



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Materials of the
International Conference

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**“Scientific research of the SCO countries: synergy
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这些会议文结合了会议的材料 – 研究论文和科学工作者的论文报告。它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 62 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

This conference was a result of the serious interest of the world academic community, the state authorities of China and the Chinese Communist Party to preserve and strengthen international cooperation in the field of science. We also thank our Russian partner Infinity Publishing House for assistance in organizing the conference, preparing and publishing the conference proceedings in Chinese Part and English Part.

I hope that the collection of this conference will be useful to a wide range of readers. It will help to consider issues, that would interest the public, under a new point of view. It will also allow to find contacts among scientists of common interests.

Fan Fukuan,

Chairman of the organizing committee of the conference

"Scientific research of the SCO countries: synergy and integration"

Full Professor, Doctor of Economic Sciences

前言

我们感谢所有参加本次会议的“上海合作组织国家的科学研究：协同作用和整合”，感谢您的演讲和报告。代表所有上海合作组织成员国的广泛参与者都谈到此次活动的必要性和重要性。参与者的报告涵盖了广泛的主题性科学问题，我们的联合互动将有助于不同国家的科学家进一步发展理论和应用的现代科学研究。会议结果是来自7个国家（中国，俄罗斯，乌兹别克斯坦，哈萨克斯坦，阿塞拜疆，塔吉克斯坦，吉尔吉斯斯坦）的83位作者的参与。

这次会议的召开，是学术界，中国国家权力机关和中国共产党对维护和加强科学领域国际合作的高度重视的结果。我们还要感谢我们的俄罗斯合作伙伴无限出版社协助组织会议，准备和发布中英文会议文集。

我希望会议的收集对广大读者有用，将有助于在新的观点下为读者提供有趣的问题，并且还将允许在共同利益的科学家中寻找联系。

范福宽，
教授，经济科学博士，中国科学院院士，会议组委会主席“上合组织国家科学研究：协同与融合”

智力资本发展的优先方向
**PRIORITY DIRECTIONS OF DEVELOPMENT
OF INTELLECTUAL CAPITAL**

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抽象。 所研究问题的相关性是由于智力资本的发展，因为其发展的方法论水平不符合客观过程的系统反映的要求，并没有充分揭示其本质。 对这个问题的概念观点的分析指出了许多论点，这表明了理论立场的分歧。 本文的目的是为现代经济中发展智力资本的优先领域。 本文的主要结果将有助于形成用于测试旨在发展智力资本的最先进创新的工具。

关键词：智力资本，资本，创新，创新发展，竞争力

Abstract. *The relevance of the problem under study is due to the development of intellectual capital, since the methodological level of its development does not meet the requirements of a systemic reflection of objective processes and does not reveal fully their essence. The analysis of conceptual views on this issue points to many arguments, which indicates a divergence of theoretical positions. The purpose of the article is aimed at developing priority areas for the development of intellectual capital in the modern economy. The main results of the article will contribute to the formation of tools for testing the most progressive innovations aimed at the development of intellectual capital.*

Keywords: *intellectual capital, capital, innovation, innovative development, competitiveness*

High technologies as a trend of modernity today are everywhere introduced in all areas of society and production. In this regard, state support and motivation for the development of intellectual capital becomes particularly relevant, which is expressed through mechanisms to ensure the institutional and legal conditions.

The competitiveness of market entities in the context of the global economy is possible on the basis of the development of intellectual capital and the promotion of the latest innovative technologies and knowledge, which in turn will contribute to the growth of the competitive potential of the state as a whole.

State participation in the development of intellectual capital creates opportunities for qualitative indicators of enterprises.

The intellectual reserve and resources form their interest from powerful business entities. The interaction of business structures with the intellectual reserve is implemented in the form of large-scale investment projects in cooperation with the state [1].

The competitive potential of the economy is closely related to the factor of its aggregate productivity, growth, which is facilitated by the growth of sectoral industrial enterprises with knowledge-intensive production.

In this regard, state support is aimed at modernizing the leading funds of enterprises. In this sense, the state seeks to stimulate productivity growth, introduce modern innovative and management technologies into production.

An important moment for the formation of effective modernized and competitive industries is the basis of innovative mobility of business entities, a powerful brand, the qualification component of the staff, skills for successful promotion and implementation of services, product, high-quality competitive distribution, access to attractive sales markets.

In the long term, an innovative strategy focuses on stimulating the market efficiency of companies. This will be facilitated by such forms of economic activity as:

- technology transfer,
- implementation of management technologies,
- modernization of technical components,
- improvement of business processes.

The long-term plan of innovation policy includes support for projects of the latest competitively oriented products with appropriate support for the processes for their production [2].

The progressively dynamic nature of innovation development requires the creation of fundamentally different economic and regional forms of activity. Territorial innovation funds, business incubators, technology parks, etc. can be such units. These economic structures, mainly, should create conditions for their organizers to obtain a commercial basis for scientific and innovative projects. In particular, according to a similar model, a two-stage incubator system is being created in the state. These are regional and national technology parks.

The activity of the latter is characterized by a sign of sectoral vectorization based on preferential taxation under the regime of a special economic zone.

Statistics show that the vast majority of customers of technology parks in the state are producers of services and goods. Among them are manufacturers of the food industry, furniture, tailoring, artisans and those providing services in the field of education, consulting, construction and repair work. While only 2% of the total number of technology park customers are engaged in the corresponding business.

The state is able to implement the stimulation and support of innovation, using the following tools:

- create purchases for state needs of advanced technology and knowledge-based innovative products in order to ensure guaranteed implementation and distribution;
- improve and develop the legal framework in the field of innovation;
- allocate targeted finances from the state budget for innovative projects and programs;
- create preferential conditions in a certain legislative order taking into account national interests, for the implementation of innovative activities and encourage foreign and domestic investors.

In world practice, the organization of innovation infrastructure is used, which includes the development of an entire information system within the country, and which is also considered an indirect method of state regulation of innovation [3].

The main task of state regulation of intellectual capital is to ensure its effective formation, use and development.

State policy in the field of intellectual capital should consist in:

- ensuring the adequacy of the existing external, civilized conditions;
- ensuring the effective functioning of intellectual capital at the domestic level by financing and creating an organizational and economic mechanism and legal environment;
- creating of socio-economic institutions to ensure the reproduction of intellectual capital [4].

The main directions of state regulation of the formation of intellectual capital include direct and indirect stimulation.

Direct stimulation of intellectual capital includes:

- financing of basic research;
- provision of subsidies for scientific applied research;
- public procurement of foreign intellectual property projects;
- transition to private financing of applied research in industry.

Indirect stimulation of intellectual capital includes:

- stimulation of venture investment development, tax incentives;
- attracting investors.

In our opinion, it is necessary to stimulate further organizations that are building up their intellectual capital for companies [5].

The development of a strategy for the development of intellectual capital includes:

- development and implementation of policies in the field of intellectual capital;
- selection of the main areas of technology and science;
- objective change in technological patterns in the economy;
- development of internal relations of science, education, production;
- creating conditions for the effective use of scientific and technological potential.

Thus, in the future, it is necessary to improve state regulation of the development of intellectual capital in the Russian Federation, namely:

- to increase investment in the development of intellectual capital;
- improve the quality of education; stimulate the activities of scientists;
- to strengthen the ties of science, education, state and business;
- to develop the institutional environment in the field of intellectual capital development;
- to improve the quality of innovation infrastructure; to accomplish legal regulation of intellectual capital.

References

1 Oskolova M.A., Teplykh G.V. *Measuring IC Results: A Review of Empirical Research // Financial Management*. - 2015.-24 (114). - P. 41-49.

2 Kiryanov A.V. *Types of investments in human capital and their effectiveness* 12.01.2014.

3 Tomashov A.S. *Problems of managing the development of human capital in the Russian Federation // Labor Economics - Economic systems management*. - 2016. - No. 9 (45). - P. 17-22.

4 Ivashchenko A.E. *Technology of cost estimation, added by intellectual capital based on the definition of information productivity // Creative Economy*. - 2016. - No. 4 (52). - P. 90-99.

5 Zubko V.Yu. *The development of various types of IC: human, organizational and capital relations // Creative Economy*. - 2017. - No. 12 (36). - P. 60-65.

国民经济体系中的企业资源管理
**ENTERPRISE RESOURCE MANAGEMENT
IN NATIONAL ECONOMIC SYSTEMS**

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抽象。 本文讨论了一种企业资源，其基本内容是将新想法（自己的发明或创新）引入经济过程（生产或交换），应将其归类为主要资源。 该研究使得有可能确定未使用的企业家资源参与的概念基础，这将提高国民经济的竞争力。

关键词：创业资源，创业领域，未使用资源，文明创业，创新，新技术

Abstract. *This article discusses an entrepreneurial resource, the essential content of which is the introduction of a new idea (own invention or innovation) into the economic process (production or exchange), which should be classified as a main resource. The study makes it possible to determine the conceptual basis for the involvement of unused resources of entrepreneurship, which will increase the competitiveness of the national economy.*

Keywords: *entrepreneurial resource, entrepreneurial sphere, unused resources, civilized entrepreneurship, innovation, new technologies*

The new face of the economy is associated with the development of entrepreneurship activities. This applies equally to large and small and medium-sized businesses.

It is obvious that, changing the structure of the economy through the transformation of large-scale business in the foreseeable future seems to be a difficult task. That is why the main efforts are directed to the sphere of small and medium enterprises.

Today, the importance of the entrepreneurship factor can hardly be overestimated, since the economy of our country is tasked with raising the innovation level. And this is a prerequisite for the transition to a new, higher stage of technical, economic, socio-economic and other development, since the basis of the above is the possibility of mobile innovative modernization.

An entrepreneurial resource can be represented as a set of functions performed by it in a socio-economic system. This is one of the controversial aspects of entrepreneurship theory, where researchers disagree [1].

S.E. Zilinsky, distinguishes three functions:

- resource, consisting in an unconventional combination of factors of production - land, capital, labor, contributing to the growth of production of goods and services, improving the efficiency of the economy;
- organizational, consisting in such an integration and combination of factors of production, which in the best way will lead to the achievement of a goal, to a high income;
- creative, related to innovations.

M.G. Lapusta A.G. Porshnev, Yu.L. Starostin, L.G. Skamay consider that entrepreneurship performs general economic, creative and search (innovative), resource, social, organizational functions. Some scholars believe that entrepreneurship also has a political function, which is usually carried out by the associations (unions) of entrepreneurs [2].

The development of the innovation environment in the national economy is a systemic education and depends on many factors.

State regulation contributes to the formation of the necessary innovative potential, which accumulates the result, ensuring growth. The most important component of such a system is the development of entrepreneurship.

The increase in the scale and effectiveness of entrepreneurial activity will increase the output of the national product. Thus, the necessary innovative mass of possible achievements is formed, if not in the short term, then strategic. It seems to us that an economy structured from large, medium and small businesses has the necessary potential resources.

The entrepreneurial resource of the national economy concentrates precisely those opportunities that transfer the economy from a state of static development to a state of accelerated dynamics. This, in particular, is about the regularity of the wave dynamics of entrepreneurial activity, manifested in the cyclical nature of the impact of the entrepreneurial potential of society on economic growth.

World economic practice uses a small and medium form of activity for innovative renewal, since it tends to be included in this process if not by less efforts, then at least at the cost of losses, from which the economic system is insured due to the enormous scale of resource involvement.

It is obvious that, this feature makes it possible to develop a mechanism for innovative modernization and test it before the full-scale involvement of the entire system in the process takes place. Thus, it can be assumed that a gradual partial immersion in innovative modernization will follow.

The current stage of development of the global economic system has such a feature, when there is a technological update and a transition to a fundamentally new level. This kind of process cannot be limited only to small forms of business, but it requires systemic transformations covering the entire system.

The global unstable situation of recent years makes it possible to take into account the possibilities of integration efforts, including joint partnership mechanisms of various national economic systems [3].

In the economic field of entrepreneurial activity, the use of the combined efforts of international organizations is observed, forming a favorable environment for the functioning of the business. Organizations of this kind are developing conditions for jointly overcoming the crisis consequences of global instability.

It is obvious that, the set of mechanisms is not always beneficial for all parties to the agreement and it should be about working out of joint decisions to create a common favorable business climate. These agreements are based on the definition of a common set of rules for all parties to the agreement.

Certainly, these agreements cannot be absolutely beneficial for economic partners operating in a single economic field, but in comparison with the interaction beyond the external borders of this field with aspects, a more favorable climate for their implementation is being developed.

In view of the aforementioned, the national economic system and its entrepreneurial sphere are, in modern conditions, participants in a number of integration projects.

The civilizational experience of entrepreneurship provides an extensive base for studying it to assess the results of use, with the exception of possible risks from this practice, and to limit the negative outcome of global instability.

In the modern world, civilizational development is being reassessed and the main directions of socio-economic transformations are identified, involving a multi-vector modernization of public life, the selection of new guidelines and criteria according to which effective and preferred ways of promotion are associated with provisions that ensure sustainable development.

The latter is based on a combination of social and economic performance and economic equilibrium.

The new civilized world order puts forward innovative priorities, including nanotechnology, biotechnology, alternative energy, information and communication technologies [4].

Public administration is able to influence the expansion of small and medium-sized businesses through the formation of conditions favorable to their development.

This is evidenced by the situation in the world when the scale of globalization is growing everywhere, which affects the most profound processes of socio-economic systems operating in a regime independent of particulars.

The general structure of an entrepreneurial resource can be represented by the number of:

- carriers of entrepreneurial abilities (an integrated set of entrepreneurial organizations, individual entrepreneurs, as well as complex associations of entrepreneurial organizations);
- implemented by them or presented to the implementation of innovative ideas.

The structure of the entrepreneurial resource is represented by the levels of its implementation: micro and small entrepreneurial resource, medium, large entrepreneurial resource.

The difference between an entrepreneurial resource and other resources is its property of self-realization.

For all other resources: land, capital, labor - an external force is required - the initiative of the entrepreneur-organizer, so that they are included in the production process as constant and variable factors.

We believe that in this case, the entrepreneurial resource in production itself cannot be classified as a variable.

In our opinion, based on the fact that the main, essential content of this resource is the introduction of a new idea (own invention or innovation) into the economic process (production or exchange), it should be classified as a main resource.

This understanding is led, in particular, by an analysis of the dependence of the entrepreneur's income on the realization of the result of his innovation (product or service) in the market. The prices of production services are "fixed" in the market during the competition of entrepreneurs, but the entrepreneur's income is not fixed: it includes everything that remains after payment of fixed costs.

Thus, it is necessary to investigate it indirectly, delving into the forces that determine fixed incomes and correlating them with the entire product of an enterprise or society.

The novation underlying the product or service will not generate income at once, paying off for one revolution, but rather a long period of time, corresponding to the product life cycle.

There is an analogy with the gradual expenditure of fixed capital. The innovativeness of the idea applied by the entrepreneur is gradually decreasing and should be replaced by a new one. The ability to generate ideas or methods of their application, ensuring the self-renewability of an entrepreneurial resource is the main part of the entrepreneur's human capital, due to which the entrepreneur receives income. On the other hand, the ability to generate ideas brings an entrepreneurial resource closer to an intellectual resource [5].

Like any other type of human capital, creative abilities applicable to the sphere of economy can be developed by appropriate education, supplemented by practical skills, which will accordingly affect income. Therefore, from our point of view, the complex structure of entrepreneurial income should reflect this aspect.

