro community must not lead us to a distrust of all white people. For many of our white brothers, as evidenced by their presence here today, have come to realize that their destiny is tied up with our destiny. They have come to realize that their freedom is inextricably bound to our freedom. We cannot walk alone.

13. And as we walk, we must make the pledge that we shall always march ahead. We cannot turn back. There are those who are asking the devotees of civil

rights, "When will you be satisfied?" We can never be satisfied as long as the Negro is the victim of the unspeakable horrors of police brutality.

14. We can never be satisfied as long as our bodies, heavy with the fatigue of travel, cannot gain lodging in the motels of the highways and the hotels of the cities. We cannot be satisfied as long as the Negro's basic mobility is from a smaller ghetto to a larger one.

15. We can never be satisfied as long as our children are stripped of their selfhood and robbed of their dignity by signs stating "For Whites Only." We cannot be satisfied as long as a Negro in Mississippi cannot vote and a Negro in New York believes he has nothing for which to vote. No, no, we are not satisfied, and we will not be satisfied until justice rolls down like waters, and righteousness like a mighty stream.

16. I am not unmindful that some of you have come here out of great trials and tribulations. Some of you have come fresh from narrow jail cells. Some of you have come from areas where your quest for freedom left you battered by the storms of persecution and staggered by the winds of police brutality. You have been the veterans of creative suffering. Continue to work with the faith that unearned suffering is redemptive.

17. Go back to Mississippi, go back to Alabama, go back to South Carolina, go back to Georgia, go back to Louisiana, go back to the slums and ghettos of our Northern cities, knowing that somehow this situation can and will be changed. Let us not wallow in the valley of despair.

18. So I say to you today, my friends, so even though we face the difficulties of today and tomorrow, I still have a dream. It is a dream deeply rooted in the American dream that one day this nation will rise up and live out the true meaning of its creed — we hold these truths to be self-evident, that all men are created equal.

19. I have a dream that one day on the red hills of Georgia the sons of former slaves and the sons of former slaveowners will be able to sit down together at the table of brotherhood.

20. I have a dream that one day even the state of Mississippi, a state sweltering with the heat of injustice, sweltering with the heat of oppression, will be transformed into an oasis of freedom and justice.

21. I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin but by the content of their character. I have a dream today!

22. I have a dream that one day, down in Alabama, with its vicious racists, with its governor having his lips dripping with the words of interposition and nullification, one day right there in Alabama little black boys and black girls will be able to join hands with little white boys and white girls as sisters and brothers. I have a dream today!

23. I have a dream that one day every valley shall be exalted, every hill and mountain shall be made low, the rough places will be made plane and the crooked places will be made straight, and the glory of the Lord shall be revealed, and all flesh shall see it together.

24. This is our hope. This is the faith that I go back to the South with.

25. With this faith we will be able to hew out of the mountain of despair a stone of hope. With this faith we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood.

26. With this faith we will be able to work together, to pray together, to struggle together, to go to jail together, to stand up for freedom together, knowing that we will be free one day. This will be the day when all of God's children will be able to sing with new meaning, "My country 'tis of thee, sweet land of liberty, of thee I sing. Land where my fathers died, land of the pilgrim's pride, from every mountainside, let freedom ring." And if America is to be a great nation, this must become true.

27. So let freedom ring from the prodigious hilltops of New Hampshire.

28. Let freedom ring from the mighty mountains of New York.

29. Let freedom ring from the heightening Alleghenies of Pennsylvania.

30. Let freedom ring from the snowcapped Rockies of Colorado.

31. Let freedom ring from the cepaceous slopes of California.

32. But not only that.

33. Let freedom ring from Stone Mountain of Georgia.

34. Let freedom ring from Lookout Mountain of Tennessee.

35. Let freedom ring from every hill and molehill of Mississippi, from every mountainside, let freedom ring.

36. And when this happens, when we allow freedom ring—when we let it ring from every village and every hamlet, from every state and every city—we will be able to speed up that day when all of God's children,

black men and white men, Jews and Gentiles, Protestants and Catholics, will be able to join hands and sing in the words of the old Negro spiritual, "Free at last! Free at last! Thank God almighty, we are free at last!"

СПИСОК ЛИТЕРАТУРЫ:

1. Караулов Ю.Н. Русский язык и языковая личность. М.: Издательство ЛКИ, 2010. — 264 с.
2. American Heritage Dictionary of the English Language.
3. Baider F., Cislaru G. Linguistic Approaches to Emotions in Context. John Benjamins, 2014. — 338 p.
4. Carver T., Pikalo J. Political Language and Metaphor: Interpreting and changing the world. Routledge, 2008. — 296 p.
5. Chilton Paul A. Analysing political discourse: theory and practice. Routledge; Taylor & Francis e- Library, 2004. — 214 p.
6. Chloupek J., Nekvapil J. Studies in Functional Stylistics / ed. by Jan Chloupek, Jiri Nekvapil. Amsterdam: John Benjamins Publishing Company, 1993. — 293 p.
7. Joseph J.E. Language and Politics. Edinburgh: Edinburgh University Press, 2006. — 170p.
8. Trosborg A. Pragmatics across Languages and Cultures. De Gruyter Mouton, 2010. — 644 p.
9. Wilson J. Talking with the President: The Pragmatics of Presidential Language. Oxford University Press, 2015. — 288 p.
10. Онлайн словарь Urban Dictionary – urbandictionary.com
11. Стилистический энциклопедический словарь русского языка/ под ред. М.Н. Кожинной. – М.: Флинта: Наука, 2003 – 696с.
12. Толковый переводоведческий словарь/ Л. Л. Нелюбин.– 3– е изд., перераб.— М.: Флинта: Наука, 2003. — 320 с.

PHILOSOPHICAL SCIENCES

EXISTENTIALIST MOTIF IN THE STORY OF THE MOURNING BEAUTY BY M.AUEZOV

Elubaeva K.

Eurasian National University named after L.N.Gumilyev, Faculty of Social Sciences, Department of Philosophy, 2nd year Master's Degree student in Philosophy, Nur-Sultan, Kazakhstan

Abstract

The article is devoted to the topic of oppressive sorrows in the work of M. Auezov. The story of The Mourning Beauty ("Karaly Sulu") by the writer describes the tragedy of human nature, the skill of depicting the loneliness of man in the world.

Keywords: Suffering, existentialism, defenselessness, loneliness.

Works on the theme of homelessness, loneliness, helplessness in human nature are considered in philosophy within existentialism. "Existentialism develops in Kazakh literature in the late twentieth and early twenty-first centuries. Because the changes in the Kazakh society, the existential crisis, the spiritual decline led to the development of existence in culture and literature" [1, 207-208].

The stitching of M. Auezov's stories, which belong to the first stage of his work, did not easily fit into the space of realistic literature of the twentieth century. However, from the very first works it is possible to observe simple everyday events and situations that reveal the hidden "springs" of the characters governed by the laws of human life. In real historical situations, there is an intensification of general contradictions. In this way, a new interpretation of the traditional life material is given.

Early prose of M. Auezov is difficult and ambiguous in its aesthetic structure. The writer's transitions from tension to simplicity are explained by internal artistic features. It would be useful to consider the connection of philosophical thoughts with real life and the inner nature of creative pursuits, that is, the direct existence of philosophical concepts, postulates, the realization of such philosophical ideas allows us to talk about existentialism. At the same time, the search for the exchange of life and art shows the diversity of ideological and aesthetic orientation of the word painter.

Of course, it would be absurd to talk about the existing system of existentialism in the writer's work and its transformative role in literary activity, but it should be noted that there is such a special approach to life and culture, given the experience of real personal phenomena. From this point of view, it is worth noting that this type of thinking is typical of European and Russian writers, who are well acquainted with the work of the Kazakh writer. Therefore, the philosophical motifs in the first works of M. Auezov require individual research and contribute to the understanding of the depth of personal thought.

During the reorganization in the literature, it might have appeared that Mukhtar Omarkhanuly annoyed an "opponent" as Soviet government, but he was engaged in solving the problems that exist within us, but were invisible. The writer was interested in the drama of "local life", the role and significance of the

individual in answering the "vital" questions of the world order, the obstacles in human life. His "fact of life" and his concern as an author were reflected in his stories, and this peculiarity led him to think existentially. Perhaps the young writer wanted to test the viability of his philosophical knowledge based on his life experience.

The harmony of the world and man is one of the main themes of the first prose of the writer, where the existential formulation of certain problems is observed. From this point of view, we can consider such works as "The Day of the Defenseless", "Orphan", "Stories of the Land". In this regard, it can be seen that the author has identified two constant categories: content and story, and aims to revive it in the difficult life of the man. The phenomenon of being that accompanies the life of M. Auezov's characters, the nature of its understanding, the direction is determined by a qualitative worldview that was widespread in the early twentieth century.

Many stories of the artist and writer M. Auezov, who was able to write in depth about the problems of existentialism inherent in Kazakh life, include works dedicated to loneliness, including the tragic life of a woman. One of the best and unique stories of the author on this topic is The Mourning Beauty.

The first version of M. Auezov's story, The Mourning Beauty was published in the Dawn magazine (Tan) in Semey in 1925, issue 2 (pages 79-92) under the pseudonym The Walking Word Man. The second version was included in the collection called In the Shadow of Antiquity in 1935. The story was written by the writer while teaching at a pedagogical college in Semey. From the theme of the story of The Mourning Beauty we can see that the writer at that time did not focus on politics, but on human, and human feelings, and wrote literary works of art. There is a big difference between the two stories. The main feature is that the first version of the writer is written in a romantic style, which depicts the fidelity of a girl, and the second version portrays a woman who resisted lust but could not win. In the first version, Karagoz doesn't give in to temptation and doesn't fall into Bolat's arms. As we know, Karagoz fell into the river in her dress, and hit her feet on the rocks in the water. She healed the pain in her soul with the physical pain, hugged her Mukash and went back to sleep. And in the well-known versions she gave in. What is the force behind such final

changes? Otherwise, we have no right to blame Karagoz, who is depicted within such a big psychological image. We can assume that the Soviet ideology of the time stood behind making such changes to the second version of the story. Given that Karagoz, a widow of aristocratic descent who had been faithful to her husband for six years, could not fall into the arms of a poor Bolat. Undoubtedly, the work of the writer was influenced by the political government of that time. He may have made such changes only in an age when the truth was hidden, as it was the only way for his works to be published. Whatever the reason, we do not know it.

The tragic character in the story of *The Mourning Beauty* is Karagoz. In the work, which touches on a woman's drama, the feelings of the only widow in the village, her inner sorrow and grief are told. The very beginning of the work shows that the life of the mourning Karagoz with heavy fate is meaningless, colorless and hopeless. In describing moments from her life experience, the writer often uses the word "black" («қара»): "mourning" («қаралы»), "sad" («қайғылы»), "black wind" («қаражел»), "black mood" («қаралықұй»), "black snake" («қаралыжылан»). This means that the ideological nature of the story makes the widow's life meaningless. Karagoz is defenseless. She doesn't believe that she will ever get married and experience love life again. She blocked that path out for ever and just locked the door so that it would not open. After the death of her beloved husband, she vowed in public not to marry ever again. For that her people honor her, upraise her. The very name "The only widow of the village" shows that Karagoz's condition is so deplorable. The writer was able to reveal the theme of loneliness in philosophy through Karagoz. Nobody oppresses her in the story. However, her enemy is inside, not outside. Her main enemy is her femininity. The pain and anguish of a woman who has been fighting the enemy for six years are known only to herself. The people, who have long forgotten about Azimkhan's death, are somehow less concerned about her sorrow. There are even no grandmothers or elders in the village who care about the fate of the widow. That's why she is defenseless. Her patience was almost exhausted as she continued to stay alive for the sake of her son, who had been her only joy and hope for the future. The writer does not even show that little gleam of the light which could come into her life. Even the son is not portrayed as a one to alleviate his mother's grief. As the story unfolds, we see Karagoz's lonely soul and suffering. While fighting her inner enemy at night, seeing during the day the women and girls laughing and enjoying life, especially witnessing Bolat having fun with them, even though he is an old man, only aggravate her grief.