Creating the conditions for entrepreneurship, the state showed a demand for this resource. Thanks to this, the entrepreneurial resource was in demand, which, in conjunction with capital, ensured the development of an innovative economy.

The supply of entrepreneurial resources is determined by factors such as:

- availability of abilities, willingness to put them into practice,
- the ability to provide satisfactory warranties,
- a combination of these factors in one person.

The most important factor in the supply of entrepreneurial resources is competition, which determines the amount of profit.

Thus, an entrepreneurial resource, subject to the mechanisms of demand, supply, competition and price, has a certain specificity of its functioning in the resource market, as well as all other resources have their own characteristics. The state policy of regulating the entrepreneurial resource should be based on the action of market forces: if the measures taken do not give the desired result, then they do not take into account the actions of the objective laws of the resource market or even go against them.

References

1. *Freidkin O.L. Patterns of development of the entrepreneurial resource of the economy // Russian Entrepreneurship. - 2008. - No. 4. - Issue 1 (108). - P. 60-63*
2. *Zhilinsky S.E. Entrepreneurial law (legal basis of entrepreneurial activity). - Moscow: Norma, 2007. - 950 p.*
3. *Lapusta M.G., Porshnev A.G., Starostin Yu.L., Skamay L.G. Small business - Moscow: Infra - M, 2007. - 608 p.*
4. *Yakovets. Yu.V. 21st Century Innovation: Innovation Breakthrough Strategy. - M., 2008. - P. 15.*
5. *Tatarkin A.I. Innovative spatial sources for the development of the Russian Federation // Innovations - 2013 - No. 3 - P. 13-14*

社会服务领域竞争环境的状态和发展: 立法, 理论, 实践
(以科米共和国为例)

**THE STATE AND DEVELOPMENT OF THE COMPETITIVE
ENVIRONMENT IN THE FIELD OF SOCIAL SERVICES:
LEGISLATION, THEORY, PRACTICE
(ON THE EXAMPLE OF THE KOMI REPUBLIC)**

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抽象。 本文考虑了确定社会领域竞争的方法。 在全俄经济活动类型分类器的基础上, 并根据俄罗斯联邦各组成实体的竞争发展标准, 列出了该区域具有社会意义的市场清单。 提出了一项行动计划(“路线图”), 以促进科米共和国的竞争发展。 分析了人口满意度与社会服务质量的监测。 确定已实现私营服务市场的既定目标指标, 至少10%。

关键词: 竞争, 社会领域, 社会服务, 社会导向的非营利组织, 财政支持, 公私伙伴关系。

Abstract. *The article considers approaches to the determination of competition in the social sphere. On the basis of the all-Russian classifier of types of economic activity and in accordance with the standard for the development of competition in the constituent entities of the Russian Federation, a list of socially significant markets of the region is indicated. An Action Plan (“road map”) is presented to promote the development of competition in the Komi Republic. The monitoring of population satisfaction with the quality of social services have been analyzed. It is determined that the established target indicators of the private services market, at least 10 percent, have been achieved.*

Keywords: *competition, social sphere, social services, socially-oriented non-profit organizations, financial support, public-private partnerships.*

The definition of competition is contained in Clause 7, Article 4 of Federal Law dated July 27, 2006 № 135-ФЗ "On Protection of Competition" [1]. Competition is the rivalry of business entities in which the independent action of each of them excludes or limits the ability of each of them to unilaterally influence the general conditions for the circulation of goods in the relevant product market. However, this definition does not reflect competitive relations in the social sphere in which state dominance prevails. In accordance with the international economic classification, the all-Russian classifier of types of economic activity subdivides all sectors of the national economy into material production and non-production services. Hence, in economic science, the non-production social sphere is identified with the service sector [2].

Currently, the social sphere is legally interpreted in accordance with the "Standard for the Development of Competition in the Subjects of the Russian Federation" approved by Decree of the Government of the Russian Federation № 1738-p, where the social significance of social sectors is determined taking into account the list of priority and socially significant regional markets aimed at increasing the level of life of the population [3].

The theoretical basis of the competitiveness of the regions is analyzed by the work of such scientists as A. V. Asadullina, F. M. Ashimov, A. S. Barabanov, Z. A. Vasilyeva, T. A. Vityunina, N. A. Grineva, B. M. Grinchel, S. P. Gorisov, V. S. Gusarov, T. V. Zadorova, L. G. Zakharchenko, I. S. Kakushkina, N. Ya. Kalyuzhnova, A. A. Kartauzov, O. M. Kuzmin, E.A. Nazarova, V.E. Rokhchin, Yu.V. Saveliev, T.V. Sachuk, D.V. Proskura, I.A. Shogenova and others.

The Decree of the President of the Russian Federation "On the main directions of the state policy on the development of competition" [4] defined the goals of improving the state policy on the development of competition: increasing customer satisfaction by expanding the range of goods, works, services, improving their quality and lowering prices; increasing economic efficiency and competitiveness of business entities; stable growth and development of a multistrukture economy, reduction of social tension in society, and ensuring national security. The fundamental principle of state policy on the competition development is to reduce the share of business entities controlled by the state in the total number of business entities operating in the markets for goods and services. The National Plan for the Development of Competition in the Russian Federation for 2018-2020 has been approved, the measures of which are aimed at achieving key indicators, one of which is to increase the share of procurements by 2020, the participants of which are socially oriented non-profit organizations engaged in activities aimed at solving social problems, developing civil companies in the Russian Federation in the field of state and municipal procurement not less than twice compared to 2017 [5]. For the implementation of such projects, a mechanism for fixing long-term

obligations is necessary. Organizations providing public services of appropriate quality for one year or more acquire the status of an executor of public services, with financial support of at least two years. The Ministry of Justice of the Russian Federation maintains a register of non-profit organizations performing publicly useful services [6]. The public procurement mechanism in this case is inefficient, since it can be used to conclude an agreement for a maximum of three years. And business needs to have longer term guarantees. In this case, a tender was proposed to conclude an agreement on public-private partnership. Thus, it became possible to apply a concession agreement in which the involvement of the private sector in the effective management of state property or in the provision of services usually provided by the state occurs on mutually beneficial conditions.

In the Regulation on the executive authorities of the Komi Republic [7], the development of competition is also defined as one of the main priorities of activity. By order of the Government of the Komi Republic, the authorized body to promote competition is the Ministry of Economy [8]. A list of priority and socially significant markets has been approved to promote the development of competition in the region with the rationale for their choice [9]. It includes socially significant markets to promote competition in the Komi Republic: the market for pre-school education, child rest and rehabilitation services, additional education services for children, the market for medical services, psychological and pedagogical support for children with disabilities, cultural services, housing and communal services economy, retail, ground transportation passenger services, informatization and communication services, and the social services market. Priority markets are highlighted: the market for tourism services and the market for the production of building materials. Taking into account the requirements for the system for assessing the competitiveness of the region, by Decree of the Head of the Komi Republic dated November 19, 2018 N 297-p, 34 key indicators of the development of competition in the Komi Republic for the period until 2022 were identified [10].

In this work, as an indicator of the region's competitiveness, we will *consider the market of social services for the population*, the key indicator of which is in the period 2018-2021. must be at least 10% [11]. The responsible executor of this market is the Ministry of Labor, Employment and Social Protection of the Komi Republic. It approved a list of types of priority social services, the provision of which can be carried out on the territory of the Komi Republic by socially oriented non-profit organizations [12]. For non-profit organizations, the procedure for including a non-governmental organization in the register of suppliers is applied in order to obtain further compensation for the costs of providing services from the budget at approved tariffs. In particular, the provider should provide information on the forms of social services, the list of social services provided, tariffs and their work experience. Each region has the right to clarify or expand the list of information provided.

The state has taken a number of measures to help businesses get involved in social services. To this end, amendments were made to part two of the Tax Code, the essence of which - is to create a favorable tax regime for organizations providing social services. In particular, this is the zeroing of the tax rate on income tax and exemption from VAT on the services provided by private companies. Also, to compensate for the construction costs, a subsidized rate on the loan, which is taken by a non-governmental organization for the construction of a social service institution, is provided. The subsidy is provided in the amount of the entire key rate of the Central Bank of the Russian Federation. The sanitary and epidemiological requirements for the buildings of social service organizations have been significantly simplified [13]. Unnecessary requirements for the placement, design, construction and operation of newly constructed and reconstructed objects have been removed. The provisions on the availability of a sanitary-epidemiological conclusion on compliance with the sanitary rules of a land plot for construction are excluded. The right to place organizations in the premises built into residential buildings, in the built-in and attached premises have been granted.

In 2017, the volume of the republican budget for the implementation of the measures “Support for socially oriented non-profit organizations” amounted to 26.5 million rubles. (tab. 1).

Table 1 - Support for socially oriented non-profit organizations, in mil. rubles.*

NAME OF THE SUB-PROGRAM, KEY ACTIVITIES	TOTAL	FROM THE REPUBLICAN BUDGET	FROM THE FEDERAL BUDGET
SUPPORT FOR SOCIALLY ORIENTED NON-PROFIT ORGANIZATIONS	26,5	26,5	-
FINANCIAL SUPPORT FOR SOCIALLY ORIENTED NON-PROFIT ORGANIZATIONS.	25,2	25,2	-
RETRAINING AND QUALIFICATION OF WORKERS OF SOCIALLY ORIENTED NON-PROFIT ORGANIZATIONS	0,01	0,01	-
ORGANIZATION AND CONDUCT OF REPUBLICAN SEMINARS ON LEADER PROGRAMS, INCLUDING FOR REPRESENTATIVES OF PEDAGOGICAL Squads, YOUTH AND CHILDREN'S PUBLIC ASSOCIATIONS	0,1	0,1	-
ATTRACTION OF SOCIALLY-ORIENTED NON-PROFIT ORGANIZATIONS IN VARIOUS FIELDS OF ACTIVITY	1,2	1,2	-

* Source: author's calculations.

Financial support was provided in the form of a subsidy to 38 socially oriented non-profit organizations operating in the republic. In accordance with the procedure established by law, they provided state property of the Komi Republic under 50 agreements (gratuitous use and rental at preferential rates), as well as assistance to infrastructure activities. On a competitive basis, subsidies have been given to organizations engaged in social policy activities aimed at social support and protection of the rights of veterans of the Great Patriotic War, war veterans, family members of deceased (dead) war veterans. Grants were funded for the publication in the media of materials aimed at covering the activities of socially-oriented non-profit organizations, promoting charity and volunteering. Retraining and advanced training of employees of socially-oriented non-profit organizations. A register of social service providers of the Ministry of Labor, Employment and Social Protection of the Komi Republic has been compiled, which contains information on 76 social service providers, including 15 non-governmental organizations. The established target indicators of the private services market, at least 10 percent, have been achieved and amount to 19.7% (in 2017 - 15.7%).

According to the implementation of the Law of the Komi Republic “On some issues related to care and assistance to elderly citizens and people with disabilities in the territory of the Komi Republic” [14], it was made possible to provide elderly people and people with disabilities with home care and assistance, 330 treaties on help and assistance for disabled citizens were in effect. On behalf of the President of the Russian Federation, a number of measures were taken to transfer social services to the non-state sector to ensure access for socially oriented non-profit organizations to budget funds. Since 2017, social services at home have been fully transferred to the private sector and are provided by 11 autonomous non-profit organizations. About 8.9 thousand elderly and disabled people received care in the usual conditions at the place of their permanent residence, taking into account the new requirements of federal legislation on social services. The share of citizens provided with social services at home, in the total number of applicants for such services, has been kept at 100 percent.

Improving the quality of social services is directly related to the development of competition and the creation of an independent assessment system of the quality of work of social institutions [15]. The quality of services, as well as goods, should not depend on what type of legal entity their supplier belongs to [16]. The mechanism of public-private partnership involves an increase in the quality of services and the elimination of the weakest market participants [17].

As part of the implementation of the Competition Development Standard in the constituent entities of the Russian Federation, the following activities are foreseen:

- monitoring of administrative barriers and assessing the state of the competitive environment by business entities;

- monitoring of consumer satisfaction with the quality of goods and services in the regional commodity markets and the state of price competition;
- monitoring of the satisfaction of business entities and consumers of goods and services with quality (level of accessibility, understandability, ease of obtaining and sufficiency) of official information on the state of the competitive environment in the markets for goods and services in the region and activities to promote competition in the region.

These monitoring were carried out in the Komi Republic. The sample selection of respondents was carried out in accordance with the recommendations of the Analytical Center under the Government of the Russian Federation. A survey of business entities in a sectoral context was carried out by local authorities. The calculation of quotas for a survey of entrepreneurs was carried out separately for each municipality based on data on registered business entities as of December 31, 2017 (according to the State Statistics Service of the Komi Republic). The total required number of respondents (2500 business entities) was distributed among municipalities proportionally, including in accordance with the type of economic activity. Similarly, population quotas were calculated. The survey involved 2644 business entities of the Republic of Komi. The respondents were distributed by type of economic activity of the business, which provided social services to 14 organizations, or 0.5% of all respondents.

Monitoring administrative barriers and assessing the state of the competitive environment by business entities.

In the Komi Republic, the main negative barriers to the development of competition for the provision of social services in 2018 were: high taxes (28.6%); instability of Russian legislation regulating entrepreneurial activity (23.3%); privileges for individual business entities (14.3%); the need to establish partnerships with authorities (14.3%); the difficulty of gaining access to land, industrial or other premises (12.9%); duration of the procedure for obtaining licenses (7.8%); quotas for jobs (7.1%); corruption (3.4%). There are no barriers, convinced 35.7% of this business .

Over the past three years, it has become easier for business to overcome administrative barriers than before, 7.1% think. 21.4% noted the level and number of administrative barriers did not change.

Assessment of the state of competition and the competitive environment by business entities in the Komi Republic. In order to rank the level of competition development by type of economic activity, the answer option “very high competition” was assigned a score of “5”, “high competition” - “4”, “moderate competition” - “3”, “weak competition” - “2”, “No competition” - “1”. In 2018, manufacturers of social services rated the competition level as weak (2.07), compared with 2015, it fell by 0.35 points.

To calculate the indicator characterizing the average number of competitors by type of economic activity, the answer option “a large number of competitors” was assigned a score of “4”, “4 or more competitors” - “3”, “from 1 to 3 competitors” - “2”, “are no competitors” - “1”. Producers of social services (50%) believe that they have “1 to 3 competitors” (2.21), in 2015 this indicator was higher (2.44) by 0.23 points. To the question “How has the state of the competitive environment changed over the past year?” (2018) replies were received: “has not changed” - 78.6%; “Improved” - 14.3%; “Worsened” - 7.1%.

Representatives of social services (85.7%) believe that the state of the competitive environment has not changed over the past three years. Respondents' satisfaction with the state of competition was equally divided between “rather satisfactory” (21.4%) and “satisfactory” (21.4%).

Consumer satisfaction with the quality of goods, services and price competition in the markets of the Komi Republic. The survey covered 11277 people (60% of them are women, 40% are men). The survey was conducted in all municipalities of urban districts and municipal regions of the republic. During the survey, respondents were asked to evaluate how widely represented the organizations in the field of social services of the district (city) in which they live are. Most of the respondents described the number of these organizations as sufficient (74.3%). The number of respondents who noted the growth of social services organizations increased (28.5%).