Since existentialism is a branch of philosophy that deals with the suffering of human life, in addressing this topic, M. Auezov compares the loneliness of women with nature. The harmony of the night with the description of a young man and a young woman sitting on the bank of the river under the bright moon, the stone-cold river, which was seen as the only savior by

Karagoz, barefoot in her dress and not noticing the heat of feelings, intensifies the protagonist's grief. In addition, the writer pays special attention to the peak of Karagoz's pain, the time of nature, between day and night: "... Every day, people, happy with their lives, were in their sleep at night, while in her sadness, covered with her blackkerchief were crying her heart out." [2, 220]. Her bitter cry and monologues are heartbreaking. Twilight, the time between day and night is the most hated time for Karagoz. It causes a constant pain for her to experience every single day a moment when her wound is bleeding, her face is open and the soul is visible. The tragedy of Karagoz is that she crossed out the worldly pleasures and for Mukash gave up on man and vowed to be a widow for the rests of her life. That's why she hasn't been interested in anything for six years. Life moves along its own course, and so she got nothing to do but to swim inconsolably with that stream. This world is alien to her. Not only the universe deprived her of the sweets of life, but also took away her other one from her. She suffered more than the pain of the body. Her soul is so full of wounds. Getting rid of the pain of the soul leads to getting rid of the pain of the body. M. Auezov clearly calls her lust a "black snake". Karagoz's main enemy is stronger than her. Both the reader and the writer know it. But the character of the protagonist, who gave up on life and turned in on herself, has also changed. Inner sorrow causes an unknown disease. Her quick temper, tears, and laughter at the same time are all part of this pain.

Karagoz does not see physical suffering, the writer depicts the severity of her moral and emotional suffering in deep psychological circles. Describing the air of spring and a good mood while walking, the writer says that the widow is alienated from this society, doesn't belong there: "There walks Karagoz, in the middle of the crowd, saddened and grief-stricken, the only widow who is the owner and the leader of this nomad camp" [2, 215]. The image of Karagoz described in this way does not give good hopes for the future. Bolat's lightsome fun with young girls, and the fact that Karagoz has no choice but to take this in her stride, further aggravate her sorrow. You really feel sorry for this woman. At the age of 32, she has already suffered so much and it is also sad to realize that the vow she made costs a lot.

The turning point of the work is the defeat of Karagoz, who in an attempt to fight that snake in the middle of the day, before the twilight, saw the forest and fled to it. That is the lust, the wolf snake that the woman was fighting so hard. Her honor, nobility were erased due to lust, human weakness. Eventually, she fell into an old man Bolat's arms. The question is not about who he was. Karagoz, who could not even put this wildfire of passion down by the icy water, finally lost.

The idea of the story is the winning of lust and passion over the woman firmly tied to the oath of faithfulness. In this story, Karagoz's desire and attraction to life can be seen as a sign of a modernism. The ideological meaning of the work is to show how love, attraction can overcome dogma, firmness of spirit. The uniqueness of the characters, the isolation of

extraordinary destinies above the situation, the tragic death of a loved one, the aesthetics of love are the hallmarks of the poetics of the romantic epic. The rotating nature of time (spring, six years) and space (return to Kayindy after Azimkhan's death) gave a romantic content to the story"[5]. The life of the defenseless and lonely Karagoz was described by the writer M. Auezov with very delicate and deep psychological threads. This story is so relevant that it was staged in the theater and is one of the best works about a Kazakh woman, whose psychology is widely revealed.

Given that the current of existentialism deepens the contradictions in life, reveals that man is alone in life during the period of conflict of consciousness, M.

Auezov's story of *The Mourning Beauty* fully meets the requirements of this trend.

REFERENCES:

1. Orazbek M. Author and creative process: Monograph. - Almaty: Atamura, 2006. - 486 p.
2. Auezov M. Works. The first volume. Stories and short stories. - Almaty: Writer, 1967. - 446 p.
3. Amanshaev E. In search of a legend. - Astana: Saryarka Publishing House, 2013, - 384 p
4. Controversy in the stories of M. Auezov
<https://bankreferatov.kz/adebiettanu/1855-2011-05-13-15-55-38.html>
5. About short prose by Mukhtar Auezov.
http://old.adebiportal.kz/kz/news/view/muhtar_auezov_shagin_prozasi_hakinda__22302

PHYSICAL SCIENCES

ELECTRICAL AND OPTICAL PROPERTIES OF RHENIUM COVERED BY GRAPHITE MONO LAYER

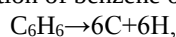
Orujov A.,
Assoc. Prof. PhD
Rustamova S.
Master degree
Baku State University

Abstract

The study of the electrophysical properties of the Re-C system by the catalytic dissociation of CsCl molecules and thermionic emission by TEE methods shows that a graphite monolayer is formed on the rhenium layer when the rhenium layer is heated to benzene vapors and saturated with carbon atoms to $T \leq 1800$ K and then lowers the temperature. As an example, $50 \times 1,5 \times 0,02$ mm³ rhenium layer (the layer is polycrystalline) was used. Recrystallization of rhenium layer at $T = 2300-2400$ K is obtained after heating for several hours at alternating current. After heating, the recrystallized rhenium layer becomes homogeneous in terms of output (no anomalous Schottky effect is observed).

Keywords: graphite, output, thermoelectron emission, surface ionization, diffusion, mass spectrometry

We used layer-shaped materials to study the electrophysical properties of the Rh-C, Re-C system. The output of the recrystallized rhenium layer was determined by the surface ionization method (TEE) of the difficult ionizing element - indium. Both methods of determining the output give almost the same results. At the beginning, the resistance of the recrystallized rhenium layer was $R_{20}^0 C = 0,29$ Ohm. After the Re (1010) surface was taken, $T = 1600$ K heated layer was stored in $P_{C_6H_6} = 2 \cdot 10^{-5}$ Torr pressurized benzene vapors. The decomposition of benzene occurs as follows



hydrogens combine with volumetric oxygen, form water vapor and are absorbed by the pump. In order to obtain a graphite monolayer on the surface of rhenium, as in the case of polycrystalline rhenium layer, the carbon atoms obtained by the decomposition of benzene molecules on the surface of the heated rhenium layer diffuse into the volume of rhenium until the concentration of carbon atoms increases, dissolves at a given temperature, and then a graphite monolayer forms on

the surface of Re (1010) (Fig.1). This process continues $\approx 30-40$ minutes. To obtain a carbon monolayer on rhenium, a graphite monolayer on rhenium in the interval $T = 1600-1800$ K was obtained by releasing C_6H_6 benzene vapor as a pressure of $3 \cdot 10^{-2}$ Torr from a special gas discharge system (Fig.2). The production of carbon monolayer was determined based on the increase in thermoelectric emission current and surface ionization of CsCl molecules. Calculations based on known currents and temperatures show that the output decreases from 5.1 eV to 4.5 eV, and in particular the ion current of Cs atoms resulting from the dissociation of CsCl molecules decreases sharply. It was determined that the ionization coefficient on the surface of Re-C was reduced by about a thousand times. Figure 10 shows one of the numerous dependencies of the thermoelectron emission current of the sample at a constant temperature $T = 1600$ K, the surface ionization ion I^+ currents of I^- , CsCl and KI molecules in the benzene vapor of the layer ($P_{C_6H_6} = 2 \cdot 10^{-5}$ Torr).

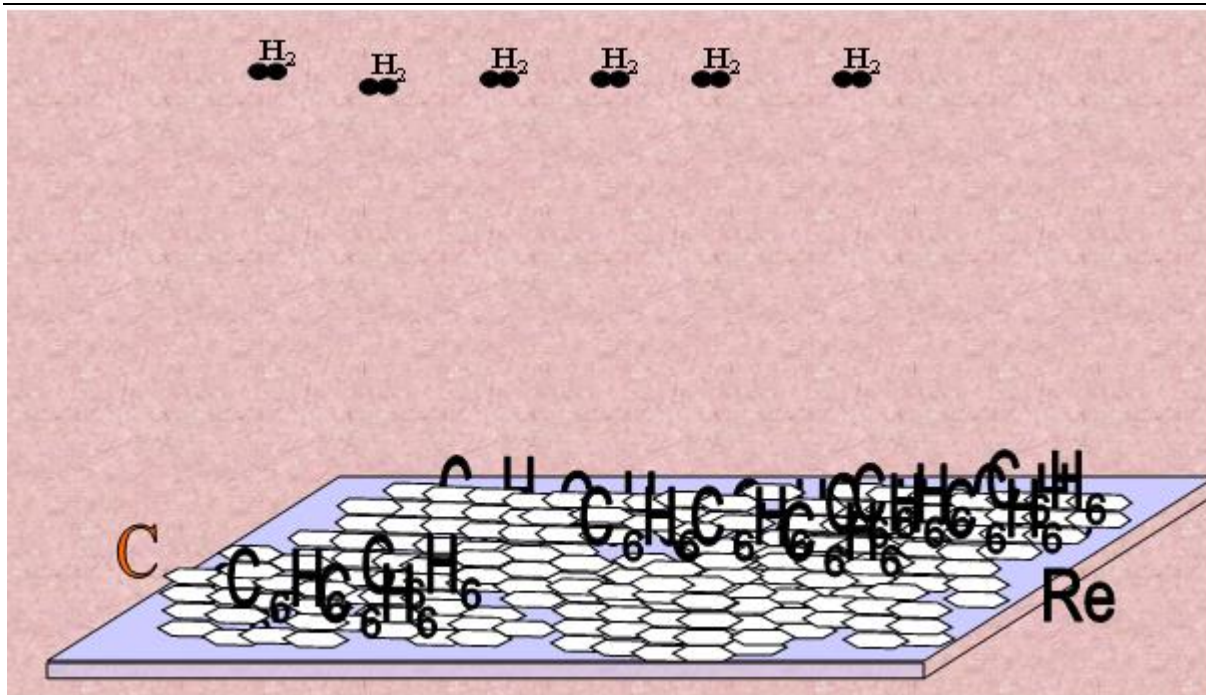


Figure 1. Model of formation of graphite monolayer on the surface of rhenium

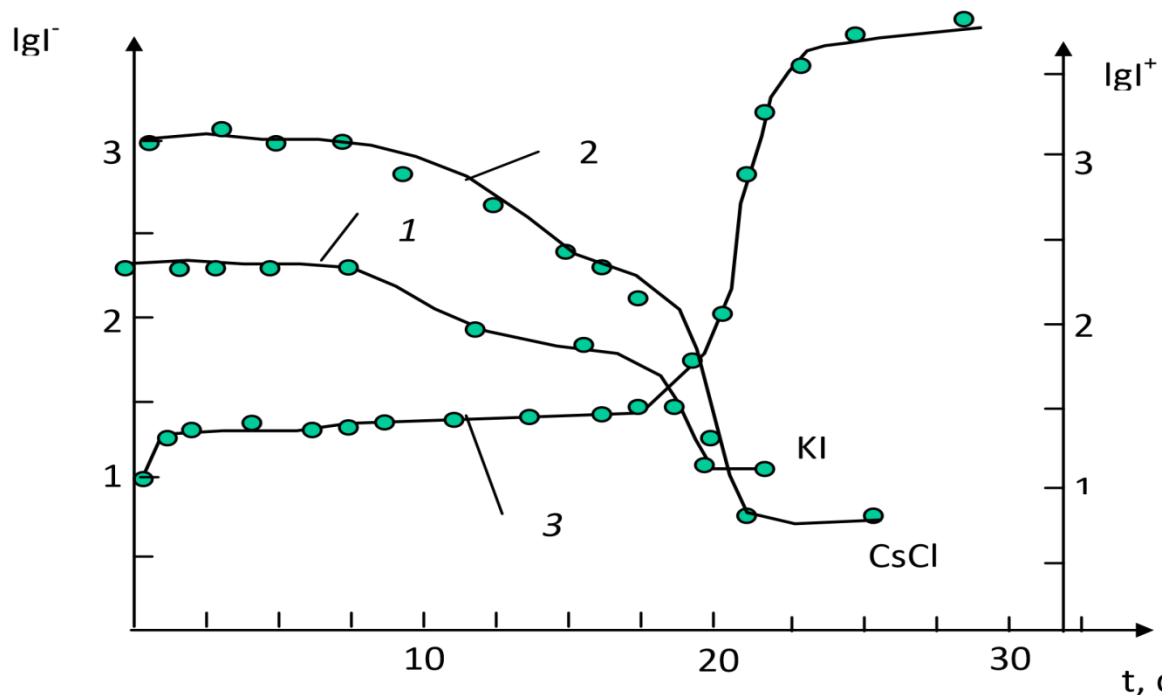


Figure 2. Time dependence of ion (1; 2) and electron currents (3) when the Re layer is stored in benzene vapor
 $P_{C_6H_6} = 2 \cdot 10^{-5}$ Torr, $T = 1600$ K.