To the question “How, in your opinion, has the number of organizations providing services in the field of social care for the population changed over the past three years?” - 42.7% of respondents answered “not changed”, 1.3% - “decreased” and 33.5% - “increased.” 89.1% of respondents was satisfied by quality of these services. Satisfaction with the level of prices was noted by 41.1%, 28.2% were “rather satisfied”, “rather not satisfied” were 11.9% and “unsatisfied” 7.1%. Most of the respondents were satisfied with the choice of services in the field of social care for the population (78.5%).

Satisfaction of business entities with the quality of official information on the state of the competitive environment. Respondents were asked to evaluate the quality of official information on the state of the competitive environment in the markets of goods and services of the Komi Republic and the activities of executive bodies to promote competition on four criteria: level of accessibility, level of comprehensibility, ease of receipt and sufficiency. Respondents were offered four answers: 1 - unsatisfactory, 2 - rather unsatisfactory, 3 - rather satisfactory, 4 - satisfactory, 0 - I find it difficult to answer. According to all the criteria, the respondents rated the quality of information as rather satisfactory (according to the criterion of the level of accessibility, the average score was 3.36, by the criterion of the level of comprehensibility - 3.32, by the criterion of convenience of receipt - 3.33, by sufficiency - 3.31).

The opinion of business entities as to what the work to develop competition in the Komi Republic should be directed first of all The results of the survey showed that the most common answers to the question of to what should to the development of competition for social services in the republic first be directed were: ensuring that competition is fair (42.9%); ensuring product quality (35.7%); control over the work of natural monopolies, such as water supply, electricity and heat supply, railway and air transport (28.6%); control over price increases (21.4%); creating a system of informing the public about the work of various companies, protecting consumer rights and the state of competition (14.3%); ensuring that one company does not begin to fully dictate conditions in the services market (14.3%); creating conditions so that everyone who wants to do business can get this opportunity (14.3%); assistance to start-up entrepreneurs (14.3%); creation of conditions for development of legal entities and individuals selling goods and services (7.1%); legal protection of entrepreneurs (7.1%). Respondents believe that authorities help in something, interfere with business in some ways (21.4%), help businesses with their actions (14.3%), authorities only interfere with business with their actions (7.1%). All this should help to ensure the competitiveness of socially oriented non-profit organizations in the social services market.

References

1. Federal Law "On Protection of Competition" dated July 26, 2006 N 135-Φ3.
2. Raysberg B.A., Lazovsky L. Sh., Starodubtseva Ye. B. *Modern economic dictionary*. 3rd ed. - Moscow: INFRA-M. 2001.p. 318.
3. Kitsay Yu. A. *Competition in the social sphere as an object of legal regulation [Text] // Actual problems of law: materials of the V Intern. scientific conf. (Moscow, December 2016)*. - Moscow: Buki-Vedi, 2016. - p. 83-86. — URL <https://moluch.ru/conf/law/archive/224/11199/> (application: 23.04.2019). c. 83-86.
4. Decree of the President of the Russian Federation of December 21, 2017 N 618 "On the main directions of the state policy for the development of competition" (together with the "National Plan for the Development of Competition in the Russian Federation for 2018 - 2020").
5. Federal Law of January 12, 1996 N7-Φ3 "On Non-Profit Organizations".
6. Decree of the Government of the Russian Federation of January 26, 2017 No. 89 "On the register of non-profit organizations performing publicly useful services".

7. *The Law of the Republic of Komi of October 31, 1994 N 8-P3 "On Executive Bodies in the Republic of Komi".*

8. *Order of the Government of the Komi Republic of October 23, 2014 N 354-p On the determination of the authorized body to promote the development of competition in the Komi Republic.*

9. *"On approval of the List of priority and socially significant markets for promoting the development of competition in the Komi Republic of December 14, 2015 N 360-p" (as amended on July 17, 2018).*

10. *On amendments to the order of the Head of the Komi Republic dated 12.30.2016 N 433-p "On approval of the Action Plan (" road map ") to promote the development of competition in the Komi Republic."*

11. *Message from the President of the Russian Federation to the Federal Assembly of the Russian Federation on December 3, 2015.*

12. *Order of the Ministry of Labor, Employment and Social Protection of the Komi Republic № 2188 of 11/23/17 "On approval of the list of priority social services, the provision of which can be carried out on the territory of the Komi Republic by socially oriented non-profit organizations."*

13. *Decree of May 27, 2016 N 69 On the approval of CII 2.1.2.3358-16 "Sanitary and epidemiological requirements for the placement, arrangement, equipment, upkeep, sanitary-hygienic and anti-epidemic regime of work of social service organizations".*

14. *The Law of the Komi Republic of July 6, 2009 N 68-P3 "On some issues related to care and assistance to elderly citizens and people with disabilities in the territory of the Komi Republic" (as amended).*

15. *Message from the President of the Russian Federation to the Federal Assembly of the Russian Federation on December 1, 2016.*

16. *Decree of the Government of the Russian Federation dated 27.10.2016 N1096 "On approval of the list of socially useful services and criteria for assessing the quality of their provision".*

17. *Bychkov D. Competition in the social sphere: on whose side is the state // Public services: planning, accounting, taxes. - 2012. - № 6.*

避免在制裁下使用俄罗斯经济中的美元支付：问题和前景
**AVOIDING THE USE OF DOLLAR PAYMENTS IN THE RUSSIAN
ECONOMY UNDER SANCTIONS: PROBLEMS AND PROSPECTS**

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抽象。 本文讨论了拒绝美元支付的理论本质，并确定了去美元化的可能性。本文的目的是在制裁条件下制定俄罗斯经济去美元化的问题和前景。 作为研究方法，系统化和理论概念的概括，使用统计数据进行分析。 提出的主要方向为俄罗斯经济的去美元化提供了前景

关键词：拒绝美元支付，财务战略，俄罗斯，中国，美国金融支付。

***Abstract.** The article discusses the theoretical essence of the rejection of dollar payments and identifies the possibility of dedollarization. The aim of the article is to formulate problems and prospects for the de-dollarization of the Russian economy under the conditions of sanctions. As research methods, systematization and generalization of theoretical concepts, analysis of statistical data were used. The main directions are proposed that provide prospects for the dedollarization of the Russian economy*

***Keywords:** refusal of dollar payments, financial strategy, Russia, China, USA financial payments.*

Introduction

In recent decades, developing countries have made significant strides in the field of financial development, including by deepening their financial situation, increasing their financial accessibility and the efficiency of the banking sector. Financial development, in turn, has contributed to higher economic growth in these countries. At the same time, financial dollarization, defined as the share of deposits / loans in foreign currency in the total volume of deposits / loans, remains a common and constant phenomenon [3]. The trends towards de-dollarization of the financial sector arose from the beginning of the 2000s and continued until the global financial crisis of 2008–09. Since then, de-dollarization has slowed in many countries. Nevertheless, some of them continue to dedollarize, despite the fact that various internal factors interacting with global factors influence this process [1].

Dollarization can be seen as the result of a financial equilibrium between lenders and borrowers, which optimizes the currency structure of their contracts in response to certain characteristics of the economic environment. The portfolio approach explains dollarization as a response to macroeconomic instability, which manifests itself in high inflation and exchange rate volatility. With this approach, the domestic investor chooses the composition of investments in order to minimize deviations in expected returns, which depend on the volatility of inflation and the real exchange rate [4]. This is consistent with numerous evidence that episodes of high inflation and depreciation of the real exchange rate are associated with increased dollarization. The consequence of this approach is that expectations play an important role, and confidence in monetary policy and the exchange rate regime are the key. The absence of a credible monetary policy and exchange rate regimes explains the persistence of dollarization even after inflation has stabilized, usually due to the fact that a stable real exchange rate is used as a nominal anchor. Following this approach, one can agree that dollarization is associated with weak economic institutions [10].

Main part

The existence of a balance mismatch in countries with a high degree of dollarization tends to strengthen the deterrent effect of depreciation, which also explains the continued dollarization. The second feature that explains dollarization is the presence of market friction or setbacks in credit markets. In countries with economies in transition, there is a close link between deepening the financial sector, cross-border banking and dollarization. Empirical studies of dedollarization also confirm the idea that financial dollarization has its origins both in matters of macroeconomic stability and in operations in credit markets. In this regard, many Russian researchers confirm the importance of reliable macroeconomic stabilization measures to reduce inflation and stabilize the exchange rate as a key component of successful dedollarization strategies [5, 7, 8].

A.V. Koren in his study analyzes the historical premises of the dominance of the US dollar in international payments, retrospectively studying the evolution of the international monetary system under the influence of leading powers, on the basis of which the mechanism of emission of the American currency and its effect on the international currency are characterized. Based on the analysis of data from news agencies and statistical services, the shortcomings of the existing international monetary system were identified. The features of the mechanisms of currency issuance owned by the world's largest central banks, as well as the principles of cooperation in the implementation of the main programs of the International Monetary Fund were also considered [6].

Based on a study of the causes of the relationship between falling demand for currencies of developing countries and the strengthening of currencies of developed countries, the author formulates the negative consequences of increased demand for precious metals as a classic protective asset during economic crises. Two ways of reforming the world monetary system with an important role for Russia in this process are proposed: 1) as the next stage in the development of the international currency system, a gradual decrease in the volume of world trade with dollar payment is proposed, as well as a transition to multicurrency trading; 2) the possibility of a new economic crisis with the loss of the functions of the US dollar as the leading world currency as the alternative scenario is also considered [6].

A.V. Berdyshev considers the factors that determine the formation of the US national currency as a world reserve currency, defines the conditions for the dominance of the dollar in the global financial arena in modern conditions. The article assesses the prospects for strengthening the position of the euro, Chinese yuan and the Russian ruble in the status of the world reserve currency. Based on the results of the study, it is concluded that there are significant limitations on the possibility of transforming a single currency model of the global financial system based on the US dollar at the present stage [4].

Analysts say that the status of a currency is often determined not only by economic factors, but also by military power, which is often the most powerful argument in negotiations. For many years, the United States spent more on armaments than all other countries combined, pursued a very aggressive policy, not hesitating to use military force, while the dollar was fixed as the main mean of international payments. The consciousness of most people has a sufficiently high inertia and it will take not a single year or a single failure of US foreign policy in order for the perception of the dollar as the main means of payment to be seriously shaken [2].

Such studies confirm the need for dedollarization, however, external factors significantly limit these processes [11]. So, in August 2017, the United States passed a law to counter US opponents through the introduction of sanctions. A year later, the first stage of the new, so-called chemical, sanctions package was put in place, prohibiting the supply to Russia of a number of dual-use products, the pretext of which was the Skripals case. The second, tougher line of the “chemical package” has not yet been put into effect, although it has received principal approval from the administration.

According to this law, the US administration should choose at least three of the following six types of actions against Russia: counteracting the receipt by Russia of financial resources from international organizations like the IMF, a complete ban on lending to the Russian government by American banks, and a significant restriction on the export of American technology and goods to the Russian Federation, the restriction of the supply to the United States of any goods from Russia, including hydrocarbons, the prohibition of flights of state airlines of the Russian Federation in the United States.

The Cruz-Shahin bill introduced now only multiplies entities. Almost all of the measures envisaged by him can be applied by the US administration in pursuance of the 2017 law. In the meantime, two more bills on the same topic are being considered in Congress, which were launched after the Helsinki meeting of the presidents. The first of them received the name DETER-Act, or the act on the protection of American elections. Its authors are members of the upper house of Van Hollen (from the Democrats) and Rubio (from the Republicans). The Deter-Act provides for actions such as a ban on dollar transactions in relation to Russian state banks, arrests of accounts of energy enterprises from Russia, etc. Moreover, these sanctions should be introduced automatically even without the participation of the administration, 30 days after the head of intelligence reports on an attempt to intervene in the course of elections in the United States.

Another bill, the so-called “Infernal Sanctions,” was introduced on behalf of a two-party group of Graham-Mendes congressmen. It also provides for prohibitive measures in relation to new issues of the Russian state debt, arrests of accounts and transactions of Russian banks, as well as sanctions against individuals. After the amendments, sanctions against the new oil developments of the Russian Federation and LNG projects outside of the Russian territory were also added there. Thus, here, in the Cruise-Shahin project, the previously envisaged measures are repeated. But this year so far not a single hearing or vote has been held on any of these bills. It seems that American lawmakers are waiting for the next contact of Trump with Putin in order to please both presidents with another sanction law.

There is another bill targeted specifically at “Nord Stream 2”. The likelihood that it will be adopted in the near future is much higher, especially when you consider that both Trump himself and the members of his administration repeatedly opposed the construction of this gas pipeline and even threatened sanctions to their European partners. If this law is passed, it should be another tool to force Germany to increase purchases of expensive American LNG. But, its main provisions, of course, are directed against Russia. The Washington administration may believe that in this way it will strengthen its negotiating position on other issues.

In such conditions of sanction pressure, Russia is busy strengthening its own financial independence. One of the tools for this strengthening was the gradual but consistent de-chlorination of trade relations between the Russian Federation and other countries. According to experts, from the beginning of the imposition of sanctions in 2014, the share of dollar payments in the foreign trade of the Russian Federation decreased by 12.6%, and the share of payments in rubles and euros increased by 14 and 26%. Of course, this happened not just like that, but was the result of a consistent policy pursued by the leadership of the Russian Federation [9].

Analysts conducted a large-scale study of the structure of foreign trade in Russia for five years, from 2013 to 2018. It turned out that during this time the share of dollar foreign trade payments of the Russian Federation decreased to 56.1% (\$ 388 billion), while the similar share of the euro increased by 21% and reached the level of 151 billion in terms of dollars. The share of ruble payments increased to 20 % and amounted to \$ 136 billion. Other currencies in foreign trade payments of the Russian Federation are used much less frequently, their share is 2.4%, but over 5 years its growth amounted to 84.6% [9].

The tendency to abandon the dollar and the transition in foreign trade payments to rubles and other currencies is obvious and justified. Under conditions of sanction pressure, this is an important and effective tool to ensure the sustainability of the domestic economy and its protection from external destructive interference. Naturally, such measures cannot be taken alone; the consent of trading partners is necessary. And it has been achieved. Thus, the share of ruble payments for export deliveries to China increased 5.2 times, the share of payments in RMB for imports of Chinese products increased 8.8 times. Of course, the growth in trade turnover between the Russian Federation and the PRC also plays its part here, but at the same time, the share of dollar payments in bilateral trade is steadily declining.

The high likelihood of another US sanction making the dollar a toxic asset for the Russian economy. Naturally, in such a situation, it is necessary to minimize the share of settlements in this toxic currency. Although a complete ban on payments in dollars is not yet discussed, because for many countries with which Russia maintains trade relations, the dollar remains the most convenient universal means of payments.

But despite this, the process of de-dollarization of international payments gradually covers other countries. In the absence of a clear alternative to the dollar, the central banks of many countries are trying to secure their national currencies by increasing the share of gold and other currencies in their gold and foreign exchange reserves. First of all, such states as the Russian Federation, China, Turkey, countries included in CEEMEA and ASEAN associations are engaged in this. Over the past year, banks have purchased 651 tons of gold, more than ever in the past half century. Aggressive US policy is practically forcing many countries to get rid of assets in dollars. According to forecasts for 2019, gold purchases by central banks will increase to 700 tons.