In this case, the resistance of the rhenium layer was recorded to increase from the value at room temperature from $R_{20}^0 C = 0,29$ Ohm to 0.46 Ohm. It is known that the characteristic features of the formation of a graphite monolayer in metals (Ir, Rh, Re) are a decrease in the dissociation coefficient of CsCl molecules on a clean surface from 1 to $\sim 10^{-3} \div 10^{-5}$ (for Me - C) and a change in the output of the metal (~ 4.5

eV). We used this feature of the Me-C system in the study of Re-C. When the temperature of the sample is increased from the graphite extraction (dissolution) temperature (5-10) K, the surface of the rhenium is cleared of the graphite monolayer, as well as the carbon atoms are dissolved in the volume of rhenium. The output of the Re-C layered system was determined by the surface ionization of

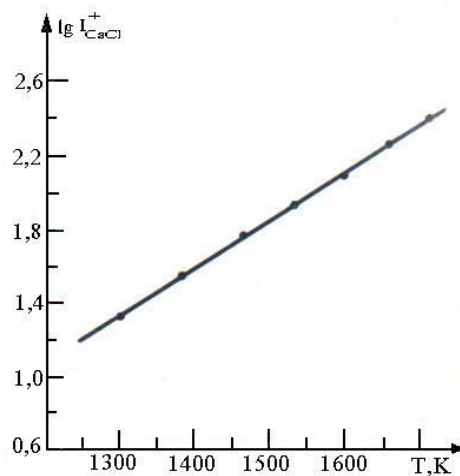


Figure 4. Temperature dependence of the ionization current of the CsCl molecule on the surface of rhenium coated with a graphite monolayer $\lg I_{CsCl}^{+} = f(T)$.

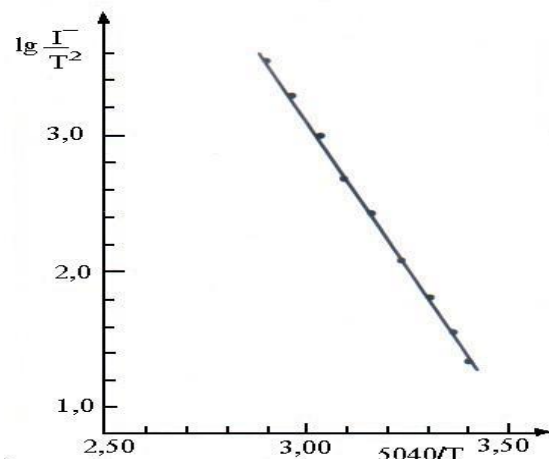


Figure.3. Richardson graph for graphite monolayer rhenium (1010)

CsCl molecules and the TEE method according to the temperature dependence of ionic and electron currents according to the Sax-Langmur and Richardson formulas (Figures 3 and 4). The value of the output gave practically the same result for both methods ($\epsilon\phi = 4.5$ eV), which corresponds to the output Re (1010) -C [10]. After saturating the volume of rhenium with carbon atoms at a constant temperature to a certain limit, as in the case of polycrystalline rhenium wire, the surface of rhenium is cleared of graphite when the temperature of the rhenium layer increases by $\Delta T = 20 \div 30$ K. In this case, the carbon atoms on the surface either enter the volume of rhenium or are desorbed from the surface. After these processes, at a certain incandescent current greater than $T_1 = 1600$ K, the TEE current from the clean surface decreased slightly compared to carbon diffusion. After these processes, at a certain incandescent current greater than $T_1 = 1600$ K, the TEE current from the clean surface decreased slightly compared to carbon diffusion. This decrease can be explained by an increase in the integrated emission capacity of the Re-C system. Since the resistance of carbon to the rhenium increases significantly as a result of its diffusion, the strength released at a given heat must increase. The decrease in rhenium temperature can be found by comparing TEE currents from a clean surface before and after the diffusion of carbon from the Richardson formula. The determination of the working function of the Re layer showed that the output function of rhenium does not change as a result of carbon diffusion; the facet (1010) is not rearranged. The change in integrated radiation emission can be estimated by comparing two values of filament current corresponding to the same temperature (i.e., same TEE current) from Re before and after carbon diffusion. As the current at high temperature is released mainly in the form of radiation, we can write it like this:

$$W = I^2 R \cong \epsilon_T \sigma T^4, \quad (1)$$

therefore we obtain from the condition $T = \text{const}$

$$\frac{\epsilon_{T_1}}{\epsilon_{T_0}} \approx \left(\frac{I_1}{I_0}\right)^2 \cdot \frac{R_1}{R_0}, \quad (2)$$

here, σ is Stefan-Boltzmann constant, ϵ_{T_1} and ϵ_{T_0}

are I_1 and I_0 are the corresponding integral black radiation coefficients, and R_1 and R_0 are the currents for heating the layer, and the electrical resistance of the layer after diffusion and before diffusion. When rhenium was saturated with carbon in benzene vapor at a pressure of $P_{C_6H_6} = 5 \cdot 10^{-5}$ Torr, the resistance of rhenium $R_{20^\circ C}$ increased from 0.29 Ohm to 0.52 Ohm, and respectively, $R_1 / R_0 = 1.79$. Then, knowing that $I_1 / I_0 = 1.01$, we can find pure rhenium at $T = 1600$ K for Re (1010) -C. The temperature dependence of the TEE and SI currents of CsCl molecules with decreasing temperature of the carbon-saturated rhenium layer at $T \leq 1800$ K was characteristic for the corresponding temperature dependences on the surface of the metal-graphite monolay system. On the other hand, it is known that the concentration of the limiting solubility depends on the temperature and should decrease as T decreases. Then the question occurs about the escape of "excess" carbon atoms with a decrease in rhenium temperature. When the temperature of the rhenium layer is lowered, it is necessary to consider the need to remove the "excess" carbon atoms from the Re-C system, since the volumetric phase transition of carbon atoms saturated with carbon atoms does not occur.

REFERENCES:

1. Orujov A.K. Adsorption and desorption of samarium atoms on the surface of iridium and iridium coated with a monolayer of graphite. Journal "Physics of Metals and Metal Science". Yekaterinburg, 2009, volume 109, issue 1, p.58-62

2. Orujov A.K. Modification of the physical properties of iridium with a surface monolayer graphite film due to intense diffusion of potassium atoms. Journal "Physics of Metals and Metal Science". Yekaterinburg, 2011, volume 111, no. 6, p. 626–627.

3. Fomenko F.S. Emission properties of materials. Kyiv, Naukova Dumka, 1981, p.338

TECHNICAL SCIENCES

METHODS OF ECOLOGIZATION OF SUGAR PRODUCTION WITH THE PURPOSE OF REDUCING EMISSIONS INTO THE ATMOSPHERE

Ovcharuk V.,

PhD, Docent, Associate Professor of the Department of Informatics, National University of Food Technologies, Kyiv, Ukraine

Yushchuk I.

Senior Lecturer of the Department of Informatics, National University of Food Technologies, Kyiv, Ukraine

МЕТОДИ ЕКОЛОГІЗАЦІЇ ЦУКРОВОГО ВИРОБНИЦТВА З МЕТОЮ ЗМЕНШЕННЯ ВИКИДІВ У АТМОСФЕРУ

Овчарук В.

К.т.н., доцент, доцент кафедри інформатики, Національний університет харчових технологій, Київ, Україна

Ющук І.

Старший викладач кафедри інформатики, Національний університет харчових технологій, Київ, Україна

Abstract

The paper studies influence of the size of equipment for saturation in crude juice purifying process in sugar production. Mathematical model for calculation of carbonation process is developed. It is established that theoretical size of saturator is smaller than the size of machines used in sugar factories. Saturation of carbonation gas with carbon dioxide has negative impact on its utilization rate.

Анотація

Робота присвячена дослідженню впливу розміру обладнання для сатурації в процесі очищення дифузійного соку в цукровому виробництві. Розроблена математична модель для розрахунку процесу карбонізації. Встановлено, що теоретичний розмір сатуратора менше тих апаратів, що використовуються на цукрових заводах. Насичення сатураційного газу діоксидом вуглецю негативно впливає на коефіцієнт його використання.

Keywords: calculations optimization, crude juice purifying, sugar production.

Ключові слова: оптимізація розрахунку, очистка дифузійного соку, цукрове виробництво.

Викиди CO₂ промисловими підприємствами кожний рік збільшуються на 2,7% і на 2021 вони на 60% більші рівня 1990 року — базового року для Кіотського протоколу [1].

У виробничі сезони викиди цукровими заводами парогазових сумішей в атмосферу є звичним явищем і сприймаються як неминучість. Внаслідок діяльності підприємств цукрової промисловості відбувається забруднення атмосферного повітря, що призводить до зміни його хімічного складу та фізико-хімічних властивостей. На підприємствах існує сімнадцять стаціонарних джерел викидів, з яких викидається п'ятнадцять забруднюючих речовин. Для таких підприємств викиди діоксиду карбону є значною та невирішеною проблемою [3].

Серед них найбільшими за кількістю та агресивністю є викиди відпрацьованого сатураційного газу з апаратів першої та другої сатурацій.

В складі відпрацьованого сатураційного газу знаходиться до 15% невикористаного діоксиду вуглецю, краплі води та водяна пара. Кількісна оцінка викидів в кожному конкретному випадку залежить від багатьох факторів. Основними з них є якість виробництва сатураційного

газу, досконалість обладнання для проведення процесу сатурації та дотримання оптимальних режимів його роботи. Для заводу середньої продуктивності 3000 т буряків/добу об'єм викидів на першій сатурації досягає 5000 м³/год., на другій сатурації — 2000 м³/год.

Апарати першої сатурації мають низький коефіцієнт використання діоксиду вуглецю, великі втрати тепла з сатураційним газом, який покидає апарати сатурації, і, як наслідок, велика забрудненість атмосфери CO₂ з відпрацьованим сатураційним газом. Прості розрахунки матеріального балансу по діоксиду карбону показують, що в відпрацьованому сатураційному газі з апарату першої сатурації концентрація CO₂ достатньо висока і достатня для використання цього газу в процесі II сатурації.

Зменшення обсягу викиду діоксиду карбону можна досягнути шляхом інтенсифікації процесу абсорбції його гідроксидом кальцію. Основними факторами, які впливають на швидкість абсорбції діоксиду карбону, є ступінь диспергування фаз, що контактують, та парціальний тиск газу. Типові апарати, які використовуються в цукровій галузі промисловості, працюють при атмосферному тиску з

диспергуванням газової фази в рідку. Ефект абсорбції діоксиду карбону складає —35%. Значної інтенсифікації процесу можна досягнути при проведенні сатурації в апаратах під тиском з диспергуванням рідкої фази в газову.

Запропоновано декілька схем підвищення утилізації CO_2 за рахунок повторного використання CO_2 з відпрацьованого сатураційного газу апаратами першої та другої сатурації. Так, згідно схеми [8] пропонується спосіб сатурації цукрових розчинів, оснований на використанні відпрацьованого сатураційного газу першої сатурації в якості сатураційного газу на другій сатурації. Це зменшує загальні витрати газу на проведення процесів сатурації та заощаджує паливо, що використовується для його отримання в вапняково-обпалювальній печі.

Ефективним способом підвищення використання діоксиду карбону в апаратах першої та другої сатурації є розпилювання цукрового розчину в надсоковому просторі, або розпилювання в додатково встановленому абсорбері, який являється першою ступенню сатурації [5].

Втрати можливо зменшити при збільшенні використання діоксиду карбону шляхом модернізації апаратів. Підняття рівня соку в апараті першої сатурації з 4 м до 6 м приводить до збільшення коефіцієнта використання CO_2 до 70%, що еквівалентно зменшенню теплових втрат на 1% до маси буряків [4].

Ще одним способом модернізації апаратів сатурації є їх секціонування при загальному прямотоці роботи секцій [7]. На першій та другій сатураціях процес пропонується проводити у модернізованому апараті сатурації з першою розпилюючою стадією контакту фаз під надлишковим тиском та наступною – барботажною. Отримані дані свідчать про збільшення використання CO_2 в двохсекційному сатураторі майже на 20%. Цукрові розчини після обробки в такому сатураторі

мають вищі якісні показники, що дозволяє на заключній стадії отримати більше кристалічного цукру. Середній показник коефіцієнту використання діоксиду карбону на 15-20% вищий за аналогічний показник в типовому сатураторі.

Недоліком такого способу підвищення використання CO_2 є значно збільшені затрати енергії, встановлення додаткових приладів, заміна обладнання на більш потужне.

Було проведено дослідження по оптимізації процесу розрахунку обладнання, що призначене для поглинання діоксиду карбону з метою нейтралізації гідроксиду кальцію при очищенні дифузійного соку в цукровому виробництві. З цією метою була розроблена математична модель розрахунку технологічного процесу сатурації, параметрична схема якої наведена на рис.1.

На першій сатурації з участю карбонату кальцію завершується формування осаду з необхідними для його відокремлення седиментаційними та фільтраційними властивостями. На кількості вилучених із соку на першій сатурації нецукрів адсорбцією та кристалізацією поряд з витратами вапна значно впливають такі параметри: вміст гідроксиду кальцію в соку під час кристалізації карбонату кальцію, температура, швидкість поглинання діоксиду карбону, площа поверхні та величина заряду часток карбонату кальцію, лінійна швидкість кристалізації карбонату кальцію та ін.