However, the de-dollarization of the global economy is a very slow process, which is still just beginning. A good illustration of this is the efforts of the PRC to achieve the renminbi's status as a reserve currency, which, despite the fact that the PRC is already the largest world economy, remains unsuccessful. The main reason for maintaining the dominant position of the dollar and the euro is the stability of the economies of their issuers, thanks to which third countries can safely store their funds in these currencies. The transfer of capital to the RMB is not profitable due to losses caused by inflationary expectations.

And although the process of de-dollarization is gradually covering more and more countries, while maintaining its current speed, it will stretch for several decades. However, it is possible that its speed will increase. The reason for this may be the measures taken by the EU, which are aimed at increasing the share of the euro in international trade payments, especially those that are produced for the import of oil and gas. This process can significantly accelerate if (when) the UK finally completely leaves the European Union.

Despite the fact that the de-dollarization of the world economy has begun, the vast majority of states and large businessmen still perceive the dollar as the main and almost the only global currency. Now the share of dollars in international payments is 43%. The euro accounts for 37%. Another 4% is occupied by the Japanese yen and the British pound, and for all other currencies, including the ruble and the yuan, no more than 2% remains. As for the international currency reserves, the dollar share here is even higher and reaches 62%. The euro accounts for only 20%, and the pound and yen - 5% each [9].

Below are the actions of the Bank of Russia to ensure dedollarization. In addition to increasing its gold reserves, the Bank of Russia is steadily increasing the share of assets denominated in euros and yuan. The geography of the allocation of funds is changing, assets are gradually being withdrawn from the United States and introduced into the PRC. Only in 2018, the share of US assets of the Central Bank of the Russian Federation decreased from 29.9 to 9.7%. At the same time, the share of assets in China increased from 2.6 to 14.1%, and Japan from 1.5 to 7.5%. The assets of the Central Bank of the Russian Federation in Finland have grown. But the Bank of Russia withdrew part of the funds from the UK and Canada, the share of these countries decreased from 7.2 to 6.6 (England) and from 2.8 to 2.3 (Canada) [9].

The share of CBR assets denominated in dollars has also sharply decreased - from 45.8 to 22.7%. At the same time, the percentage of assets in euros, yuan and gold increased from 21.7 to 31.7, from 2.8 to 14.2 and from 17.2 to 18.1%, respectively. The total growth of CBR assets for the year amounted to \$ 36.1 billion in recalculation. This is taking into account some losses caused by changes in exchange rates and withdrawal of funds from some accounts by the CBR by some clients. Russia's investment in US government securities (treasuries) decreased from 96 billion to 15 billion US dollars [9].

Conclusions

Summarizing the foregoing, we can conclude that in addition to problems associated with lower monetary policy efficiency, limitations on fiscal policy flexibility and increased risks of financial stability, there are additional costs from dollarization associated with lower financial depth and efficiency of the banking sector. Thus, the results justify policy efforts to increase the use of the national currency in financial transactions.

For this, Russia needs differentiated prudential regulations aimed at reducing the incentive of the bank to carry out operations in foreign currency and at encouraging economic agents to absorb the risks associated with lending and deposits in foreign currency. Dedollarization requires constant efforts in several directions: a reliable macroeconomic stabilization policy to reduce inflation and stabilize the exchange rate; strengthening economic institutions, and in particular the fundamentals of monetary policy, which increase confidence in monetary policy in the face of external shocks; increasing reserves for loans in foreign currency, tightening capital requirements in relation to open foreign exchange positions, differentiated requirements for reserves and interest on deposits in foreign currencies; providing alternative funds for long-term investments and savings.

References

1. Bannister G., Gardberg M., Turunen J. *Dollarization and Financial Development*. - IMF Working Paper, 2018. 39 p.
2. Sutyurin S.F., Kovalenko V.N. *Internationalization of currency in East Asia: premises, implementation, possible prospects* // *Bulletin of St. Petersburg State University. Series 5: Economics*. - 2016. - №1. p.20-41.
3. Beznoschenko V.V. *Prospects for reforming the global monetary system in the context of globalization* // *Scientific notes of young researchers*. - 2016. - №. 4-5. p.13-20.
4. Berdyshev A.V. *On the prospects of de-dollarization of the global financial system* // *Bulletin of GUU*. - 2018. - №10. p.126-129.
5. Kondratov D.I. *Actual approaches to reforming the global monetary system* // *HSE Economic Journal*. - 2015. - №1. p.128-157.
6. Koren A.V., Pustovarov A.A. *Problems and prospects for the development of the world monetary system* // *ANI: Economics and Management*. - 2018. - №1 (22). p.138-141.
7. Kuznetsov A.V. *Supranational currency regulation: theoretical and practical approaches* // *Finance and credit*. - 2018. - №1(769). p.191-208.
8. Naumova T.S., Popova T.N. *The US dollar is the key currency of the global financial system* // *Society: politics, economics, law*. - 2017. - №5. p.46-52.
9. *The official website of the Central Bank of Russia*. URL: <https://www.cbr.ru/analytics/>
10. Stanchin I.M., Soboleva A.A. *Prospects for reforming the financial system by the BRICS countries* // *Territory of Science*. - 2018. - №1. p.115-120.
11. Yashina A.S. *Possible directions of dedollarization of modern world finance* // *Economics and business: theory and practice*. - 2019. - №3-2. P.183-186.

俄罗斯政府形式
FORM OF GOVERNMENT IN RUSSIA

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抽象。本文分析了前期治理的理论模式。俄罗斯的权力特征与俄罗斯宪法的历史特征有关，其中俄罗斯第一任总统叶利钦使他的一元专制权力合法化。本文分析了俄罗斯联邦政府形式的特点，并与世界上传统和最新形式的政府进行了比较，特别是1958年法国宪法规定的戴高乐总统权力模式。俄罗斯政府作为宪法总统单一制的形式，分析了这种情境模式的优势，普京总统长期以来成功地成为俄罗斯的领导者，以保持其完整性并确保宪法体系的稳定。

关键词：政府形式，优势和劣势，超级总统制度，宪法总统候选人。

Abstract. *The article analyses theoretical patterns of presidents governance. The features of power in Russia are related to historical features of adoption of the Constitution of the Russia, in which the first President of the Russia B. Yeltsin legitimized his monist authoritarian power. This article analyses features of the government form in the Russian Federation against the background of its comparison with both traditional and the newest forms of government in the world, especially with De Gaulle model of presidential power under the French Constitution of 1958. The author names the Russian form of government as constitutional presidential monarchy, analyzes advantages of this situational model, through which President Putin managed to become the leader of Russia for a long time, to keep its integrity and ensure stability of the constitutional system.*

Key words: *form of government, advantages and disadvantages, super-president institution, constitutional presidential monokratija.*

The republican form of government is traditionally divided to the parliamentarian (FRG), the presidential (USA) and the mixed (France) republics, with many modifications among hybrid (hybrid) republics, and the issue of their classification is the most controversial¹.

¹Bobrova N.A. Form of Government in Russia: Advantages and Disadvantages // Slovak international scientific journal. Bratislava. 2019. № 29. Vol. 2. S. 47-51; Burkhardt F. Institutions and institutional change in post-communism. Munich, Ludwig-Maximilian-University press. 2007. – 216 p.; Mitterrand F. Le coup d'Etat permanent. L'Intitut Francois Mitterrand. 2010; Sakwa R. Contemporary Russia: The Problem of displaced sovereignty in Russia and its Constitution: promises and reality. №1. Brill. Ac. Pub. 2008..

With the expansion of the form of government criteria, when the form of organization of executive power is linked with the relations of power and population, i.e. with the political regime, discussions are even stronger. In the USA and Western Europe, the opinion is being cultivated that there is no democracy in Russia², and without democracy there is no real republic³. Undoubtedly, Western scientists and journalists in their research on Russia also pursue ideological and political goals.

Russian constitutional presidential monarchy (that is how the author of these lines defines the form of government in Russia) is connected with the name of the first Russian president, Boris Yeltsin, who in his turn took the French hybrid republic of Charles De Gaulle, as a model.

In Russian constitutionalism, the monarchical institution of succession was de facto formed, beginning with the Decree of B. Yeltsin of 30.12.1999 on the appointment of V. Putin as the acting president of Russia. There are other elements of the monarchy: return of the monarchic coat of arms, the presidential veto, de facto turned into an absolute, 10% presidential quota in the upper house of parliament - the Federation Council, introduced in 2014⁴, the presidential decrees powers, including role the arbitrator of federal and regional public authorities, guarantor of national unity and state security.

From the De Gaulle model formulas are taken, according to which the president alone determines the main directions of domestic and foreign policy, is the guarantor of the Constitution of the Russian Federation, human and civil rights and freedoms (Article 80 of the Constitution of the Russian Federation).

The Russian presidential monarchy appeared from the formula: everything that strengthens the president (the government's answerability to the president) is taken from the presidential republic, and from the parliamentary form of government everything was taken that weakens the parliament (possibility of the parliament dissolving, including as a result of the government's putting on vote of confidence with the aim of the parliament dissolution, the president's right to legislative initiative).

In addition, Russian constitutionalism proceeds from the principle of constant expansion of the President powers, without violating the Constitution, which provided the President with truly boundless powers.

² Remnick David Resurrection. *The Struggle for a New Russia*. New York: Random House. 1997. P.77; Gray P. *Can Bad executive institutions make good policy? The strange case of Russian government under Yeltzin and Putin*. London, Metropolitan University. 2007. P.19-25; Warner, Margaret. *What Putin's Latest Win Means for Russia*. PBS. 2013. P.39-45.

³ Judah, Ben *Fragile Empire How Russia Fell in and Out of Love with Vladimir Putin*. Newhaven and London, Yale University Press. 2013. P.7-19, 41-58; Zachary R. Ochoa *Russia The Democracy That Never Was*. James Madison University. 2013. P.3-27.

⁴ Federal constitutional law of July 21, 2014 No. 11-FKZ // Official Internet portal of legal information (<http://www.pravo.gov.ru>).

Current Russian legislation avoids detailed regulation of public relations, based on the recognition of the so-called "implied powers" of the President of the Russian Federation legalized by the Constitutional Court of the Russian Federation.

As a result, many spheres of public relations, for example, the authority of the President for resignation of the Government of the Russian Federation (Part 2, Article 117 of the Constitution of the Russian Federation), relations between the President and the Chairman of the Government in forming the Government are closed.

However, criticism of the Russian form of government for the lack or underdevelopment of democracy is incorrect because of the limited criteria taken as the basis. The Russian form of government was designed for Boris Yeltsin, who in the autumn of 1993 spifflicated legislative power, constitutionally formalizing its degradation.

Foreign journalists often ask President Vladimir Putin, a tricky question: "Do you know that you are called a czar?". Putin knows everything, including the fact that he uses power granted to him under the Constitution legally.

The President's infinitely broad powers correspond to the mechanism of power invented by the French general de Gaulle, who did not need to return the monarchy or call himself a monarch for this purposes. The nation-wide elected president is not weaker, and under certain conditions is even stronger than the monarch. De Gaulle insisted on the referendum on the adoption of the 1958 Constitution in order to legalize his unlimited powers by public will.

In super-presidential republics, the power mechanism is designed more subtly than in the dualistic monarchies, allowing to rule on behalf of the people proclaimed to be the source of power.

In monocratic (super-presidential) republics, the entire set of competencies of the head of state and parliament, constitutionally established relations between them, are such that the constitutions of these republics, starting from French Constitution of 1958, were correctly characterized as anti-parliamentary, anti-democratic, anti-republican. They are anti-parliamentary because the powers of the parliament are limited from "a" to "z," the parliament does not control the executive branch (the government's annual report to the parliament is extremely regulated and plays a decorative role). The Constitution of France is anti-republic because the president actually became elected monarch. The French Constitution was considered antidemocratic because it did not contain a section on the rights and freedoms of the individual, but in this respect there was a reference to the 1946 Constitution and a separate declaration. De Gaulle, somewhat said, referring to the founders of the constitution of 1946: you formalized extensive list of individual rights, and I recognize them, but I will do more for their implementation than you, because the new mechanism of power is more effective than the power

of vast parliamentarism. This fact of the constitutional history of France confirms the conclusion that essence of the constitution lies in the mechanism of power that it formalizes.

Nice principles about importance of a person, his/her rights and freedoms are the essence of declarations, while in constitutions they fulfil speculative goals, allowing to decorate the power mechanism by imitation of democracy.

In the monocratic (authoritarian) mechanism of power, there are not only disadvantages, but also undoubted advantages, especially when authoritarianism, like de Gaulle's one, is frank, that is, does not adorn the power canvas with patterns of human rights. By the way, in France, democratic changes subsequently took place (for example, in 1962 the term of the presidency's legislature was shortened from 7 to 5 years). As for the Constitution of the Russian Federation, the de Gaulle's mechanism of power copied in it continued to increase authoritarian muscles in full compliance with Part 3 of Article 80 of the Constitution of the Russian Federation.

The advantages of Russian authoritarianism are in the following seemingly paradoxical circumstances: *first*, the Russian presidency largely expresses the social order of the society itself, which suffered from the lightning-like change in the socio-economic formation as a result of the parliamentary revolution of the Gorbachev period; the older and middle generations are still in a state of political anabiosis and distrust of parliamentarism; *secondly*, these changes, which are often carried out under the slogan of "democracy," have turned the very word into abusive word for a long time; *thirdly*, the Russian president, in the person of Putin, acted as a powerful barrier to further fragmentation of the country by oligarchic and political groups. For this purpose, in particular, at the beginning of Putin's second presidential term it was necessary to take such an "undemocratic" measure as abolishing direct elections of the heads of constituent entities of the Russian Federation that turned under Yeltsin into a contest of "money bags" and national clans (direct elections were returned on 2012).

The integrity of Russia was under threat, in many regions up to 1/3 of the laws contradicted federal legislation. Without powerful authorities, no president could cope with the task of restoring the integrity of the state. V. Putin prevented the disintegration of Russia and restored its power, which explains its high authority among the people.

The vertical of power was built in different ways, but there were consequences that are not approved even by those representatives of the electorate who invariably vote for Putin, because the social order of society for a "strong hand" is limited.