Високий показник ступеня використання діоксиду карбону забезпечує роботу заводу без перевитрат вапняку, палива та енергії, значно поліпшує керування першою сатурацією, а також суттєво призводить до зменшення обсягу викиду діоксиду карбону в атмосферу. На ступінь використання діоксиду карбону впливають такі параметри: вміст гідроксиду кальцію в соку, що містився в сатураторі, поверхня розділу між соком та газом, інтенсивність перемішування соку та ін.

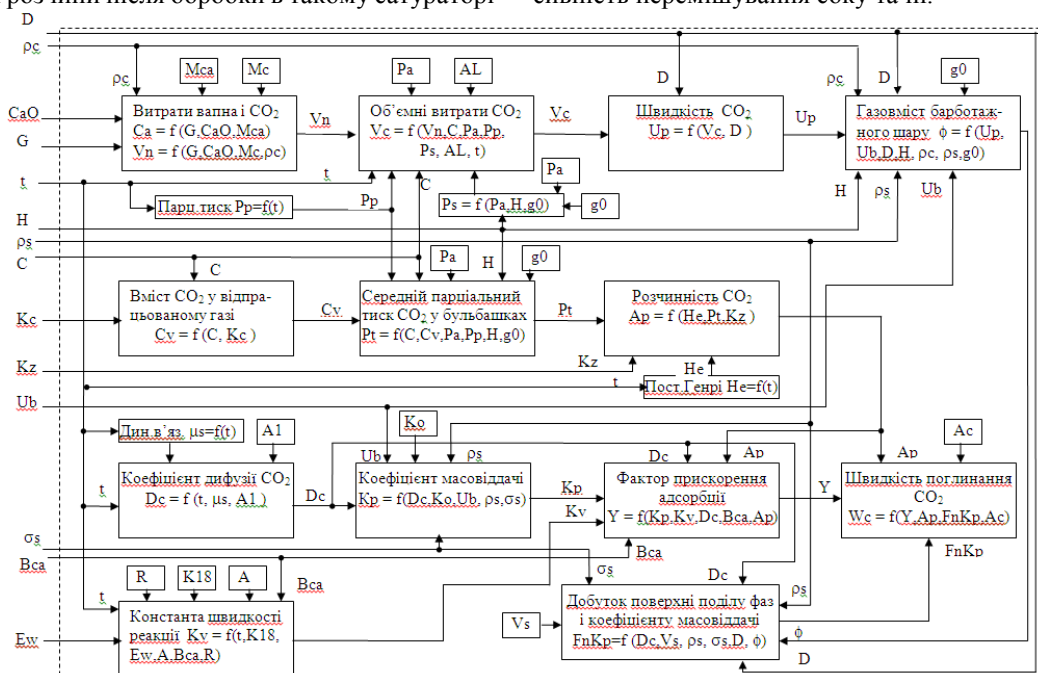


Рис.1. Параметрична схема математичної моделі розрахунку швидкості поглинання CO_2 в сатураторі.

Досліджувалось вплив технологічних параметрів процесу, конструктивних розмірів апарата і характеристик сатураційного газу на швидкість поглинання CO_2 лужним соком. Кінцевою метою цієї роботи є досягнення оптимального значення діаметру сатуратора в залежності від вмісту діоксиду карбону в сатураційному газі.

На математичній моделі першої сатурації досліджувався вплив конструктивних розмірів апарату: діаметра апарату, висоти соку в апараті, і технологічних параметрів: вмісту CO_2 в сатураційному газі, витрат вапна на очищення, температури соку в апараті, швидкості спливання газових бульбашок на швидкість поглинання CO_2 лужним соком. Математична модель складається з рівнянь, що описують гідродинаміку руху бульбашок сатураційного газу в сатурованому соку, а також рівнянь для опису масообміну в апараті з урахуванням розрахунку поверхні поділу фаз і коефіцієнтів дифузії діоксиду карбону і масовіддачі при абсорбції в рідинному середовищі.

Зменшення кількості викидів за рахунок покращення гідродинамічних умов ведення процесів і збільшення коефіцієнта використання CO_2 в сатураторах можливо досягти при максимальній швидкості процесів масопередачі, які відбуваються при оптимальних значеннях гідравлічного опору обладнання і залежать від висоти шару продукту, що обробляється, його газовмісту, швидкості руху газової фази.

Швидкість поглинання діоксиду карбону:

$$Wc_i = Y_i \cdot Fn \cdot Kp_i \cdot (Ap - Ac),$$

де Y_i – фактор прискорення абсорбції; Fn – питома поверхня поділу фаз, $\text{м}^2/\text{м}^3$; Kp_i – коефіцієнт масопередачі, $\text{м}/\text{с}$; Ap – розчинність CO_2 у цукровмістних розчинах, $\text{кмоль}/\text{м}^3$; Ac – початкова концентрація CO_2 у соку.

Коефіцієнт масопередачі виражає собою кількість речовини, що переходить з однієї фази в іншу за одиницю часу через одиницю поверхні контакту фаз. При проведенні масопередачі важко розчинних газів, яким і є CO_2 , опір масопередачі зазвичай знаходиться зі сторони газової фази та залежить від її швидкості:

$$Kp_i = \frac{\sqrt{Dc \cdot Ko \cdot Ub_i^3 \cdot \rho_s}}{2 \cdot \sigma_s},$$

де Dc – коефіцієнт дифузії CO_2 у цукровмістних розчинах, $\text{м}^2/\text{с}$; Ko – коефіцієнт опору; Ub_i – швидкість спливання газових бульбашок, $\text{м}/\text{с}$; ρ_s – густина соку, $\text{кг}/\text{м}^3$; σ_s – поверхневий натяг на поверхні поділу фаз сік–газ, $\text{Н}/\text{м}$.

При оптимізації був врахований взаємозв'язок вище перерахованих параметрів процесу і зроблений контрольний розрахунок. За табличними даними отримані рівняння, які використані в моделі. Це величина сталої Генрі для температур у межах $20 - 90^\circ\text{C}$, яку визначали за формулою, що отримана методом найменших квадратів з абсолютною похибкою, яка становить $\delta^2 = 1,6 \cdot 10^{-2}$, величина парціального тиску водяної пари, яку визначили за рівнянням, що отримано з абсолютною похибкою $\delta^2 = 4,818 \cdot 10^{-3}$ і значення динамічної в'язкості соку, яка отримана по апроксимованій з середньоквадратичною похибкою $\delta^2 = 5,38 \cdot 10^{-10}$.

Було встановлено, що при зниженні вмісту діоксиду карбону в сатураційному газі до 20% ступінь його поглинання зростає приблизно до 70%.

Так для заводу потужністю по переробці 3000 тисяч тон буряків на добу, з витратами на очищення 2,5% CaO до маси буряків і висотою соку в сатураторі 3,5 метри зменшення діаметра апарату з трьох до двох метрів і зменшенням швидкості спливання бульбашок сатураційного газу від 0,3 до 0,1 $\text{м}/\text{с}$ приводить до зростання швидкості поглинання CO_2 (рис. 2).

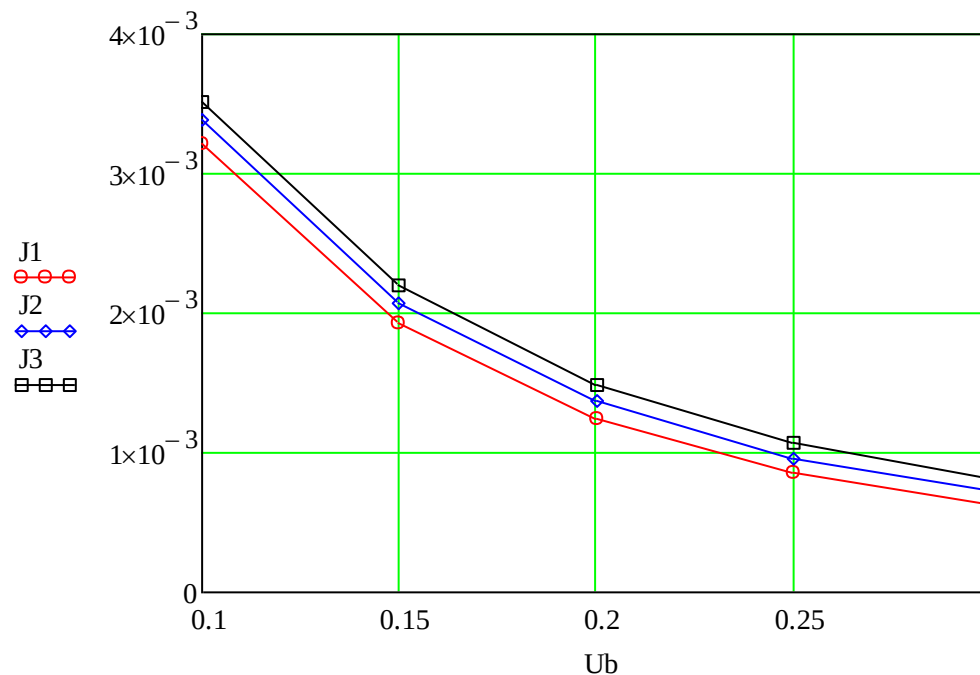


Рис.2. Залежність швидкості поглинання CO_2 від швидкості спливання бульбашок U_b і діаметра апарату (J1 – 3 м; J2 – 2,5 м; J3 – 2 м).

Аналіз рівнянь масопередачі у моделі показує, що створення обладнання для проведення першої сатурації, в якому процеси масопередачі відбуваються з високою інтенсивністю, однозначно приводить до зменшення викидів CO_2 у навколишнє середовище.

СПИСОК ЛІТЕРАТУРИ:

1. Cuellar-Franca, R. M. Carbon capture, storage and utilisation technologies: A critical analysis and comparison of their lifecycle environmental impacts [Text] / R. M. Cuellar-Franca, A. Azapagic // Journal of CO₂ Utilization. — 2015. — Vol. 9. — P. 82–102. doi:10.1016/j.jcou.2014.12.001
2. Duraccio, V. Carbon capture and reuse in an industrial district: A technical and economic feasibility study [Text] / V. Duraccio, M. G. Gnani, V. Elia // Journal of CO₂ Utilization. — 2015. — Vol. 10. — P. 23–29. doi:10.1016/j.jcou.2015.02.004
3. Fairbairn, E. M. R. Cement replacement by sugar cane bagasse ash: CO₂ emissions reduction and potential for carbon credits [Text] / E. M. R. Fairbairn, B. B. Americano, G. C. Cordeiro, T. P. Paula, R. D. Toledo Filho, M. M. Silvoso // Journal of Environmental Management. — 2010. — Vol. 91, № 9. — P. 1864–1871. doi:10.1016/j.jenvman.2010.04.008
4. Вискребцов, В. Б. Інтенсифікація технологічних процесів в цукровій промисловості

на основі ежекційних методів / В. Б. Вискребцов, В. В. Пономаренко // Харчова наука і технологія. — 2011. — № 3 (16). — С. 87–90.

5. Досвід впровадження в виробництво високоефективного тепло- та масообмінного обладнання. Від теорії до впровадження / В. А. Мельник, В. О. Бойко, М. О. Прядко, С. А. Наумчик та ін. // Цукор України. — 2017. — №2 (134). — С. 12–17.

6. Мартинюк, А. С. Підвищення ефективності очищення дифузійного соку шляхом удосконалення і карбонізації [Електронний ресурс] : автореф. дис. ... канд. техн. наук : спец. 05.18.05 / А. С. Мартинюк ; Національний університет харчових технологій. — Київ, 2017. — 23 с. — Режим доступу до Електронного архіву Національного університету харчових технологій : <http://dspace.nuft.edu.ua/jspui/handle/123456789/25929> (дата звернення: 22.06.2018).

7. Пономаренко, В. В. Спосіб підвищення ефективності роботи сатураційних апаратів [Текст] / В. В. Пономаренко // Цукор України. — 2014. — № 7(103). — С. 13–16.

8. Рева, Л. П. Фізико-хімічні основи технологічних процесів очищення дифузійного соку у виробництві цукру : монографія / Л. П. Рева ; Національний університет харчових технологій. — Київ : НУХТ, 2015. — 371 с.

DEVELOPMENT OF METHODS OF EXPERIMENTAL AND ANALYTICAL RESEARCH OF METAL FLOW IN THE CENTER OF DEFORMATION OF ALUMINUM ALLOYS DURING COMBINE PARTS ROLLING

Puzyr R.,

Doctor of Technical Sciences, Associate Professor

Department of Mechanical Engineering

Kremenchuk Mykhailo Ostrohradskyi National University

Ukraine

Shvets L.

PhD, Associate Professor

Department of Agricultural Engineering and Technical Service

Vinnitsia National Agrarian University,

Ukraine

Abstract

It is proved that the efficiency of grain harvesting equipment decreases after three or four harvest periods, which leads to increased downtime and, consequently, partial crop losses. To increase the reliability of combines, high-quality production of the most worn transmission parts is required. For this purpose, an experimental-analytical method of studying the flow of metal in the deformation center in the transition and steady zones during rolling of workpieces, taking into account the development of deformation over time, during their volumetric deformation, is proposed.

Keywords: ductility, deformation, metal flow.

Introduction

Because of the growing need for expensive steels that are difficult to deform, titanium, magnesium alloys, the research of non-uniformity is very important. Due to their mechanical, physical and technical properties, they are widely used, not only in mechanical engineering, but also in the agricultural production of machinery and equipment for crop and livestock production.

The use of hot deformation reduces the effort, which increases the ductility of alloys. In the absence of zones of difficult deformation and local overheating, comprehensive restoration of the metal structure takes place.

Grain harvesting equipment consists of a large number of standard mechanisms that are necessary for harvesting cereals and other crops, such as sunflower, corn, soybeans, canola, buckwheat and sugar beets [1, 2].

Breakdown and downtime of a combine harvester in the field entails delay of harvesting process, violation of the delivery terms, and also may result in partial or full loss of a crop harvest. Therefore, the problem of the reliability of grain harvesters remains topical, especially for those combines that have worked for several seasons.

The experimental research conducted by the authors [3, 4] revealed that the coefficient of readiness, as an indicator of the technical condition of combines such as "DON-1500", begins to decline after about 500-600 hours, which corresponds to the time of two harvests, and for combines produced by the world leading companies – after operating 1200-1400 hours. That is, combines work steadily for three or four seasons.

To increase the reliability and durability of Ukrainian combines, a comprehensive approach at all stages of their production and assembly is required. The

development and implementation of the latest scientifically substantiated processing methods, working out traditional methods of manufacturing heavy-duty parts of agricultural machinery will allow reaching a new level of efficiency and reliability of their operation [5, 6].

It will reduce downtime, change the technical condition of combines with increasing service life. This, in turn, should decrease crop losses, which depend on the productivity of the machinery.

One of the methods of manufacturing heavy-duty parts of combines such as shafts, transmission parts is the method of hot rolling, which produces profiles of different shapes and sizes for further machining.

To obtain workpieces with given mechanical characteristics in this way, it is necessary to follow the laws of metal flow in the center of local deformation, which depend on the geometry of the gauges, the speed of the workpiece, the amount of compression, etc. [7, 8].

During the development of technological processes of metal forming, questions arise on the determination of effort, energy consumption, selection of optimal technological parameters of deformation, indication of non-uniformity of deformation, etc. To solve these complex problems, various methods of metal forming research are used, which are divided into analytical, experimental and experimental-analytical ones [9, 10].

Analysis of recent research and publications

A special place in the theory of rolling is occupied by the movement of metal in the deformation center. The development of rolling requires the disclosure of patterns and physical essence of the phenomena occurring during the deformation of the metal in the center of deformation.

In [9], a review of the research of metal flow in the deformation center is described by analytical and experimental-analytical methods. Thus, A. Hollenberg

drilled holes in the middle of the width of the strip, into which he pressed rods. A. Hollenberg judged the movement of metal in the center of deformation by the nature of the curvature of the rods. N. Metz replaced the smooth rods with screws, which made it possible to determine the distribution of deformation along the height of the strip by changing the pitch of the screw. In addition, he applied a coordinate grid on the side surfaces of the strip. Observation of the curvature of screws or rods after rolling can only provide an approximate quantitative estimate of the distribution of deformation in the deformation center. The violation of the integrity of the pumped metal is the disadvantage of this method. W. Trinks made lead strips from two halves, on the surfaces of which he applied vertical lines with a cutting tool. To detect the flow of metal in the center of the strip, these lines were filled with paint, after which the halves of the sample were soldered in several places at the coincidence of the lines on the side surface and in the middle of the sample. G. Ungel used composite samples to determine the flow of metal in the deformation center. M.L. Zaroshchynskyi judged the nature and distribution of deformation by the curvature of screws and lines on the side faces; the length of the adhesion zone was determined by measuring the distances between the lines on the contact surface of the deformation center on the strip braked in the rolls. O.H. Muzaliovskyi studied the flow velocities of metal in the deformation zone by moving the coordinate grid during hot rolling of aluminum alloys by the method of high-speed filming. T.M. Golubiev studied the movement of separate layers of metal on a lateral surface of lead samples with a device of an original design. The device made it possible to graphically depict the movement of the points of the sample, taken at different heights in one plane of the cross section, and flow velocities were plotted according to the obtained data. T.M. Golubiev used two methods to determine the boundaries of the adhesion zone on the contact surface: samples of colored plasticine were rolled in rolls of transparent material with lines along the generatrix, applied at a certain distance from each other; the plastic sample with the lead needles inserted into it was illuminated by X-rays in the course of rolling. The Ural Institute of Ferrous Metallurgy used layered lead samples with a printed grid in the research of the metal flow in the deformation center. A.I. Kolpashnikov conducted significant and original research in the field of determining the flow of metal in the center of deformation. The research was carried out by the methods of filming and recrystallized grain when rolling aluminum alloys AMC and D16 with a slight expansion, which was not taken into account. The limits of the actual deformation center, the length and position of the adhesion zone, the nature of the velocity distribution in wide, thin and thick workpieces under different conditions of deformation – degrees of deformation, rolling speeds and lubrications were determined.

The theoretical analysis of metal forming processes is carried out by different methods, each of which is characterized by certain possibilities and limitations.

In [11] it is emphasized that the study of issues related to determining the patterns of metal movement during rolling of workpieces depending on various factors influencing the unevenness of deformation (shape and size of gauges, speed and degree of deformation, the ratio of geometric shapes of gauge and rolled workpiece, edging in the rolling process, etc.) will make it possible to improve the quality of the deformed metal: to avoid a flash at rolling, to reduce unevenness of deformation or to obtain a profile with the set unevenness of deformation, to improve the structure of metal and mechanical properties of a profile.

It should be noted that the non-uniformity of the metal flow process is the result of different concentrations of plastic deformation in its volume. The non-uniformity of deformation can be determined by studying the nature of the movement of the metal in the research area, choosing for this purpose one of the above methods, which are widely covered in the literature on the theory of metal forming.

Formulation of the problem

Due to the growing need for the use of expensive steels that are difficult to deform, titanium, magnesium alloys, the study of non-uniformity is very important.

The analysis of the above methods revealed that the correct choice of the actual resistance to deformation and boundary conditions on the contact surfaces of the tool is especially important for solving the metal forming problems depending on their class.

As can be seen, the theoretical analysis of metal forming processes is given much attention, a significant number of analytical and experimental-analytical methods for determining the deforming forces and deformations, the nature of the movement of the metal during deformation are developed. These methods are successfully applied depending on the necessary conditions in solving flat and axisymmetric problems. However, they do not allow determining the movement of metal in the center of the researched area (deformation center) and the non-uniformity of deformation depending on the geometric ratios of the caliber and the rolled workpiece when solving problems in three-dimensional space (volumetric problem).

This shortcoming is eliminated by the method developed by DSc (Eng.) S.O. Skryabin on the basis of deformation theory of plasticity, application of imaginary coordinate grid, method of finite differences and variable parameter of elasticity, method of theoretical research of metal flow process during rolling of volume deformation workpieces in deformation center with arbitrary contour and discretely set boundary conditions [12-14].

The method makes it possible to reveal the pattern of metal movement in the researched area both for steady (deformation under constant compression) and unsteady (deformation with increasing or decreasing deformation) processes of hot deformation, to determine the non-uniformity of deformation depending on the ratio of geometric shapes and gauges as well as the area of possible concentration of stress.

Material and methods of 3D problems of plasticity theory

The stress state of a deformed body is determined by the stress tensor:

$$T_\sigma = \begin{pmatrix} \sigma_x & \tau_{xy} & \tau_{xz} \\ \tau_{yx} & \sigma_y & \tau_{yz} \\ \tau_{zx} & \tau_{xy} & \sigma_z \end{pmatrix}, \quad (1)$$

whose components meet balance equations

$$\begin{cases} \frac{\partial \sigma_x}{\partial x} + \frac{\partial \tau_{xy}}{\partial y} + \frac{\partial \tau_{xz}}{\partial z} + X = 0; \\ \frac{\partial \tau_{yx}}{\partial x} + \frac{\partial \sigma_y}{\partial y} + \frac{\partial \tau_{yz}}{\partial z} + Y = 0; \\ \frac{\partial \tau_{zx}}{\partial x} + \frac{\partial \tau_{zy}}{\partial y} + \frac{\partial \sigma_z}{\partial z} + Z = 0, \end{cases} \quad (2)$$

where X, Y, Z —the components of external forces.

Body deformation is determined by the deformation tensor:

$$T_\epsilon = \begin{pmatrix} \epsilon_x & \frac{1}{2}\gamma_{xy} & \frac{1}{2}\gamma_{xz} \\ \frac{1}{2}\gamma_{yx} & \epsilon_y & \frac{1}{2}\gamma_{yz} \\ \frac{1}{2}\gamma_{zx} & \frac{1}{2}\gamma_{zy} & \epsilon_z \end{pmatrix} \quad (3)$$

The components of the deformation tensor can be calculated if vector $\vec{u}$ (u, v, w) of displacement of arbitrary point of the deformed body is known via formulas:

$$\epsilon_x = \frac{\partial u}{\partial x}; \quad \epsilon_y = \frac{\partial v}{\partial y}; \quad \epsilon_z = \frac{\partial w}{\partial z}; \quad (4)$$

$$\gamma_{yz} = \frac{\partial w}{\partial y} + \frac{\partial v}{\partial z}; \quad \gamma_{zx} = \frac{\partial u}{\partial z} + \frac{\partial w}{\partial x}; \quad \gamma_{xy} = \frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}.$$

In the linear theory of elasticity, the components of the displacement vector, as well as their derivatives, are small quantities, the squares of which and their derivatives can be neglected.

The calculation of the components of the deformation tensor by formulas (3, 4) is possible only with an accuracy up to constants [15, 16], i.e. with an accuracy of rigid displacement of the body as a whole. The components of deformation T_ϵ and stress T_σ tensors are interconnected by the relations of Hooke's law.

In the case of a homogeneous isotropic body, they are of the following form:

$$\begin{cases} \sigma_x = \lambda\theta + 2\mu\epsilon_x; & \tau_{yz} = \mu\gamma_{yz}; \\ \sigma_y = \lambda\theta + 2\mu\epsilon_y; & \tau_{zx} = \mu\gamma_{zx}; \\ \sigma_z = \lambda\theta + 2\mu\epsilon_z; & \tau_{xy} = \mu\gamma_{xy}, \end{cases} \quad (5)$$

$$\text{where } \theta = \epsilon_x + \epsilon_y + \epsilon_z = \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{\partial w}{\partial z};$$

λ, μ —Lame's elastic constants.

The basic equations of statics of an elastic body can be written in displacements (Lame's equation), substituting formulas (5) in equilibrium equation (2) and using relation (4):

$$\begin{cases} (\lambda + \mu) \frac{\partial \theta}{\partial x} + \mu \nabla^2 u + \bar{O} = 0; \\ (\lambda + \mu) \frac{\partial \theta}{\partial y} + \mu \nabla^2 v + \bar{O} = 0; \\ (\lambda + \mu) \frac{\partial \theta}{\partial z} + \mu \nabla^2 w + Z = 0, \end{cases} \quad (6)$$

$$\text{where } \nabla^2 = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}.$$

As the direction of coordinate OZ includes deformation elongations ϵ_z , and hence displacements w , these components are determined from Hooke's generalized law

$$\begin{aligned} \epsilon_x &= \frac{1}{E}(\sigma_x - \nu\sigma_y); \quad \epsilon_y = \frac{1}{E}(\sigma_y - \nu\sigma_x); \\ \epsilon_z &= \frac{\nu}{E}(\sigma_x + \sigma_y); \quad \gamma_{xy} = \frac{2(1+\nu)}{E}\tau_{xy}, \quad G = \frac{E}{2(1+\nu)} \end{aligned} \quad (7)$$

where E —Young's module, ν —Poisson's ratio,

Lame's differential equations under incompressibility $\epsilon_x + \epsilon_y + \epsilon_z = 0$ are expressed by the following formulas:

$$\begin{cases} (\lambda + \mu) \frac{\partial \theta}{\partial x} + \mu \nabla^2 u = 0; \\ (\lambda + \mu) \frac{\partial \theta}{\partial y} + \mu \nabla^2 v = 0; \\ \frac{\lambda}{2\mu + \lambda} \left(\frac{\partial \theta}{\partial z} + \frac{\partial v}{\partial z} \right) + w = 0. \end{cases} \quad (8)$$

The conditions of the deformed workpiece contour are written down in the form:

$$\begin{aligned} P_{x\nu} &= \sigma_x \cos(\nu, x) + \tau_{xy} \cos(\nu, y), \\ P_{y\nu} &= \tau_{yx} \cos(\nu, x) + \sigma_y \cos(\nu, y). \end{aligned} \quad (9)$$

Using geometric equations:

$$\epsilon_x = \frac{\partial u}{\partial x}; \quad \epsilon_y = \frac{\partial v}{\partial y}; \quad \epsilon_z = \frac{\partial w}{\partial z}; \quad \gamma_{xy} = \frac{\partial u}{\partial y} + \frac{\partial v}{\partial x},$$

and the equation of deformations continuity

$$\frac{\partial^2 \epsilon_x}{\partial y^2} + \frac{\partial^2 \epsilon_y}{\partial x^2} = \frac{\partial^2 \gamma_{xy}}{\partial x \partial y}, \quad (10)$$

we get eight equations with eight unknowns. This system is closed and can be solved by different methods (force method, displacement method, mixed method).