The negative consequences of authoritarianism are the following:

1) the excessive redundancy of the apparatus and the absolute power of the bureaucracy. In fact, two governments were formed, often overlapping each other (the Government and the Presidential Administration); as the Russians say, "the people can't cope with two nobilities";

2) control over the bureaucracy is illusory, as well as, in fact, the fight against corruption, because the controlling bodies are also created by the president (his office). At one time, former Prime Minister Yevgeny Primakov was surprised that in the economic crisis of 2008, 3 billion rubles were allocated for the rehabilitation of banks. without any conditions for intended expenditure: such conditions become meaningless due to lack of the necessary number of supervisors, especially honest ones⁵;

3) the regime of "manual control" finally corrupts the bureaucracy and the Russian parliamentarians integrated in it, which are not only equal in terms of salaries and pensions to ministers, but also in terms of legal status. However, the level of responsibility of deputies is incommensurable with the responsibility of ministers. High indemnity of deputies is purchase of their loyalty, one of the ways to "tame" them, as a result, even factions of the parliamentary minority become decorative opposition;

4) To a significant extent parliaments are made up of businessmen, who need the status of deputy to promote their own business and weaken their competitors. And this represents claim to the electoral system, including the system of state funding of parliamentary parties. Budgetary feeding for every vote in the elections to the State Duma of the Russian Federation is a powerful way to create a "stable" party system. But why at the expense of taxpayers? At one time, the CPSU, which existed on the basis of party fees, was criticized for its becoming associated with the state apparatus, the term "governmentalization" appeared. State funding of parties is a sign of their governmentalization;

5) High level of deviation from the constitutional principles, especially in terms of inadmissibility of adopting laws that abolish or diminish the rights and freedoms of a person and a citizen (art. 2, art. 18, art. 55, part 2), and also in terms of principle of powers separation (art. 10 of the Constitution of the Russian Federation);

6) Absence of strategic national development plan of the country does not contribute to the stability of the system, which itself becomes situational. People are frightened by horror stories about return of state ideology. But a state without ideology, as a man without brains, and so-called Yeltsin de-ideologization was a sophisticated kind of ideology, a kind of social anesthesia, through which all former values were debunked and spiritual disarmament of the people was ensured⁶;

7) The unprecedented social stratification of Russian society, which arose in the "wild" 90s, does not decrease, and by all criteria (class, branch, official, regional);

8) the limit of failed expectations is exhausted. Thus, during the election campaign in 2018 presidential election and the night after summarizing the results of

⁵Where can we get the army of honest controllers? Interview by E. Primakov // Kommersant, 20.08.2008.

⁶Bobrova N.A. Constitutional system and constitutionalism in Russia. M.: UNITY-DANA. 2003. P.113-129.

the elections, Putin talked about the need for a breakthrough. The people believed that progressive tax would be introduced, and the government would be substantially updated. And what happened in the end? During television call-in show with the people on the question about progressive tax, Putin answered with the same version that Prime Minister Medvedev had repeatedly voiced: introduction of progressive tax would bring the taxable base of large scale business into the shadow. But why other countries are able to control the taxable base with progressive tax, reaching 60-80%? Why in Russia 13% for superprofits are uttermost? Does the President recognize by it the weakness of his own state? If the state is not able to "bring to life" the oligarchs, who own 90% of national wealth, is it strong? In the name of what the Russian nation agrees with the institution of super-strong president and expects incomprehensible "breakthroughs" still with the same prime minister and with the same "indistinct" economic policy?

Such political system has no real opposition, because it requires not only ideological platform, but also economic basis. And only oligarchs criminalizing power have this basis.

Russia is not the only country in which the society, realizing the unsightliness of the political underside, agrees to a social compromise in the form of super-president institution to ensure the society's stability, its self-defense against various kinds of color revolutions and other cataclysms. As a result, even those who prefer more balanced political system vote for a strong and charismatic president many times. The system, based only on the high rating of the president, makes the whole society hostage, and the only thing which is left for them is: 1) hope that the institution of a super-strong president will not be used to harm the people, 2) to believe that the real power in the country will be picked up by decent hands.

This generates either the institution of the president's successor (the Russian establishment constantly wonders who can become it), or the cardinal reform of the Constitution, or both. One does not exclude the other.

Russia belongs to that model of the political system, which is based on expediency and is situational in nature, flexible from ideological and organizational points of view, maximally convenient for the president-leader as it allows to combine the incombinate: conservatism and liberalism, democracy and authoritarianism, system stability and mobility of electoral legislation, legality and expediency.

No president will ever agree with changes of the Constitution, limiting his own power. By the initiative of the president, such changes were made when the last term of presidential powers expired and power could be retained only at the price of its transfer to the prime minister, but for this purpose the party led by the reformer should win in the parliamentary elections. This was the case of reform in Georgia at the end of his presidential powers held and failed by M. Saakashvili.

To the credit of President V.Putin, before the end of his second presidential term, he did not go in for reform of the government either in the Georgian or the Belarusian variant (abolition of the constitutional norm on the limitation of presidential powers by two consecutive terms). Putin took a rather risky variant of "switching jobs" of the president and prime minister, while retaining the actual leadership, and he was the only one who managed it in the world practice. But first Putin took care of the stability of the status of the prime minister, by leading the list of "United Russia" in 2007 before the elections to the State Duma. This was a delicate move, underappreciated by scientists: Putin in 2008 actually combined in one person the post of prime minister and the first person in the electoral list of the party of the parliamentary majority. Then this approach was repeated with D. Medvedev. In fact, this is already a political tradition that largely explains Medvedev's next appointment to the post of the Prime Minister in May 2018. The Russians took this appointment rather with disappointment, not realizing that Medvedev's dismissal from the post of prime minister would presuppose the replacement of the chairman of United Russia.

However, it is not necessary to consider the emerged political tradition as institution sufficient for transition to parliamentary form of government, for the very fate of this tradition depends only on the President V. Putin, as well as the fate of the constitutional reform.

Bibliography

1. Bobrova N.A. *Constitutional system and constitutionalism in Russia*. M.: UNITY-DANA. 2003. – 264 p.
2. Bobrova N.A. *Form of Government in Russia: Advantages and Disadvantages* // *Slovak international scientific journal*. Bratislava. 2019. № 29. Vol. 2. S. 47-51.
3. Burkhardt F. *Institutions and institutional change in post-communism*. Munich, Ludwig-Maximilian-University press. 2007. – 216 p.
4. Gray P. *Can Bad executive institutions make good policy? The strange case of Russian government under Yeltzin and Putin*. London, Metropolitan University. 2007.
5. Judah, Ben *Fragile Empire How Russia Fell in and Out of Love with Vladimir Putin*. Newhaven and London, Yale University Press. 2013.
6. Mitterrand F. *Le coup d'Etat permanent*. I'Intitut Francois Mitterrand. 2010.
7. *Where can we get the army of honest controllers?* Interview by E. Primakov // *Kommersant*, 20.08.2008.
8. Remnick David *Resurrection. The Struggle for a New Russia*. New York: Random House. 1997.
9. Sakwa R. *Contemporary Russia: The Problem of displaced sovereignty in Russia and its Constitution: promises and reality*. №1. Brill. Ac. Pub. 2008.
10. Warner, Margaret. *What Putin`s Latest Win Means for Russia*. PBS. 2013.
11. Shapoval V.N. *Comparative constitutional law*. Kiev: Publishing house Knyaginya Olga. 2007. 416 p.
12. Zachary R. *Ochoa Russia The Democracy That Never Was*. James Madison University. 2013.

没有意识形态的国家是荒谬的
STATE WITHOUT IDEOLOGY IS ABSURD

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抽象。道德化的口号具有意识形态性质，允许在前价值观发生根本变化的时期对社会进行道德裁军，并使社会在反对庸俗市场资本主义的过程中无能为力，在20世纪90年代以俄罗斯为幌子引入俄罗斯。所谓的普遍价值观。Deideologization是一种混乱和虚伪的意识形态，资产阶级价值观总是占上风。批评艺术第二部分的科学家和政治家。俄罗斯联邦宪法第13条不主张在宪法中写下一些反对者指责他们的意识形态。这篇文章应该被排除在宪法文本之外，仅仅是非科学和不真实的。

关键词：国家，意识形态，宪法禁令，讨论，道德化，意识形态，意识形态裁军。

Abstract. *The slogan of deideologization is of ideological nature, allowing moral disarmament of society during the period of a fundamental change in former values and making society powerless in the fight against vulgar market capitalism, introduced in Russia in the 1990s of XX century under the guise of the so-called universal values. Deideologization is an ideology of chaos and hypocrisy, where bourgeois values always prevail. Scientists and politicians who criticize part 2 of art. 13 of the Constitution of the Russian Federation do not advocate writing down some ideology in the Constitution, which opponents accuse them of. This article should be excluded from the text of the Constitution simply as unscientific and untrue.*

Keywords: *State, ideology, constitutional ban, discussion, deideologization, kind of ideology, ideological disarmament.*

Part 2 of art. 13 of the 1993 Constitution of the Russian Federation reads: “No ideology can be established as state or mandatory.”

One of the authors of the Constitution of the Russian Federation S.M. Shakhrai in the days of her 25 said: “Look at how our art. 13 on the prohibition of state ideology is attacked. As soon as we write down state ideology, ideology will die.

As soon as we write down the leading role of one party, one religion - this is the end of the party, the end of the religion. (...)The nature of the phenomena cannot be changed by legal registration”¹. He is right in speaking out against the state ideology being “**written down**” (the key word!) In the Constitution. From the lips of the author of the constitution, upholding of its wording is quite logical. But he is wrong in another, namely:

C.M. Shahrai made a logical substitution of the thesis, as a result of which all critics of part 2 of art. 13 of the Constitution advocated writing down state ideology in the constitution. But this wrong. Nobody is going to write down any “isms” like “patriotism”, “Marxism-Leninism”, “liberalism”, “conservatism”, “capitalism”, “authoritarianism” in the constitution, all the more so since for the victory of capitalist values there are enough of part 2 of art. 9 of the Constitution of the Russian Federation: "Land and other natural resources may be in private, state, municipal and other forms of ownership." The word “others” does not exclude foreign owners, and private property comes first.

Those who criticize part 2 of art.13 of the Constitution do not want to establish (write down) any ideology in the form of a constitutional norm, but they are to exclude this odious norm established in part 2 of art. 13 and prohibiting state ideology from the text of the Constitution of the Russian Federation. To deny the existence of state ideology is as absurd as to deny state policy. A state without ideology is impossible. It is the same as a person without thoughts.

Despite the prohibition of state ideology, it was in fact present under Yeltsin, just as it is under Putin. Yeltsin’s political regime was based on such ideological postulates as: freedom of the market, private ownership of land and natural resources, the destruction of the principle of supremacy of the union constitution and legislation of the USSR (this was the beginning of the Soviet Union's destruction), the proclamation of unbridled sovereignty, which put Russia itself on the verge of a geopolitical catastrophe (Yeltsin’s phrase: “Take as much sovereignty as you swallow!”), the elimination of Soviet symbols, including Soviet coat of arms, anthem, red flag, the identification of communism with fascism (the term "red-brown"), ridicule of patriotism and betrayal of national interests. Moreover, all these ideological offenses have so flooded the information space under the slogan of "deideologization" that even those people who did not participate in the plunder of the country found themselves in a state of ideological stupor, political anabiosis. Russian actor, director and poet Leonid Filatov bluntly stated that "current ideological legislators are injecting their thoughts into people's brains even more actively than communists did"².

¹Shahray S.M. Interview // Lenta.ru, 10.10.2018 [application 21.08.2019].

²Filatov L. Time works against me // “New daily newspaper”, 22.01.1994.

Certain ideology is also characteristic of the Putin era: restoring the principle of the supremacy of federal legislation, bringing regional laws³ in line with federal laws, administrative reform, building of a vertical of power, direct communication between the President and the people, the regime of “manual control”, the return of the red Victory banner and anthem to Aleksandrov's music, rehabilitation of patriotism, Soviet achievements, powerful defense, revival of a sense of national pride.

State ideology is voiced in the annual messages of the President to the Federal Assembly, in state programs, national projects, etc. Who can say that there is no state ideology in Russia? Or does someone still believe in “deideologization”? Deideologization was only a new type of ideology, a peculiar way of debunking of Marxist-Leninist ideology at the state level.

The absurd norm enshrined in part 2 of art. 13 of the Constitution of the Russian Federation should, undoubtedly, be excluded from the text of the Constitution. However, the exclusion of this absurd norm from the text of the constitution does not mean that it is necessary to establish (write down) some kind of mandatory state ideology in it. In essence, the state ideology is the Constitution itself, the system of ideas, norms, principles, goals and objectives fixed in it. The entire content of the first two chapters of the constitution - is a magnificent bouquet of ideological principles, which, due to their attractiveness, have received “constitutional registration”.

According to S.M. Shakhrai, “that which so often clings precisely to Art.13 - from weakness. Inability to lead the discussion. This is an attempt to cover up their weaknesses with the rule of law and, accordingly, with the apparatus of state coercion. I can't defend my ideology every day, I lose discussion after discussion, let's write my ideology in the constitution. And if we write in the constitution that Orthodoxy is the main religion of the country, there will simply be nothing that could do more harm to Orthodoxy. We live in Russia! We don't like when something being forced upon us.”⁴.

Yes, we don't like it. But why was a ban on state ideology imposed on us? Why is this absurdity imposed on us? The so-called “deideologization” was nothing more than a new kind of muddy ideology, where values are mixed, black is called white and vice versa, and under the guise of beautiful phrases the cynical ugliness of elementary profit made its way. It is no coincidence that there is Russian wisdom: “to fish in muddy water”.

When S.M. Shahrai declares that upholding the state ideology and a clear answer to the question of where we are going - is the sign of weakness, he is only

³Bobrova N.A. “War of laws”, or On the inadmissibility of weakening guarantees of the supremacy of federal law // Law and regulations. 2000. № 2. p.28-33.

⁴Shahray S.M. Spec. works

right in that liberal ideology has long won the text of the constitution, and the winners are by definition stronger. The ideology of socialism, social equality, and the inadmissibility of rampant social stratification of society have lost. The Constitution of the Russian Federation summarized the results of the victory of the liberal revolution and anti-communist counter-revolution⁵.

And yet, the “founding fathers” of the Russian constitution themselves made slack, because they showed “constitutional fears” that permeated the atmosphere of creating a new constitution: they were afraid that “old mistakes” would ever appear (Marxism-Leninism, one-party system, public property priority, public domain, the vertical of representative authorities, etc.). Moreover, the new constitution was called upon to legalize the first results of privatization carried out on the basis of Yeltsin’s decrees. In fact, the new constitution was needed in order to legalize the power that arose as a result of the privatization of a new economic force - the oligarchy⁶, the power of a clan state, so the authors of the new constitution were not concerned by any considerations about justice.

Clause 4 of art. 15 of the Constitution of the Russian Federation reads: “Generally recognized principles and norms of international law and international treaties of the Russian Federation are an integral part of its legal system. If other rules are established by an international treaty of the Russian Federation than those provided by law, then the rules of the international treaty shall apply.” That is, the foreign law turned out to be higher than the national one.

Who has imposed the principle of priority of international law on Russia? For the first time, the principle of priority of international law was recorded in the constitutions of three countries that were defeated in World War II (Germany, Italy, Japan). The fourth country to consolidate this principle was Russia. C.M. Shahrai reminds that “our constitution is highly rated by experts from all over the world. A lot of work has appeared on self-developing constitutions. This is when the document cemented the basic rules, the foundation, but made it possible to make the walls, windows, roof depending on the situation (...)”⁷. The argument that our constitution was highly praised by international experts was used for the first time in a report by B.N. Yeltsin, dedicated to the draft constitution of 1993⁸. It is strange

⁵Avakyan S.A. No country can live without ideology // Russian Federation today. 2009. №6. p.3; Bobrova N.A. The constitutional system and constitutionalism in Russia. M. 2003. p.167-210; Bobrova N.A. General theoretical and intersectoral aspects of legal liability. Moscow: Jur-litizdat. 2019. p. 247-250; Krasnov M.A. The birth of the Russian Constitution according to the scenario of Lassalle? // Social sciences and modernity. 2014. №4; Lukyanova E.A. Russian statehood and constitutional legislation in Russia / 1917-1993 /. Moscow: MSU. 2000. p.101-147.

⁶Luchin V.O. Constitution of the Russian Federation. Implementation Issues. – Moscow, 2002. p.138-269.