Fig.1 –A sample after rolling with increasing and decreasing compression

For a clearer representation of the non-uniformity of the deformation distribution, this problem was solved by the method of displacements. To determine the boundary conditions on the end and the surface of the workpiece $\varnothing 50 \times 150$ mm from the alloy AK6 a 5×5 mm grid was applied, which after deformation of the workpiece – the sample was used to determine the

displacements on the surface of the researched area, Fig.1.

The samples consisted of several diameters with an applied grid, Fig.2. The displacements of the grid point on the deformed samples after rolling were measured with a large instrumental microscope VMI-1. The measurement error did not exceed ± 0.005 .

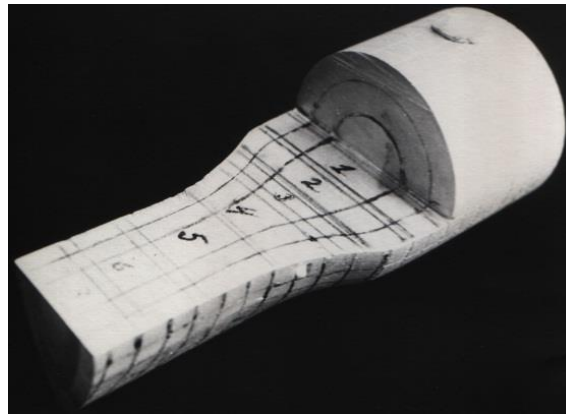


Fig. 2 –A sample consisting of several diameters with an applied grid

Research of metal flow in transition and steady zones during rolling of workpieces in the deformation center, taking into account the development of deformation over time.

The development of a method for the theoretical research of the flow of metal in the transition and steady zones during the rolling of workpieces in the center of deformation, taking into account the development of deformation over time, is a further development of the theoretical method for studying the flow of metal in the center of deformation during volumetric deformation worked out by DSc (Eng.) Skryabin S.O. [11, 16-18]. The method described in these papers was taken as a basis for the theoretical research of the process of metal flow during volumetric deformation of workpieces in calibers. The research problem is solved in stages: the elastic problem as the first approximation to the elastic-plastic one, the elastic-plastic problem for small plastic deformations. The nature of the movement of the metal in the calibers is described using the finite difference method and a variable parameter.

To solve the volumetric problem by determining the process of metal flow in the deformation center, the following conditions were adopted:

- in the plastic area of the deformation center there

is no change in volume $\varepsilon_x + \varepsilon_y + \varepsilon_z = 0$.

- stress and deformation tensors for each point of the deformed layer dz , Figs 2.3, are of the form:

$$T_\sigma = \begin{pmatrix} \sigma_x & \tau_{xy} & 0 \\ \tau_{xy} & \sigma_y & 0 \\ 0 & 0 & \sigma_z \end{pmatrix};$$

$$T_\varepsilon = \begin{pmatrix} \varepsilon_x & \frac{1}{2}\gamma_{xy} & 0 \\ \frac{1}{2}\gamma_{yx} & \varepsilon_y & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}; \quad (11)$$

- the stress state at each point of the deformed medium during plastic deformations depends not only on the deviator part of the stress tensor, but also on the normal octahedral stress

$$T_\sigma = \begin{pmatrix} \sigma_x - \sigma_{cp} & \tau_{xy} & \tau_{xz} \\ \tau_{yx} & \sigma_y - \sigma_{cp} & \tau_{yz} \\ \tau_{zx} & \tau_{zy} & -\sigma_{cp} \end{pmatrix} + \begin{pmatrix} \sigma_{cp} & 0 & 0 \\ 0 & \sigma_{cp} & 0 \\ 0 & 0 & \sigma_{cp} \end{pmatrix}, \quad (12)$$

where $\begin{pmatrix} \sigma_x - \sigma_{cp} & \tau_{xy} & 0 \\ \tau_{yx} & \sigma_y - \sigma_{cp} & 0 \\ 0 & 0 & -\sigma_{cp} \end{pmatrix}$ - the deviator

part of the stress tensor;

$\begin{pmatrix} \sigma_{cp} & 0 & 0 \\ 0 & \sigma_{cp} & 0 \\ 0 & 0 & \sigma_{cp} \end{pmatrix}$ - ball stress tensor;

σ_{cp} - the normal octahedral stress in the point.

- in each deforming layer dz of the deformation center, the stress state is characterized by a three-dimensional circuit with three compressive stresses $|\sigma_1| > |\sigma_2| > |\sigma_3|$; - in the plastic area of the deformation

center, the elastic component of the plastic deformation is not taken into account;

- in each deforming layer dz of the deformation center, the plastic deformation begins only when the stress reaches the yield strength;

- stressed-deformed state of the deforming medium meets the law of rigid-plastic deformation;

- the loading process at each point of the deformation center is characterized by the absence of rotation of the main axes of stress and deformation tensors;

- the loading process at each point of the deformation center is proportional to the value of the growth of the stress tensor of some parameter, which in the plastic area of deformation is equal to twice the value of the shear modulus of the second kind, i.e. $2G^*$.

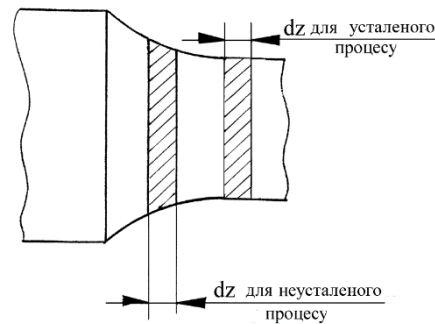
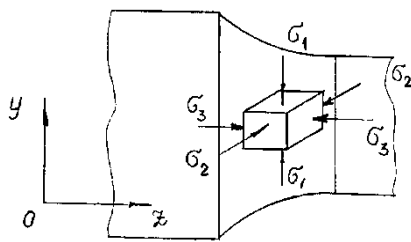


Fig.3 –Scheme of the stress state in the transition zone of the rolled workpiece

For a steady rolling process, with volumetric deformation of the workpiece, the deformation tensor T_ε is of form (13), since direction OZ contains elongation deformations ε_z , hence, displacement W .

$$T_\varepsilon = \begin{pmatrix} \varepsilon_x & \frac{1}{2}\gamma_{xy} & 0 \\ \frac{1}{2}\gamma_{yx} & \varepsilon_y & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}. \quad (13)$$

With this ratio of the deformation tensor, the amount of displacement W for layer dz , Figure 2.3, will be determined by formula:

$$W = \varepsilon_z \cdot Z \quad (14)$$

Since the direction of coordinate OZ contains deformations of elongation ε_z , hence, displacement w , these components are determined from Hooke's generalized law,

$$\begin{aligned} \varepsilon_x &= \frac{1}{E}(\sigma_x - \nu\sigma_y); \quad \varepsilon_y = \frac{1}{E}(\sigma_y - \nu\sigma_x); \\ \varepsilon_z &= \frac{\nu}{E}(\sigma_x + \sigma_y); \quad \gamma_{xy} = \frac{2(1+\nu)}{E}\tau_{xy} \end{aligned} \quad (15)$$

where E —Young's modulus; ν - Poisson's ratio, we obtain:

$$w = \frac{\nu}{E}(\sigma_x + \sigma_y)z, \quad (16)$$

$$\sigma_x + \sigma_y = \frac{E}{1-\nu}(\varepsilon_x + \varepsilon_y). \quad (17)$$

After substituting the right-hand part of equation (17) into formula (16) we obtain

$$w = \frac{\nu}{1-\nu}(\varepsilon_x + \varepsilon_y)z, \quad (18)$$

Using relation (19),

$$\varepsilon_x = \frac{\partial u}{\partial x}; \quad \varepsilon_y = \frac{\partial v}{\partial y}; \quad \varepsilon_z = \frac{\partial w}{\partial z}; \quad (19)$$

$$\gamma_{yz} = \frac{\partial w}{\partial y} + \frac{\partial v}{\partial z}; \quad \gamma_{zx} = \frac{\partial u}{\partial z} + \frac{\partial w}{\partial x}; \quad \gamma_{yx} = \frac{\partial v}{\partial x} + \frac{\partial u}{\partial y},$$

we obtain w —moving in a layer equal to the step of the grid in the direction of the axis oz

$$w = \frac{\nu}{1-\nu} \left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} \right) z. \quad (20)$$

Substituting the parts of the derivatives by their finite differences in formula (20), we obtain the formula for determining the displacements along axis OZ for the transition zone

$$w = \frac{\nu}{1-\nu} \left(\frac{u_{i+1,j} - u_{i,j}}{h_{\alpha 1}^i} + \frac{v_{i+1,j} - v_{i,j}}{h_{\alpha 2}^i} \right) z. \quad (21)$$

To determine the flow of metal during the unsteady rolling process (transition zone), the calculation

method is used with the previous division of the transition zone into a number of elementary sections dz (Fig. 3), in each of which the process is considered as established.

Values $u_{i,j}$ and $v_{i,j}$ are determined by the method described in paper [2], Fig. 4

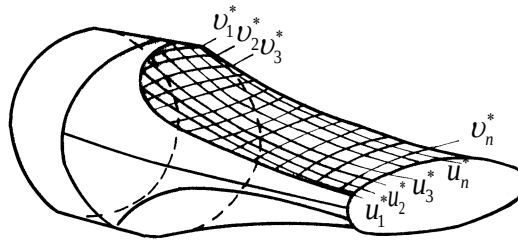


Fig. 4 – The area of the deformation center

To determine the nature of the metal flow in the transition zone of the rolled workpiece, the sample was cut by a plane parallel to XOZ (Fig. 5) into sections (2; 2) (4; 4) (6; 6) (8; 8) (10; 10) (11; 11); by the plane of

the parallel YOZ (Fig. 6) into sections (1; 1), (2; 2), (4; 4), (6; 6), (8; 8); by a plane parallel to XOY (Fig. 7) into sections (1; 1), (2; 2), (3; 3), (4; 4), (5; 5).

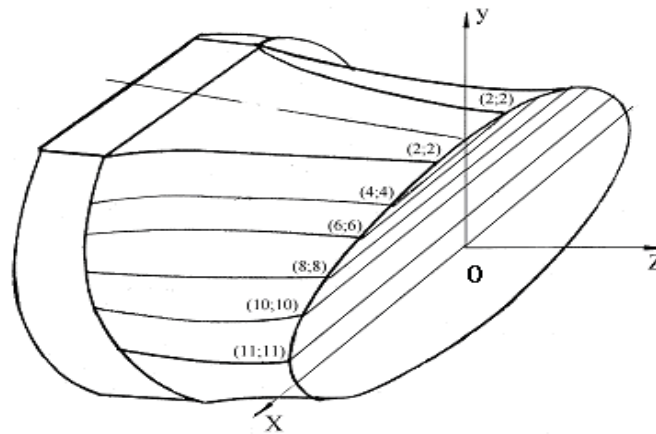


Fig. 5 – The general view of the sections

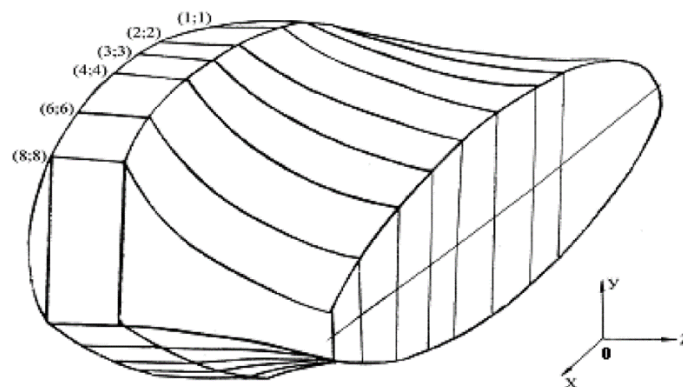


Fig. 6 – The general view of the side section

Fig. 7 contains a view of the surface of the end of the rolled workpiece after volumetric deformation in oval caliber (first approximation)

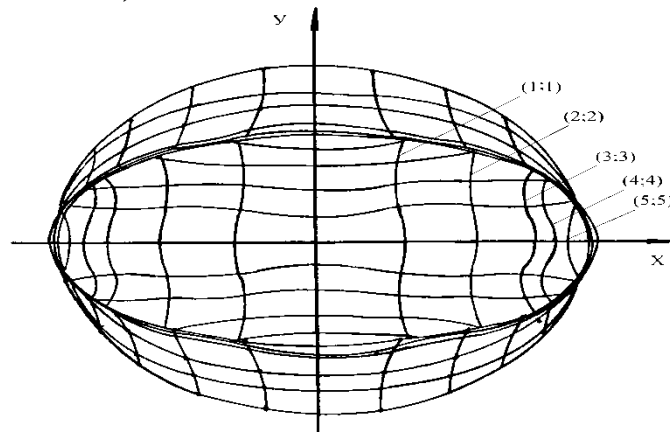
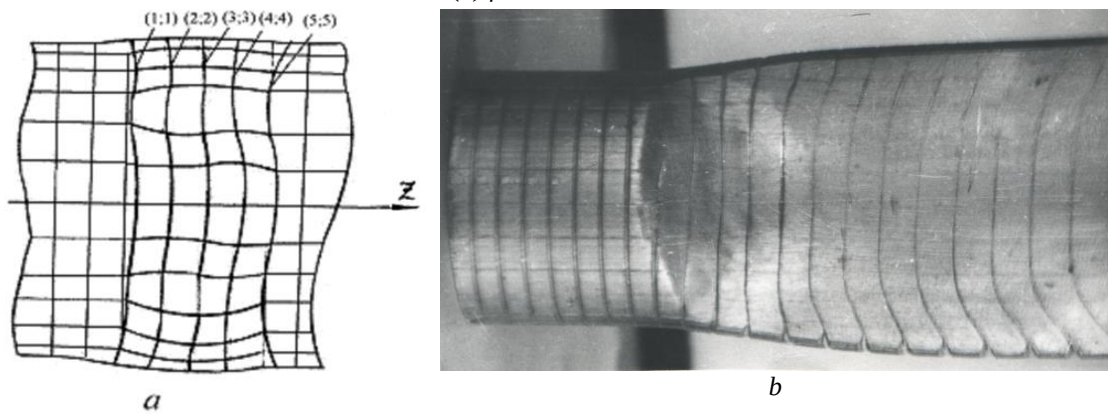


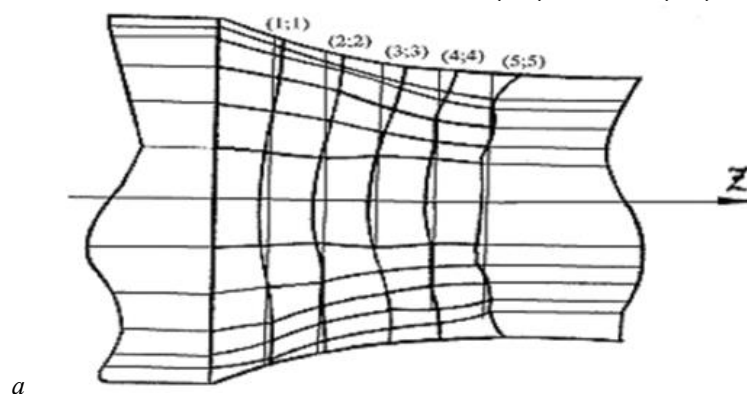
Fig. 7 – Change of "plastic waves" in the center of deformation with taking into account the development of deformation over time, s: (1- 1) – 0.0145; (2 - 2) – 0. 0290; (3 - 3) – 0. 043; (4 - 4) – 0. 0580; (5 - 5) – 0. 0725

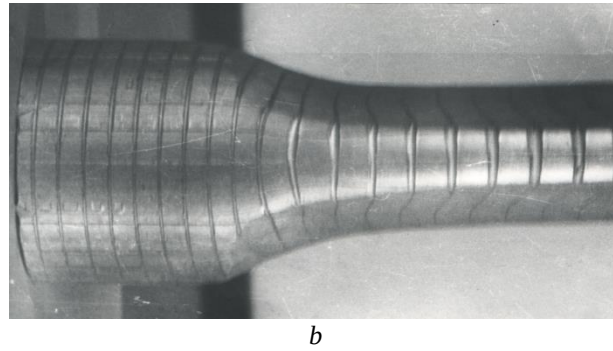
Figs. 8, 9 contain a pattern of the flow of metal in the research area in the analytical (a) and experimental (b) forms



Top view: a –analytical research; b –experimental research) taking into account the development of deformation in time, s:

Fig .8 –Change of "plastic waves" in the center of deformation on the surface (1-1) – 0.0145; (2-2) – 0.0290; (3-3) – 0.0435; (4-4) – 0.0580; (5-5) – 0.0725





a – analytical research; *b* – experimental research

Fig. 9 – Change of "plastic waves" in the center of deformation on the surface of the test specimen (side view) taking into account the development of deformation over time, s: (1-1) – 0.0145; (2-2) – 0.0290; (3-3) – 0.0435; (4-4) – 0.0580; (5-5) – 0.0725

From the analysis and comparison of experimental data shown in Figs. 8, 9 it is seen that the solution to the problem in three-dimensional formulation in the field of small elastic-plastic deformations, using the methods of finite differences and variable parameter, gives a true

pattern of the metal movement during rolling of round sections in oval calibers.

Fig. 10 presents a general view of the flow of metal in the volumetric deformation of the workpieces in the oval caliber

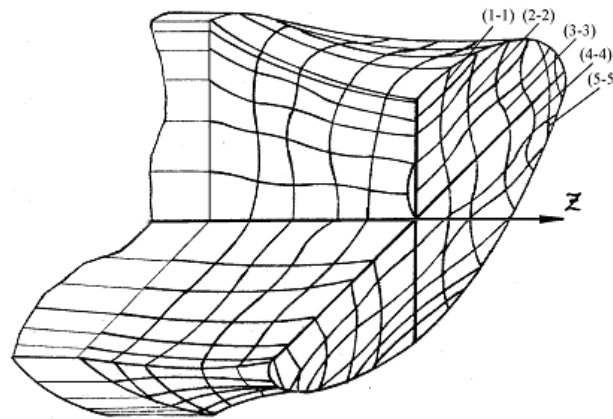


Fig.10 –The general type of change of "plastic waves" at volumetric deformation of workpieces in oval caliber (first approximation) taking into account the development of deformation over time, s:

(1-1) – 0.0145; (2-2) – 0.0290; (3-3) – 0.0435; (4-4) – 0.0580; (5-5) – 0.0725

The movements of coordinate grids ("plastic waves") presented in Figs. 7, 8a, 9a, 10 were researched using experimental data obtained by DSc. (Eng.) Skryabin S.O. in the study of metal flow during volumetric deformation of workpieces in oval caliber and determined taking into account the development of deformation over time (lines: 1; 1 – 0.0145 s; 2; 2 – 0.0290 s; 3; 3 – 0.0435 s; 4; 4 – 0.0580 s; 5; 5 – 0.0725 s).

As another approach to solving the problem that characterizes the flow, when rolling in the center of de-

formation, taking into account the development of deformation over time, consider rolling workpieces with dimensions $\varnothing 25 \times 150$ mm of aluminum alloy AK6 in oval caliber of the following dimensions: height 13 mm, width 29 mm, caliber radius 20.5 mm, rolls working radius 66.5 mm, gap between rolls 1.0 mm. Rolling temperature 450 °C. Rollers rotation frequency 37 min⁻¹.

The angle of contact of the rolled workpiece with the tool is determined by formula

$$\alpha = \arccos \left(1 - \frac{2R_3 - \Delta h}{2R_p} \right) = \arccos (0.9022) = 0.4458, \quad (22)$$

where – R_3 –workpiece radius, mm;

R_p –rollers working radius, mm;

Δh –absolute compression, mm.

The intervals of deformation of the workpiece over time were determined by formula (23), Table 1

$$t = 10^{-3} \left(\frac{R_p \cdot \alpha}{v_s} \right) = 10^{-3} \left(\frac{66,5 \cdot 0,4458}{0,2} \right) = 0,145, \quad (23)$$

where v_s - rollers rotation speed, m/s.

Table 1

The intervals of deformation of the workpiece over time

α_i	5	10	15	20	25
t_i, s	0.029	0.058	0.087	0.1160	0.1450

Other intervals of deformation over time are determined similarly.

The values of the contact angle in the cross section of the deformation center were determined by formula (24), Table 2

$$\varphi_i = \frac{v_{\delta} \cdot t_i \left(1 - \frac{\Delta h}{2R_k} \right)}{R_p \cdot \alpha}, \quad (24)$$

where R_k – caliber radius, mm.

Table 2

The value of the contact angle in the cross section of the deformation center

t_i, s	0.029	0.058	0.087	0.1160	0.1450
φ_i	0.1312	0.2624	0.3936	0.5248	0.6561

The lengths of the cross-sectional arcs of the contact zone for each value of current angle φ_i were determined by formula (25), Table 3

$$l_{\varphi_i} = R_p \varphi_i. \quad (25)$$

Table 3 – The lengths of the arcs of the cross section of the contact zone for each the value of the current angle

φ_i	0.1312	0.2624	0.3936	0.5248	0.6381
R_k	20.5	20.5	20.5	20.5	20.5
l_{φ_i}	2.689	5.379	8.068	10.758	13.450

The coefficients of deformation along the contact arc are determined by formulas (26), Table 4

$$K_x = \frac{b_{\delta}^{(i)}}{2R_3}; \quad K_y = \frac{h_{\delta}^{(i)}}{2R_3}. \quad (26)$$

Table 4

Coefficients of deformations along the contact arc

t_i, s	0.29	0.085	0.087	0.1160	0.1450
$K_x(i)$	1.048	1.092	1.140	1.188	1.240
$K_y(i)$	0.876	0.7352	0.6320	0.5640	0.5400

The change in the width of the oval caliber depending on the time of deformation is determined by formula (27), Table 5

where b^3 - oval caliber width, mm;

t^i - deformation time, s.

$$b_{os} = \frac{(b_{os} + 2R_k) \cdot v_{\delta} \cdot t_i + 2R_3}{\alpha \cdot R_p}, \quad (27)$$

Table 5

The width of the oval caliber depending on the time of deformation

t_i, s	0.029	0.058	0.087	0.1160	0.145
$Bob(i)$	26.2	27.3	28.4	29.7	31.0

The contact area in each period of the deformation time is determined by formula (28), Table 6

$$F_{\delta}^{(i)} = R_{\delta} \frac{v_{\delta} \cdot t_i}{R_p} \left[(R_p + R_{\delta}) \frac{\varphi v_{\delta} \cdot t_i}{2R_p \cdot \alpha} - R_{\delta} \sin \left(\frac{\varphi v_{\delta} \cdot t_i}{2R_p \cdot \alpha} \right) \right] \quad (28)$$

Table 6

The contact area in each period of the deformation time

t_i, s	0.029	0.058	0.087	0.116	0.145
$F_k(i)$	16.7	66.9	157.8	268.9	431.5

The step in the direction of the coordinate axes is determined by the formulas:

in the direction of OX axis (29), Table 7

$$h_{\alpha_1}^{(i,j)} = R_3 K_x^{(i)} (\sin \beta_{i+1,j} - \sin \beta_{i,j+1}); \quad (29)$$

in the direction of OY (30), mm

$$h_{\alpha_2}^{(i,j)} = R_3 K_y^{(i)} (\cos \beta_{i,j+1} - \cos \beta_{i+1,j}). \quad (30)$$

Boundary conditions on the surface of the deformable workpiece along the contact arc are determined by formulas (31, 32), Table 2.8

$$u_{i,j+1}^{(z)} = R_3(1 - K_x^{(i)}) \sin \beta_{i,j+1}, \quad v_{i,j+1}^{(z)} = R_3(1 - K_y^{(i)}) \cos \beta_{i,j+1},$$

$$u_{i+1,j}^{(z)} = R_3(1 - K_x^{(i)}) \sin \beta_{i+1,j}, \quad v_{i+1,j}^{(z)} = R_3(1 - K_y^{(i)}) \cos \beta_{i+1,j}. \quad (31) \quad (32)$$