⁷Shahray S.M. Spec.works

⁸Report of the President of the Russian Federation B.N. Yeltsin on the draft Constitution of the Russian Federation // Russian newspaper, 11/10/1993.

when the constitution of a sovereign state passes the "examination" of American "experts". No sovereign state will boast that its constitution has been examined abroad.

Perhaps the most myths during the years of "reform" arose around the problem of democracy, as a result of which "democracy" from an ideological weapon to protect the interests of the people (and, therefore, the majority of the population) turned into the ideological banner of protecting the interests of the minority. The people, proudly referred to in the constitutions as the source of power in the state, appear in relation to the latter as the object of power - *okhlos*, *plebs*.

The debunking of Soviet ideology began with a metamorphosis of democracy, which turned from an instrument of protecting the interests of the majority into the exact opposite. Could it be that the Soviet myth of communism has been replaced by the myth of democracy, which was understood by no means as an instrument of democracy and the interests of the majority?

Democracy - is a generalized term for countless attempts to debug the mechanism of society's influence on power, a mechanism that forces the government to reckon with society. In one of the 2018 election articles, V.V. Putin stated that "in the 1990s, under the flag of the accession of democracy, we received not a modern state, but an underhanded struggle of clans and many semi-feudal feedings. Not a new quality of life, but huge social costs. Not a fair and free society, but the arbitrariness of self-appointed "elites" who openly neglected the interests of ordinary people"⁹.

Moreover, such figures as Boris Berezovsky, with no shame, stated in the 90s: "Power in Russia is hired by capital, and the form of this hiring is called elections. Capital must protect itself. (...) In any case, from now on and forever the poor will not rule Russia"¹⁰. Some graduate applicants feared that without an ideological kick in the past, their research would be less of a dissertation.

In conclusion - the question of the relationship between program and real elements in the text of the constitution as an ideological problem. Beautiful phrases about human rights were only a democratic decoration, a "lubricant" for softer penetration of the "Trojan horse" through the trusting consciousness of a people, already deceived and robbed by the privatization. And when current scholars argue about the great morality of the text of the Russian constitution, it is just too tempting to tell them to go to ... to Marx, who spoke about the essence of any bourgeois constitution like this: "Freedom in a common phrase - a restriction of freedom in a reservation." Moreover, these "reservations" are quite skillfully implemented with the help of current legislation.

⁹Putin Vladimir. Democracy and the quality of the state // Russian newspaper, 02/06/2012.

¹⁰Quot. by: Bobrova N.A. The latest anthology of constitutionalists. Samara: Samara Scientific Center, RAS. 2016. p.22.

No one denies the significance of the provisions of the Constitution and the values enshrined in it. But no one argues with the fact that the principles of the first chapter - are not a statement of what has been achieved, but target goals, norm goals, norm tasks, the existence of which none of the constitutionalists deny. We are talking about the optimal ratio of the legal and programmatic aspects of the constitution. It is bad when the program norms go off scale in terms of their specific gravity, are not provided with guarantees, and are in conflict with other norms of the constitution. But if the constitution contains attractive, but conflicting constitutional norms, this creates ideological confusion, exacerbating the lack of faith and the political depression of public consciousness.

Nevertheless, everyone perfectly understand: until we will have such economic and legal guarantees as in other states (progressive tax, natural rent to every Russian, such as oil rent in the UAE, the inadmissibility of exceeding the salaries of managers by more than 10 times, compared with the average salary in the industry, on the enterprise, in the region; other guarantees), we will never (!) implement the principle of the social state.

Conclusions: 1) this should always remembered: whatever is useful to the state (Russia or China) is worthy to be part of universal human values; 2) the issue of state ideology is part of state policy; 3) there can be no state without ideology, just as there can be no state without politics; 4) the policy of “deideologizing the state” was a new kind of state ideology, which made it possible to deal with the values of the socialist state 5) all the principles of the constitution are guiding ideas, i.e. have a pronounced ideological character, so the system of these ideas is the state ideology.

References

1. Avakyan S.A. *No country can live without ideology* // *Russian Federation today*. 2009. №6. p.3.
2. Bobrova N.A. *The constitutional system and constitutionalism in Russia*. - Moscow: Unity-Dana. 2003. - 266 p.
3. Bobrova N.A. *General theoretical and intersectoral aspects of legal responsibility: Monograph*. - Moscow: Jurlitizdat. 2019. - 544 p.
4. Bobrova N.A. "War of laws", or *On the inadmissibility of weakening guarantees of the supremacy of federal law* // *Law and regulations*. - 2000. - № 2. p.28-33.
5. Bobrova N.A. *The latest anthology of constitutionalists*. – Samara, 2016. - 232 p.
6. *Report of the President of the Russian Federation B.N. Yeltsin on the draft Constitution of the Russian Federation* // *Russian newspaper*; 11/10/1993.
7. Krasnov M.A. *The birth of the Russian Constitution according to the scenario of Lassalle?* // *Social sciences and modernity*. - 2014. - №4.
8. Lukyanova EA *Russian statehood and constitutional legislation in Russia / 1917-1993* /. Moscow: MSU. 2000. - 192 p.
9. Luchin V.O. *Constitution of the Russian Federation. Implementation Issues*. - Moscow: Unity-Dana. 2002. - 687 p.
10. Putin Vladimir. *Democracy and the quality of the state* // *Russian newspaper*; 6.02.2012.
11. Filatov L. *Time works against me* // "New daily newspaper", 22.01.1994.
12. Chuykov Alexander. *Russia: to fall behind forever?* // *Arguments of the week*, 17.07.2019.
13. Shahray S.M. *Interview about the article of V.D. Zorkin "The letter and spirit of the Constitution"* // *Lenta.ru*, 10.10.2018 [application 21.08.2019].

专业标准“普通教育组织负责人”：范式基础
**PROFESSIONAL STANDARD “HEAD OF A GENERAL
EDUCATIONAL ORGANIZATION”：PARADIGM BASES**

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注解。 本文简要介绍了专业标准发展的历史。 它证实了需要依靠候选人的范式观点来填补普通教育组织负责人的职位,并评估采用以人格为导向,文化学和多主体方法作为程序组织的主要方法论基础的想法。。

关键词。 专业标准“普通教育组织负责人”。

Annotation. *The article provides a brief excursion into the history of the development of professional standards. It substantiates the idea of the need to rely on the candidate's paradigmatic views on filling the post of the head of the general educational organization and assessing the adoption of personality-oriented, culturological and multisubject approaches as the main methodological foundations of the organization of the procedure.*

Keywords. *Professional standard "Head of a general educational organization."*

The rooted development of technology and the rapidly changing labor market, characteristic of modern times, inevitably lead to the need for continuous improvement of old and the acquisition of new competencies by employees of all fields of activity. This is particularly relevant for those who operate in the field of education, which is one of the most conservative organizational state structures. Moreover, it is education that is a priori oriented towards providing advanced training for future citizens - builders of high-tech production and an intellectually oriented society. As one of the mechanisms for resolving this contradiction at the state level, the total introduction of professional standards is proposed, including in the field of educational activities.

The introduction of professional standards in Russia is not an innovation in its essence: it is a fairly old world practice. Especially long and productive mechanisms for the development and implementation of professional standards have been implemented in the UK.

In Russia, they started talking about the need to develop and implement professional standards after the publication of the Program of Social Reforms in the Russian Federation for the period 1996–2000, which was approved by RF Government Decree No. 222 of February 26, 1997, but only in 2007 did real work begin on the development of the first mock-ups of professional standards and this is associated with the activities of a specially created National Agency for the Development of Qualifications (National Agency for the Development of Qualifications). However, the first standards were approved only in 2013 after the Decree of the President of the Russian Federation dated 07.05.2012 No. 597 “On measures for the implementation of state social policy”, which stated the need to introduce at least 800 professional standards by 2015. To date, more than 1000 professional standards have been developed, but not all of them have been introduced into social practice. The entire register of approved and planned professional standards, as well as their public discussion is presented on the resource of the Ministry of Labor of Russia (Ministry of Labor of Russia).

The general structure of professional standards was approved by order of the Ministry of Labor of Russia dated 04.04.2013 No. 147H “On Approving the Layout of a Professional Standard” (as amended on September 29, 2014). It highlights the generalized functions and the corresponding qualification level; defined labor functions and actions that are attributed to the employee within his professional sphere; lists the knowledge and skills that he should possess, as well as a list of posts correlated with the selected functionality, level of education and work experience.

Naturally, in parallel with the development of the requirements of a professional standard, a procedure is being developed for assessing the compliance of a specialist - a candidate for a position to be replaced - with the standard standard. Certification materials have already been developed for some of them, with the help of which it is possible to assess the degree to which the employee is ready for all regulated requirements or for individual generalized labor functions. The employer sends the specialist to the appropriate certification center and, based on the test results, makes a decision on the employee's compliance with the position.

However, standards come into force, and certification materials are lagging behind in development. What to do to the employer? How to evaluate employee compliance with the standard? As a way out, you can offer a higher organization to independently evaluate or certify an employee (Professional standards in questions and answers).

The professional standard “Head of a general educational organization” has not yet been approved and, of course, there are no evaluative means. The certification procedure for an education worker, in general, and the head of a general educational organization, in particular, is not an easy task. There are many questions:

- what knowledge to include in certification materials;
- what mechanisms of analysis of skills to use;
- what should be the criteria for evaluating the tests;
- who should be included in the assessment committee and what to use assessment tools.

Of course, not all the problems that may arise during the organization of the certification procedure of a candidate for a position of the head of a general educational organization are listed.

Most often, such a tool as testing is used for certification. But its results, as you know, cannot be considered absolutely reliable. Questions most often arise regarding the content of test items, which inevitably reflect the subjective nature of the paradigmatic views of the development team. At the same time, the paradigm of managing an educational organization does not take into account the candidate for the position of its leader. In this situation, different “true” answers to the same test question turn out to be natural. Moreover, in real management practice, which is carried out in different paradigm representations, the same reaction cannot have the same reaction; moreover, they can be diametrically opposite.

Does this mean that before determining whether a candidate for the post of head of an educational organization corresponds to, it is necessary to find out his worldview position, to determine which of the managerial models of educational organizations is a traditionalist, existential, anthropocentric or civic education model that corresponds to the system of his pedagogical views (Monakhova L. Yu.) Only after that, to reveal his knowledge governing the educational detail of documents and, to assess his skills, before lag practical cases.

Thus, it is possible that the developers of the professional standard “Head of a general educational organization” need to rely on the methodology of personal and cultural approaches, in which a person is considered as a carrier of culture and a product of socio-historical development. It is on this basis that paradigm representations are formed that define the “products” of the job applicant’s position as “Head of a general educational organization”.

Of course, the procedure for determining the adequacy of the applicant to the standard should be based on a multisubjective (dialogical) approach, because the essence of a person is richer than the results of his computer (paper) testing. Man is not only an objective result of activity, but also a relational one (Akhverdiev K. N.).

Another ambiguous problem associated with the certification procedure is that it is usually not discussed - is it possible to “close one's eyes” on any candidate’s “shortcomings”: should he fully comply with all the requirements of a professional standard?

It is clear that for each applicant the question should be decided individually, but at the same time one should not go beyond the presumption of rationality. It is interesting to note that in some already developed and approved standards, individual requirements are presented in alternative versions based on the principle of “You can’t! But, if you really want to, then you can.” For example, one can see those alternative standards for the level of education that have become typical for standards: “an employee can have a higher education ... or a secondary education and additional professional education (professional retraining)” (Standard “Specialist in the field of labor protection”).

If the employee does not meet the requirements of the standard, then, of course, he cannot function in the corresponding position, moreover, perhaps he needs to even change the scope of professional activity. However, if the employer is interested in a candidate who, by obvious signs, does not meet qualification requirements, then it is possible to “train” him on a compensatory program for acquiring missing knowledge.

Consider an example of a layout of already developed assessment tools presented on the website of the National Qualifications Development Agency (National Qualifications Development Agency) (hereinafter - Agency). The layout is structured as follows: skill level; professional standard code; name of professional standard; material and technical resources to ensure the theoretical stage of a professional exam; material and technical resources to ensure the practical stage of a professional exam; information about staffing.

Interestingly, the understanding of the term “assessment tools” turns out to be unequal in the field of pedagogical knowledge and its interpretation, presented on the Agency’s website. In pedagogy, it is customary to mean evaluation tools as questionnaires, questionnaires, tests, typical tasks (tasks, situational tasks, etc.), creative tasks (case studies, description of problem situations, research and design tasks, business game scenarios, etc.). On the Agency’s website nothing of the kind is presented. On the tab "evaluation tools" we see only procedural descriptions. So the material and technical resources to ensure the theoretical stage appeal to the requirements for equipping the premises (heating, the presence of tables and chairs, pens with blue ink, paper - three sheets of A4 size per person, etc.). And the material and technical resources to ensure the practical stage - in addition to similar (with some changes) requirements for the room in which the assessment procedure is carried out, provide guarantees for a working PC with a keyboard and mouse, computer desks complete with computer chairs (armchairs), adequate software provision and access to the Internet. The applicant is allowed to use additional plug-ins by prior agreement with the CSC engineers.

Information on staffing is focused on the requirements for experts implementing the decision-making procedure for assessing qualifications.

The expert commission should be represented by at least three members: the chairman, an expert on the assessed type of activity and an expert on the independent assessment of qualifications. Quite high demands are made on the members of the commission, and this section of the Evaluation Tools is perhaps the largest in volume.

The Agency's website offers the opportunity to test your qualifications "right now". At the moment, there are 9 professions represented there: agronomist, accountant, roofer, elevator operator, waiter, hairdresser, programmer, precious metals operation operator. An attempt to pass any test by the author of the article was unsuccessful. The system allowed to answer only the first question, without feedback, and did not give the opportunity to move on to the next question. It can be assumed that the portal is still under development, but that should be reported to users.

Professional standards should be put into practice by 2020, we hope that by this time every employee, including the head of the educational organization, will be able to check his qualification level in online training mode and, based on its results, decide on the need for "further education" or termination of activity in this area.

To date, the following standards have been developed in the field of 01 Education and Science:

01.001 Teacher (pedagogical activity in the field of preschool, primary general, basic general, secondary general education) (educator, teacher) - Order of the Ministry of Labor of Russia dated 10.10.2013 No. 544H. (When applying this professional standard, it is necessary to refer to the Letter of the Ministry of Education of Russia of March 28, 2019 N TC-817/08 and the letter of the Ministry of Education of Russia of 12.02.2016 N 09-III-MOH-814)

01.002 Teacher-psychologist (psychologist in the field of education) - Order of the Ministry of Labor of Russia of 07.24.2015 N 514H.

01.003 The teacher of additional education for children and adults - Order of the Ministry of Labor of Russia of 05.05.2018 N 298H.

01.004 Teacher of vocational training, vocational education and additional professional education - Order of the Ministry of Labor of Russia dated 08.09.2015 N 608H (For the application of this standard, refer to the Letter of the Ministry of Education and Science of Russia dated 20.04.2017 N 06-III-MOH-15200.

01.005 Specialist in the field of education - Order of the Ministry of Labor of Russia dated 10.01.2017 N 10H.

01.006 Master of industrial training in driving vehicles of the corresponding categories and subcategories - Order of the Ministry of Labor of Russia of September 28, 2018 N 603H.