Table 7

Step in the directions of axes OX and OY

t,s	t = 0.029					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
hα1(i,j)	3.3902	3.1597	2.71301	2.0815	1.3086	0.4467
hα2(i,j)	0.3733	1.0939	1.7399	2.2677	2.6411	2.8338
t,s	t = 0.058					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
hα1(i,j)	3.5326	3.2923	2.8268	2.1703	1.3635	0.4654
hα2(i,j)	0.3133	0.9180	1.4424	1.9032	2.2166	2.3783
t,s	t = 0.087					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
hα1(i,j)	3.6879	3.4371	2.9511	2.2657	1.4235	0.4858
hα2(i,j)	0.2693	0.7891	1.2399	1.6360	1.9054	2.044
t,s	t = 0.116					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
h21(i,j)	3.8431	3.5818	3.0753	2.3611	1.4854	0.5063
h22(i,j)	0.2403	0.7042	1.1202	1.4600	1.7004	1.8245
t,s	t = 0.145					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
h21(i,j)	4.014	3.7386	3.2099	2.4645	1.5483	0.5284
h22(i,j)	0.2301	0.6733	1.0725	1.3978	1.6281	1.7469

Table 8

The value of the boundary conditions on the surface of the deformable workpiece along the contact arc lpi

ti,s	t1=0.029 s					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
$u_{i,j+1}$	0.0000	-0.1552	-0.3000	-0.4242	-0.5136	-0.5754
$u_{i+1,j}$	-0.1552	-0.3000	-1.4242	-0.5196	-0.5754	-0.6000
$v_{i,j+1}^{\otimes}$	1.5500	1.4971	1.3423	1.0960	0.7750	0.4011
$v_{i+1,j}^{\otimes}$	1.4971	1.3423	1.0960	0.7750	0.4011	0.000
ti,s	t2=0.058 s					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
$u_{i,j+1}$	0.000	-2976	-05750	-0.8131	-0.9959	-1.1107
$u_{i+1,j}$	-0.2976	-0.575	-0.8131	-0.9959	-1.1107	-1.150
$v_{i,j+1}^{\otimes}$	3.3100	3.1971	2.8664	2.3405	1.155	0.8566
$v_{i+1,j}^{\otimes}$	3.1971	2.8664	2.3405	1.155	0.8566	0.0000
ti,s	t3=0.087					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
$u_{i,j+1}$	0.000	-0.4528	-0.8750	-1.2374	-1.5155	-1.6903
$u_{i+1,j}$	-0.4528	-0.8750	-1.2374	-1.5155	-1.6903	-1.7500
$v_{i+1,j}^{\otimes}$	4.4431	3.9836	3.2526	2.3000	1.19048	0.0000
$v_{i,j+1}^{\otimes}$	4.6000	4.4431	3.9836	3.2526	2.300	1.19048
ti,s	t4=0.116 s					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
$u_{i,j+1}$	0.000	-0.6081	-1.1750	-1.6616	-2.0351	-2.2698
$u_{i+1,j}$	-0.6081	-1.175	-1.6616	-2.0351	-2.2698	-2.3500

$U_{i,j+1}^{\textcircled{R}}$	5.4500	5.2641	4.7197	3.8536	2.7260	1.4106
$U_{i+1,j}^{\textcircled{R}}$	5.2641	4.7197	3.8536	2.7260	1.4106	0.0000
t_i, s	$t_5 = 0.145s$					
i, j	(1;1)	(3;3)	(5;5)	(7;7)	(9;9)	(11;11)
$u_{i,j+1}$	0.0000	-0.7764	-1.500	-2.1213	-2.5980	-2.8977
$u_{i+1,j}$	-0.7769	-1.500	-2.1213	-2.598	-2.8577	-3.0000
$U_{i+1,j}^{\textcircled{R}}$	5.5539	4.9795	4.0658	2.8750	1.4881	0.0000
$U_{i,j+1}^{\textcircled{R}}$	5.7500	5.5539	4.9795	4.0658	2.8750	1.4881

Fig. 11 shows the nature of the change of "plastic waves" in the center of deformation during rolling of

the workpieces in oval caliber with the dimensions described above (view of the end face of the workpiece, the first approximation).

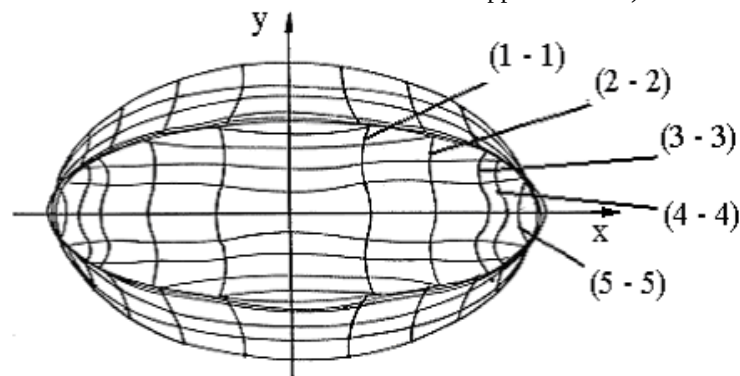


Fig. 11 –Change of "plastic waves" in the center of deformation with taking into account the development of deformation over time, s :

$$(1-1) - 0.0145; (2-2) - 0.0290; (3-3) - 0.0435; \\ (4-4) - 0.0580; (5-5) - 0.0725$$

The above figures demonstrate the nature of the flow of metal during workpiece rolling in the deformation center in a three-dimensional setting (volumetric problem), performed by the method described in [11, 14-19] and such that received further development, which takes into account the development deformation over time.

Experimental verification of the results of theoretical and experimental research of metal flow during workpiece rolling by volumetric deformation in the deformation center confirmed that the developed method makes it possible to reveal the pattern of metal movement for both steady (deformation under constant compression) and unsteady (with increasing or decreasing deformation) hot deformation processes, to determine the non-uniformity of deformation depending on the ratio of geometric shapes of the caliber and the deformable workpiece, find the area of possible stress concentration.

The maximum discrepancy between theoretical and experimental research in testing the proposed method does not exceed 10% for the third approximation, which confirms the possibility of using this method to research the flow of metal in the deformation center during workpiece rolling in gauges of arbitrary shape.

Conclusions.

Theoretical and experimental research of metal flow in the deformation center in the transition and

steady zones during rolling of workpieces, taking into account the development of deformation over time, with their volumetric deformation, has been further developed.

The method of theoretical research of metal flow in the deformation center during workpiece rolling by volumetric deformation, taking into account the development of deformation over time has been developed and experimentally confirmed. The maximum discrepancy between theoretical and experimental research in testing the proposed method does not exceed 10% for the third approximation, which confirms the possibility of using this method to study the flow of metal in the deformation cell.

Experimental verification of the results of theoretical and experimental research of metal flow during rolling of workpieces with their volumetric deformation in the deformation center taking into account the development of deformation over time has confirmed that the developed method allows revealing the pattern of metal movement for both steady and unsteady deformation processes.

The application of the method of calculating the flow of metal in the local center of deformation makes it possible to predict the mechanical characteristics of the product, as well as to vary them in a wide range, based on functional features and operating conditions. This enables avoiding parts rejects and reducing the debugging time at the design stage of the technological

process. With regard to the transmission parts of combines and other grain harvesting equipment, the use of the method will increase the strength of heavily loaded parts due to plastic deformation of the internal cross section of the part, healing cracks and defects in the structure of the workpiece. During the operation of such a part in the mechanisms of the combine, the zones of strong load strengthened by plastic deformation will not change their operability for a long time.

REFERENCES:

1. Sonka S. 2014. Big Data and the Ag Sector: More than Lots of Numbers. *International Food and Agribusiness Management Review*. № 17. PP. 1-20.
2. Andreas D. 2013. Special Issue on Artificial Intelligence in Agriculture. *Editorial Kunstl Intell*. № 27. PP. 309-311.
3. Garkuha S., Skazhennik1 M., Chizhikov V., Kiselev E., Petrushin A. 2020. Analysis of the use of a combine harvester equipped with a precision farming system in rice growing conditions. *IOP Conf. Ser.: Mater. Sci. Eng.* 1001, 012027.
4. Nozdrovický L., Macák M., Šima T. 2013. Current trends in the development of agricultural machinery and their impact on the knowledge and skills of the human factor. *Proceedings of the 5 th International Conference on Trends in Agricultural Engineering*. Prague. PP. 467– 474.
- 5 Bulgakov V., Adamchuk V. 2015. Mathematical Modelling of the Process of Renewal of the Fleet of Combine Harvesters. *Agriculture and Agricultural Science Procedia*. Vol 7. PP. 35-39.
6. Puzyr R.H., Shchetynin V.T., Arhat R.H., Muravlov V.V., Kravchenko S.I. 2021. Numerical modeling of pipe parts of agricultural machinery expansion by stepped punches. *IOP Conference Series: Materials Science and Engineering*. 1018(1), 012013.
7. Haikova T.V., Puzyr R.H., Levchenko R.V. 2020. Experimental Studies on the Stress-Strain State under Drawing Aluminum–Copper Bimetal Parts Rectangular in Plan. *Russian Journal of Non-Ferrous Metals*. № 61(4), PP. 404–412.
8. Kurpe O., Kukhar V., Puzyr R., Balalayeva E., Klimov E. 2020. Electric Motors Power Modes at Synchronization of Roughing Rolling Stands of Hot Strip Mill. *Proceedings of the 25th IEEE International Conference on Problems of Automated Electric Drive. Theory and Practice, PAEP*. 9240818.
9. Kuzman K., Kardelj E., Pirtovsek M. 1988 *Forge Rolling-Computer Aided Process Planning and Tool Design*. 4 Semin. Plast. Umforming, Gjöer, 16-18 l [Juni., Budapest], p. 57 - 62.
10. Haikova, T., Puzyr, R., Savelov, D., ...Argat, R., Sivak, R. The Research of the Morphology and Mechanical Characteristics of Electric Bimetallic Contacts. *Proceedings of the 25th IEEE International Conference on Problems of Automated Electric Drive. Theory and Practice, PAEP 2020*, 2020, 9240847.
11. Skryabin S.A. 2007 *Technology of hot deformation of billets from aluminum alloys on forging rollers*. Vinnytsia: A. Vlasjuk. 284 s. (In Russian)
12. Skryabin S.A., Shvets L.V., Chaika D.S. 2006. Investigation of the metal flow in the transition and steady-state zones during the rolling of blanks in the deformation zone, taking into account the development of deformation in time. *Technological systems*. No. 4. S. 32 - 38. (In Russian)
13. Skryabin S.A., Shvets L.V. 2007. Investigation of the plasticity of alloys AK6 and D16, reinforced with whiskers made of SiC material, under conditions of isothermal deformation. *Technological systems*. No. 1 (37). S. 56 - 62. (In Russian)
14. Pulupec M., Shvets L. 2019. Characteristics and thermomechanical modes of aluminum alloys hot deformation. *Current Problems of Transport: Proceedings of the 1st International Scientific Conference*. Ternopil Ivan Puluj National Technical University and Scientific Publishing House «SciView». Ternopil, 195-204. ISSN: 978-966-305-101-7
15. Posviatenko E., Budyak R., Shvets L., Paladiichuk Y. 2018. Influence of a material and the technological factors on improvement of operating properties of machine parts by reliefs and film coatings. *Eastern-European Journal of Enterprise Technologies*. № 5/12 (95). P. 48-56. SNIP: 0.558 | 2018
16. Shvets L. 2020. Methods of experimental and analytical research of metal in the center of deformation during hot compression heating. *The scientific heritage*. Vol. 1., № 48. P. 54-75.
17. Shvets L. 2020. The essence and possibility of the method of isothermal deformation *Slovak international scientific journal*. Vol. 1., № 42. P. 16-24.
18. Shvets L. 2020. Extension value, with hot rolled aluminum alloy specimens, round section in smooth rollers. *Scientific foundations of modern engineering: monograph*. Boston: Primedia e Launch. 528 p. ISBN 978-1-64871-656-0. doi : 10.46299/isg.2020.mono.tech.i
19. Arhat R., Puzyr R., Shchetynin V., Puzyr V., Haikova T. 2021. The Contact Pressure in Drawing Parts Without Clamping the Workpiece Flange. *Lecture Notes in Mechanical Engineering*. PP. 12–20.

№83/2022

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Scientific journal “Norwegian Journal of development of the International Science” is issued 24 times a year and is a scientific publication on topical problems of science.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@njd-iscience.com

site: <http://www.njd-iscience.com>