01.007 Specialist involved in organizing the activities of the children's team (counselor) - Order of the Ministry of Labor of Russia dated 12.25.2018 N 840H.

The development and implementation of professional standards in general and standards in the field of education in particular, stimulates the process of processing the corresponding educational standards for training specialists at various levels and will help to eliminate the contradiction between the requirements for knowledge and skills of the professional standard and the requirements for competencies in educational standards. It is clear that professional standards developed by the Ministry of Labor of Russia should come from educational programs that graduates of educational organizations master and, at the same time, from an analysis of real work activity corresponding to a specific position within the framework of the socially oriented or industrial sector under consideration.

References

1. Akhverdiev K. N. *Basic methodological approaches in pedagogy // Young scientist*. - 2010. - No.6. p. 308-310. [Electronic resource]. - Access mode: URL <https://moluch.ru/archive/17/1674/> (accessed: 03/15/2019).
2. Ministry of Labor of Russia [Electronic resource]. - Access mode: URL <http://profstandart.rosmintrud.ru/> (accessed: 03/15/2019).
3. Monakhova L.Yu. *Administrative models of educational organization as a reflection of pedagogical paradigms / Education management: theory and practice*. - 2017. - No 3 (27). p. 12-19.
4. *National Agency for the Development of Qualifications [Electronic resource]*. - Access mode: URL <https://nark.ru/>. (Date of treatment: 03/15/2019).
5. *Professional standards in questions and answers / Assistant Secretary*. - 2015. - No. 4 [Electronic resource]. - Access mode: URL https://www.profiz.ru/sr/4_2015/ (accessed: 03/15/2019).
6. *The standard "Specialist in labor protection" for the position of "Specialist in labor protection" of the 6th qualification level [Electronic resource]*. - Access mode: URL <http://demo.nark.ru/> (accessed: 03/15/2019).

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全民教育中的社群主义社会概念
**THE CONCEPT OF A COMMUNITARIAN SOCIETY
IN A NATIONALLY ORIENTED EDUCATION**

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抽象。如果俄罗斯联邦教育部的主要意识形态方向符合欧洲中心主义，如何建立一个以国家为导向的机构呢？如果俄罗斯本土人民有权主权发展，那么我们为什么要根据博洛尼亚体系的外国模式形成我们的孩子呢？如果俄罗斯不是殖民地而不是卫星国，那么为什么国际权利的主导地位超过国内权利（俄罗斯联邦宪法第15条第4款）？

对协同方法和混乱理论的依赖表明波动的出现需要基本的社会变革。 I. Prigogin自发出现原理的非线性动力学，Lotfi Zadeh不相容的原则，Pauli禁令的原则可以导致一个雄心勃勃的结局。我们在识别“朋友或敌人”中克服种植敌对意识形态问题的科学贡献，是找到一个实现作者“人民社会和政治技术大学概念”Ladimir的想法和方法。在双方同意的安全领域培训专家。

我们理解社会主义学校不可能出现在消费社会中，但是思想发展的运动必须在上下两个方面。我们的科学假设与从技术性的西方到神圣的东方的主导过渡的预测有关，这意味着教育系统必须按照思想时代的社群社会中预期的欧米茄点来准备。

正如白银时代的俄罗斯宗教哲学家所代表的V. Solovyov, N. Berdyaev, P. Florensky, I. Ilyin在面对内战时提高了他们的公民声音，以找到摆脱系统性危机的方法，所以在现阶段迫切需要在国家导向的教育机构中找到社会发展的新概念和加热激情的方法。

关键词：波动，文化历史人，观念社会，概念，价值论，咨询保障，国民教育。

Abstract. *How can a nationally-oriented institution be created if the main ideological direction of the Ministry of Education of the Russian Federation is in line with Eurocentrism? And if the autochthonous peoples of Russia have the right to sovereign development, then why do we form our children according to foreign patterns of the Bologna system? If Russia is not a colony and not a satellite country, then why does the dominant of international rights act over domestic ones (Art. 15, Clause 4 of the Constitution of the Russian Federation)?*

Reliance on the synergistic approach and the theory of chaos suggests the emergence of fluctuations that entail cardinal social changes. Non-linear dynamics of the principle of spontaneous emergence of I. Prigogin, the principle of incompatibility of Lotfi Zadeh, the principle of Pauli's ban can lead to an ambitious ending. Our scientific contribution to overcoming the problem of the planting of a hostile ideology in the identification of "friend or foe" is to find an idea and a way to implement the author's "Concept of the People's University of Social and Political Technologies "Ladimir" with the training of a specialist in the field of consensual security.

We understand that a communitarian school cannot arise in consumer society, but the movement towards ideational development must go both above and below. Our scientific hypothesis is connected with the forecast of the dominant transition from the technogenic West to the sacred East, which implies that the education system must be prepared in accordance with the expected omega point in the communitarian society of the ideational era.

Just as in the silver age Russian religious philosophers represented by V. Solovyov, N. Berdyaev, P. Florensky, I. Ilyin raised their civic voice in the face of the civil war to find a way out of the systemic crisis, so at the present stage there was an urgent need to find new concepts of development of society and ways of heating passionarity in nationally-oriented educational institutions.

Keywords: *fluctuation, cultural and historical person, ideational society, concept, axiology, advisory security, national education.*

The entry of mankind into a new ideational era gives rise to new moral contradictions that need to be resolved in breaking the socio-political and institutional traps associated with ongoing economic, informational, geopolitical and other types of wars.

We propose to consider the concept of a communitarian society through the eyes of a cultural-historical person brought up in a nationally-oriented educational institution. On the one hand, a communitarian society is needed, delegating its subjects to a new educational institution. On the other hand, we need citizens - devotees of piety, ready for testing by initiation, preparing for new forms and conditions of not only survival, but also the creation of a high-quality spiritual society. The principle of chicken and eggs: who is primary?

The subject of theoretical construction of a new way of social development of society is the installation of an institutional trap that arose as a result of the psychological and informational anonymous war, lost at this historical stage. The formation of a communitarian society in the approaching ideational era is considered by us as an alternative to Western market development.

The purpose of our study, on the one hand, is to stop the humiliating and false process of building a market according to Western patterns with the paradigm of social Darwinism, which is built on materialistic concepts, where it is not the good and the smart who win, but the brazen and strong. On the other hand, we must build a communitarian "staircase to heaven", as in the Middle Ages, the project of "Holy Russia", on paternalistic relations with the hierarchy of a "big man" or cultural and historical person.

The dichotomy of the God-man and the barbarian-man can be seen as a confrontation between altruism and selfishness, asceticism and hedonism, liberalism and communitarianism. In the role of the *subject-decoder* of a man-mankurt-barbarian programmed for consumption, in our study, a cultural-historical person (a noble man, hesychast, existentialist) acts.

Definition. A cultural-historical person (the God-man, the first stratum) is guided by religious culture and secular ethics. He adheres to the position of creative traditionalism: he has a sacrificial spirit and social responsibility for a person, family, society; he irreversibly embarked on the path of virtue and compassion; ready for self-sacrifice for the sake of higher social and cosmological interests; his rational and metaphysical aspirations are strengthened according to the hierarchical principle: "the spirit must control the soul, the soul - the body" [16, p. 8].

To prepare a specialist in the field of consensual security, we propose taking the author's nationally-oriented concept of the People's University of Social and Political Technologies "Ladimir" as a basis [30],

Definition. The Ladimir People's University of Social and Political Technologies is an innovative nationally-oriented non-profit two-stage educational institution (the Russian school - a national university) designed to strengthen the unity of the Russian nation and promote the ethnocultural development of its peoples on the basis of socio-political technologies that can resist the destruction of the Russian state in the context of a consultative war. An educational institution is created on the ideas of communitarianism [1, p.143], autarchy and conservatism, helps to build a sovereign Russian paternalistic state and is an import substitution in education.

Building a communitarian society.

First it is necessary decide what constitutes a communitarian society. K. Jaspers, L. Gumilyov, D. Viko, P. Sorokin, A. Toynbee and other thinkers advocate the cyclical development of history. D.Vico presented the historical cycles as the "age of people", "the age of heroes" and "the age of gods". P. Sorokin proposes a change of eras from ideational to idealistic and sensual. Now we live in a "sensual" era and a "century of people."

At that moment, when we feel the social bottom of postmodern simulacra and rhizomes, at this very moment a new ideational era is ripening for the spiritual

prosperity of mankind. The East regains its dominant role in the choice of the spiritual vector, and the West with the ideas of hedonism and consumerism is dying away. In our context, a communitarian society should read: ideational.

A significant role in the emergence of the ideological and political current of communitarianism was played by three social phenomena: a) monarchism laid the foundation for paternalistic concern for the subjects of the Russian kingdom; b) communism has focused on the idea of a brotherhood of peoples; c) anarchism emphasized the possibility of a community without government intervention [14, p. 52]. According to N. Berdyaev, a communist society differs from a communitarian society in that the former is built under the dictatorship of the proletariat, and the latter is created on the conscience and voluntary acceptance of Golgotha.

E. Fromm considers a just ideal society through the prism of the “have or be” dilemma. In the worldview of a modern person, the orientation toward possession clearly outweighs the orientation toward being, i.e. to true existence. But such an advantage is a natural consequence of the implementation of the “humanistic” [4, p. 471] “Modern Project”, built by Western European civilization on the misinterpretation of Marx. True Marxism is, according to Fromm, a philosophy of being, not possession, because for Marx himself “luxury is the same vice as poverty; the goal of man is to be many, and not to possess many” [23, p. 42].

The target method of self-organization is the basis of a new synergetic theory of management. In complex dynamic natural systems with many degrees of freedom, self-organization, invariants (conservation), nonlinearity, coherence (interconnection), and cascade (fall) synthesis occur [9, p. 8].

The principle of oscillatory (pulsating) evolution is not translational, but cyclical or wave-like in nature, which means that at the moments of “silence” or “storm” (runaway-rapprochement) system shifts and course changes are possible [29, p. 478], where chaos is not only destructive, but also constructive. For systems whose complexity exceeds a certain threshold level, accuracy and practical meaning become almost mutually exclusive characteristics” [11, p.7].

Even objects of "inanimate nature" are characterized by the type of informational metabolism [2], especially for society — processes of restoring equilibrium are needed to counter terrorism, climate change, the ideological amorphous nature of society, cybercrime and chipized supervision.

Our choice to study communitarian society was initially associated with the voluntary ascent to Golgotha to serve humanity, not with ephemeral alien hands, but with our own sweat and blood, following the example of the Volga elder Neil Sorsky, who, as a hesychast, knew that “victory over the sorrow of the world” (John 16:33) is possible only in an eschatological sense, that is, in the kingdom of heaven. Therefore, only in voluntary burning and self-sacrifice is a search for a transformation of reality possible.

The education in the nationally-oriented institution of ascetics of piety and the multiplication of selfless heroic passionaries is necessary in public administration to make up for the vanishing justice and the balance of power in society.

The ideologists of the communitarian system contrast the state with both totalitarianism based on coercion and liberalism supported by financial stimulation. “A good society, in their opinion, requires such an order that is linked to the moral values of its members” [31].

In a modern tolerant and cosmopolitan society, liberal ideas of multiculturalism and syncretism are proposed [3, p.4] and conservative approaches to the construction of communitarianism. The pluralistic polyphony can be compared with a wolf and a quivering doe drawn into one cart. It is impossible to plant the devil and Christ (carrying not the right but the truth), homosexual and virgin (as symbols of darkness and light) at one table. Another thing is who will take care of whom. It is clear that consumerists will not support paternalism, and communitarianists (hesychasts, devotees of piety) will begin to “nourish” all those who have and do not have, strong and weak, stupid and smart.

Nationally-oriented education

The prestige of a secular university is determined by four factors: “training-research-innovation-demand”. In addition to the required quantities listed above, the People’s University adds “the meaning of life” and “patriotic pride” for the Calvary service in the field of spiritual, military, economic and administrative security.

For the formation of a Russian national character, forging the Russian idea and training specialists in advisory security and, most importantly, building an ideological society, I propose opening the Ladomir People's University of Social and Political Technologies (NUSPT.ru).

Before comprehending managerial, financial and military security, students are required to master spiritual and moral values.

The object of spiritual safety are spiritual and moral relations, ideas, ideas, feelings, assessments, attitudes and other connections between people that arise in them in the process of perceiving the world, nature, personal and social being.

The subject of theoretical understanding and empirical analysis, the spiritual life of the individual, society and government, representing their really functioning practical consciousness, considered in connection with the production, dissemination and consumption of spiritual and moral values [7, p.162], is advocated.

The Good Doing Mission of the People’s University aims, firstly, to defeat “darkness”, and secondly, to educate first-class leaders of the future Russian government; thirdly, to provide the society with consensual security.

Graduates of the university will be prepared for leadership positions in ministries and departments in the systems of education, culture, social security, as well as in the field of federal and diocesan administration.

The National University aims to *develop in students*: state thinking, national identity, religious lifestyle, artistic taste, cosmological harmony with nature.

All these worldviews of a cultural-historical person will ultimately *make it possible to form* a traditional way of having a large three-generation family, to prepare a solid autarky business executive with a common goal-setting for saving the soul, and to educate young people in the spirit of sacrificial patriotic service to the Fatherland.

In our *methodology* of cognition, we rely on classical German and Russian religious philosophy. V. Dilthey writes: “human life is primary, given in the spiritual and historical experience of self-experience and self-understanding, all other forms studied by biological science are determined by analogy with it” [18, p.19], but not vice versa, as with organists.

We fully agree with the philosophy of national education of A.S. Khomyakov [13, p.5], which offers:

a) state guardianship of the school with the “enforcing of moral law and Christian truth”, and not just formal respect for the law. Otherwise, outside the support of the spiritual values of the nation, the elite, focusing only on Roman law, ceases to diffuse with the people and thereby leaves the public trust [25, p.223];

b) development and strengthening of the general signs of cognition in contrast to highly specialized learning. Poor training of specialists due to low overall development [25, p.231]. Closedness to a specialty limits the possibilities of choosing a life path [25, p.227];

c) organic Russian education in Russia depends on the restoration of the concepts of “natural and moral fraternity” and “inner truth” among the people [25, p.226]. These concepts, unfortunately, are alien to science and the comprador elite. Hence the need for modeling communitarianism and its apologetics through the People’s University.

The university should begin the reloading of postmodern society into a traditional one, as well as in the collection, analysis and dissemination of open information related to global risks and threats to the development of Russia in the spiritual, moral, socio-economic, political, scientific, technical and military fields.

The People’s University offers a revolution from above, through the training of personnel rotation in 15 years. To carry out a reboot of society, a “Social Contract” is necessary between the authorities and the people, so that no riot from below occurs during this time. Behind the preparation of a new type of citizen-politician and business executive there should be transparent control of the “treaty” as a mechanism for implementing a national project.

Many critics will convict the People’s University concept of utopianism and reverie, but I must say that in the face of the extermination of mankind, we either embark on the path to finding a way out or sink into ontological non-existence. Quoting Gelderlin’s poems, Heidegger writes: “Where there is the greatest risk, there lies salvation” [24].

The construction of an ideational society in the context of a consensual war.

The very concept of “consonality” comes from the words “conscience” and “consciousness” (*conscientia*), therefore the war is associated with the defeat of self-consciousness and “collective memory” [8, p.40]. The Consultative War is civilizational in form, psychological in content, economic in the way of redistribution of resources, geopolitical in the way of the sphere of influence, informational in terms of means. The tragedy of the ongoing consensual war lies in the fact that the current society, drunk with progress and prosperity, does not notice and does not want to reflect “the death of the individual and his own final degeneration” [32, p.15].

To overcome the mondialist consciousness, based on the post-rational logic of the thalassocrats, we must discard the illusions of arguing over the Western symbolic relativistic system. A game with a sharpie will end in defeat. Under their magical tune of the “luminiferous” ideologue, “international human rights”, “equality”, “cosmopolitanism” and “tolerance” of the tellurocrats will lead, like bull-calves, for slaughter, or pigs to be thrown off a cliff (See Matthew 8: 28-32; Mark 5: 5-20; Luke 8: 30-33).

A prosperous society differs from a dysfunctional one not in the absence of conflict, but in its desire to resolve it by rational methods: “He who knows how to deal with conflicts through their recognition and regulation takes control of the rhythm of history. Anyone who misses such an opportunity gets this rhythm as an opponent” [33, p.140].

In the search for peace, important criteria are the balance of forces and the balance of parity relations.

Our beliefs in maintaining the stability and development of society are based on a number of sociologists and philosophers. G. Spencer focuses on the problem of the *balance* of society and the need to maintain it [22]. E. Durkheim develops the theory of mechanical and organic *solidarity* [5], where the system always seeks to search for order [17]. The significance of the concept of “nodal” [20, p. 224] of T. Parsons social structure consists in successively overcoming the dichotomy of the value-normative [10, p. 135-155] and class-stratification [6, p. 83-101] approaches [12, p.158].

S. Montesquieu and P. Holbach saw the planned course of the world community in the instability of the “natural” state. And only the instinct of conservation and craving for peace, self-development compel people to conclude a *social contract* that becomes the key to sustainable development [15].

P. Sorokin tried to comprehend the problems of the static and dynamic state of the social system. His theory of sociocultural dynamics was an attempt at a sociological interpretation of dynamic stability [21] through the construction of a model of macro-processes of a society’s culture, free from linearity, evolutionism and progress.

In our understanding, the static state of society is not congruent due to the fact that it has several patterns of behavior that conflict with each other due to the lack of a single (holistic) picture of the world. Hence we conclude that society needs devotees of piety to turn socio-political mechanisms towards spiritual and moral development. Particular attention should be paid to the role of the state, which is obliged to show its socially stabilizing function in times of greatest instability and systemic crises.

Conclusion. We proved the necessity of creating a communitarian society through a nationally-oriented education with reference to the ongoing consensual war. Outside of training for a consultant consultative specialist, a game according to the rules of a sharpie-mondialist will be lost.

The entire course of our study indicated that if only “predators” remained in society, then society would not survive. If only altruists begin to live in a society, then this society will be limited in prosperity and comfort, but cheerful and happy on the principle of "in cramped conditions, but not in insult." In a mixed scheme, if the dominant is behind the “marketers”, then they will not care about the communitarians [19, p.267], on the contrary, the dominant of the devotees of piety will take over the ministry of all social classes. From this it is clear that only the second model of society has a future and a future.

We found out that the cause of the education crisis lies in the split of life and spiritual foundations. The essence of the bifurcation is related to the orientation toward the Roman negative one-sidedness of freedom in different ways [26, p.143] between the enlightenment and the public element [28, p.236], life and spirit, the foundation of the spiritual world and social structure [26, p.241].

Khomyakov sees the cause of the crisis as a discrepancy with the Byzantine heritage [28, p.218], but we consider this statement incorrect. Byzantium already represented the West and its inoculation to Russian antiquity brought, and still will bring many disasters. In our opinion, the leaven of communitarianism in the Middle Ages occurred on the synergy of Vedism with Christianity.

The study shows that capitalist paradigms do not fit into Russian national and religious identity. It is necessary to return community and collegiality characteristic of the Russian mentality to the educational space. In the absence of the brotherly and family nature of education, knowledge becomes either false or imaginary. According to Khomyakov, formalism replaces life harmony with police symmetry in science, where he is more afraid of delusions than he seeks truth; in art, where it is more crowding out irregularities than striving for beauty; in everyday life, where he replaces and replaces any warm and free change of soul with a cold and dead sign of deanery [27, p.129].

The conditions for the first push towards the emergence of a communitarian society in the approaching ideal era will be given by a nationally oriented educa-

tion, however, like paternalistic care for institutional justice, it will yield fruits in the formation of a Russian national spiritual character (the principle of the dominance of a chicken or an egg).

For science, our study is not ready-made because it is one of the pioneers of communitarianism, but we note that the very formulation of the scientific problem already has epistemological benefits. So, the basis of the communitarian approach is the search for a balance of power between individual freedom and social obligations, the civilizational rifts of the East and West, the rights of the individual and society, law and truth, idealism and materialism.

References

1. Berdyaev N. *Philosophy of a free spirit*. - Moscow: Republic, 1994. - 480 p.
2. Bukalov G.K. *The definition of TIM technical object*. *Journal "Sociotics, Mentology and Psychology of Personality"*, No. 4 (1996). p.61-64.
3. Volkova T.P. *The theory of multiculturalism as a synthesis of philosophical concepts of liberalism and communitarianism*. - Murmansk, 2006. - 174 p.
4. Dudnik S.I. *Karl Marx and the problem of humanism* // *Bulletin of St. Petersburg University. Philosophy and conflictology*. 2018.V. 34. Issue. 4. p.462–473.
5. Durkheim E. *On the division of social labor. The method of sociology*. - Moscow: Nauka, 1991. - 575 p.
6. Zateev V.I. *Class theory and the theory of social stratification: opposition or the possibility of complementarity?* // *Bulletin of the Buryat University*. - Series 5: *Philosophy, Sociology, Political Science, Cultural Studies*. - Vol. 3. - Ulan-Ude: Publishing House of the Buryat State University, 1999. p. 83-101.
7. Zerkalov D.V. *Spiritual security. Monograph*. - K: Osnova, 2012. - 1118 p.
8. Kolevatov V.A. *Social memory and cognition*. - Moscow: Mjisl', 1984. - 190 p.
9. Kolesnikov A.A. *Synergetic control theory: concepts, methods, development trends*. - *Proceedings of the Southern Federal University*, No. 5. 2001. p.7-27.
10. Komarov M.S. *On two concepts of social structure in sociology* // *Problems of Theoretical Sociology*. Vol. 2: Coll. / Under. Ed. A.O. Boronoev. - St. Petersburg: Publishing House of St. Petersburg University, 1996. p.135-155.
11. Lotfi Zadeh. *Fundamentals of a new approach to the analysis of complex systems and decision-making processes*. - Moscow: Znanie, 1974. p.7.
12. Matskevich I.V. *Social structure in the theory of T. Parsons*. - Ulan-Ude, 2002. - 168 p.

13. Meleshko E.D., Nazarov V.N. *Philosophy of Education A.S. Khomyakov in the light of modern trends in Russian education. - Humanitarian statements TSPU named after L.N. Tolstoy No. 1 (29) 2019. p. 5-12.*
14. Molchanov A.V. *Communitarianism as an alternative to classical ideologies. Pro Nunc. Modern political processes. 2017. p. 51-57.*
15. Montesquieu S. *Selected Works. - Moscow: Gospolitizdat, 1955. - 799 p.*
16. *Handbook of the clergyman: in 8 vols. - M.: Moscow Patriarchate. 1988.V.4. p.8.*
17. Parsons T. *Functional Theory of Change. / American Sociological Thought. - Moscow: Moscow State University, 1994. - 496 p.*
18. Plotnikov N.S. *Life and history. The Philosophical Program of William Dilthey. - Moscow: House of Intellectual Books, 2000. - 232 p.*
19. *Politlexicon. Concepts, facts, relationships. - Moscow, 2013. - 783 p.*
20. Rutkevich M.N. *Dialectics and sociology. - Moscow; Mjsl', 1980. - 356 p.*
21. Sorokin P. *Man. Civilization. Society. - Moscow: Politizdat, 1992. - 543 p.*
22. Spencer G. *Synthetic Philosophy. - Kiev: Nika-Center, 1997. - 512 p.*
23. Fromm E. *To have or to be? For the love of life. - Moscow: Iris-press, 2004. - 384 p.*
24. Heidegger M. *Conversation on a country road: Selected articles of the late period of creativity. - M.: Higher School, 1991. - 192 p.*
25. Khomyakov A.S. *On public education in Russia // On the old and new: articles and essays. - Moscow, 1988. p. 222-238.*
26. Khomyakov A.S. *On the possibility of a Russian art school. // About the old and new: articles and essays. - Moscow, 1988. p. 135-158.*
27. Khomyakov A.S. *Opinion of Russians about foreigners // On the old and new: articles and essays. - Moscow, 1988. p. 103-134.*
28. Khomyakov A.S. *Regarding the article by I.V. Kireevsky "On the nature of the enlightenment of Europe and its relation to the enlightenment of Russia. Full coll. works in 8 vol. - Moscow: University type. 1900. V.2. p.218-243.*
29. Chernyshev S.B. *Other: Anthology of Russian identity. V.3. - Moscow: Argus, 1995. p. 477-542.*
30. Shishkin A.E. *The concept of the People's University of Social and Political Technologies "Ladomir". - Samara: Dream, 2018. - 444 p.*
31. Etzioni A. *The New Golden Rule. Community and Morality in a Democratic Society. URL: <http://www.studfiles.ru/preview/3065343/>*
32. Jung K.G. *The psychology of the unconscious. - Moscow: Canon, 1994. - 320 p.*
33. Darendorf R. *Society and Democracy in Germany. - N.Y., 1969. p.140.*

现代价值论中的价值观
VERSIONS OF VALUES IN MODERN AXIOLOGY

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抽象。本文介绍了对价值作为自然属性的本质的理解，对事物的神圣精神化，或人们对其活动结果的人类意义的理解，将自然转化为文化，将自然转化为人工的各种解释。经典的劳动价值论，但从社会哲学的经济背景到一般理论层面的重要概括，其中价值被理解为实践和精神活动的产物，被用作基本模型。辩证合成的方法用于识别人类活动在天然物质的发展和劳动产品中一个人的精神财富的物化中的深层统一。正是凭借这种统一，一个人沉迷于事物，而他周围的世界在情感上被感知。所有外在的人都体验到了他内心世界的客观化。

关键词：价值，劳动产品，人，事物，标志，制度。

Abstract. *This article presents various interpretations of the understanding of the essence of values as a natural property, the divine spiritualization of things, or the human meaning that people put into the results of their activities, turning nature into a culture, natural into artificial. The classical labor theory of value, but with its significant generalization from the economic context to the general theoretical level of social philosophy, in which values are understood as products of practical and spiritual activity, is adopted as a fundamental model. The method of dialectic synthesis is used to identify deep unity in human activity in the development of natural material and the materialization of one's spiritual wealth in the products of labor. It is by virtue of this unity that a person is addicted to things, and the world around him is perceived emotionally. All external man experiences as an objectification of his inner world.*

Keywords: *value, product of labor, person, thing, sign, institution.*

1. Formulation of the problem

The object of the article are values as elements of culture. The subject of the research is the options for understanding the essence of values in axiology. The author of the article set the goal to identify the invariant content of various versions and to define values as the dialectical unity of natural properties and artificial qualities in cultural phenomena that embody the creative essence of human activity.

A man would not be a man if he did not ask himself the question of what is good and what is evil, is there justice, what are beauty, ideal, love, benefit, truth. A man would not be a person if he did not try to answer all these “*what*”? and there would be no new answers to eternal questions. Understanding these issues is so serious and significant in human life that it led to the emergence of a whole special branch of knowledge, namely - *axiology*.

Among the variety of research topics in any of the humanities or social sciences, axiological problems are among the most important due to the fact that the values act as an integrative basis for both the individual and the social group, nation, humanity as a whole. The outstanding thinker of the twentieth century, Pitirim Sorokin, argued that “the existence of an integrated system of values is an indispensable condition for the stability of a social structure. The disintegration of the value basis, value guidelines will inevitably lead to a crisis, to the catastrophic breaking of the social system, to the destruction of society.” [1, p. 523]

The significance of values in the life of an individual society grows in borderline situations characterized by complexity and inconsistency, and there are more than enough such situations today: environmental disasters, apocalyptic dangers, local wars, ethnic conflicts, social explosions, political confrontation, etc.

In the fate of an individual, value guidelines are no less important than in solving world problems. In the process of personality formation, a person receives an emotional or intellectual impulse through the mechanism of assimilation of certain values, which determines the individuality of his spiritual world, which in turn constitutes the essence and significance of man and his life both for himself and for other people.

Justifying the importance of axiological problems for the further development of humanity, the American philosopher and futurologist E. Toffler wrote that “the future of mankind will depend on how clearly we understand and manage to predict changes in the holistic architectonics of the values that govern human behavior. Now our knowledge of this invisible architectonics and how it is changing is extremely primitive.” [2, p. 321] What even is *value*? How do values relate to each other and what configurations do they form? There are different answers, but all of them - just *versions*.

2. Versions of Values in Western Axiology

Different scientists tried to classify the whole variety of existing concepts of values in different ways. So, A. Edel identified three areas of axiological research: idealistic, naturalistic, pragmatic. Three types of value theory are distinguished by T. Lyubimova - theoretical-sociological, metaphysical or methodological, negative-critical; A. Messer (German historian) identified four axiological trends: phenomenological (M. Scheler), idealistic (G. Rickert), idealistic-realistic (G. Münsterberg) and realistic (A. Stern); M. Kissel distinguished five types of value theory: naturalism, transcendentalism, personalistic ontologism, sociologism and cultural-historical relativism.

he first version of axiology is the *naturalistic psychologism* of A. Meinong, R.B. Perry, J. Dewey, C. Lewis. Value for them is a kind of “tertiary quality”, even more distant from the objectivity of primary qualities (figure, outline of objects) than secondary qualities (color, for example). So, the American neo-realist philosopher R. B. Perry defines value as an object of interest, as a concept that expresses the position of a thing relative to interest. “Any object, whatever it may be, acquires value when any interest, whatever it may be, extends to it.” “My interests are myself in the deepest sense.” [3, p. 115] According to Perry, “value is any object of interest. Man lives and acts in the light of expectation; this is a moving expectation; in relation to the object, it is anticipating interest, value is its function. In the light of interest, an object can be desired, avoided, fearsome, disgusting, etc.” [4, p. 113]

Next, it is *axiological transcendentalism*. The neo-Kantian understanding of values is set forth in the works of W. Windelband and G. Rickert. Both of them proceeded from the teachings of Kant, in the presentation of which the main task of philosophy is to critically examine the validity of the claims of human judgments, including moral ones, to universality and necessity. Values are *not existent, but due*, but it remains an eternal mystery, a miracle that is higher than our understanding. Rickert believed: “As for the kind of values that turn parts of reality into cultural objects and set them apart from nature, we must say the following: we cannot say about values that they exist or do not exist, but only what they mean or that they are significant.” [5, p. 70]

Then consider *personalistic ontologism*. Its creator M. Scheler considered values objectively existing, emotionally colored facts. However, Scheler facts are not ideas, but metaphysical emotionality divorced from a person: the fullness of ideals and values is in the divine beginning laid in the foundation of things, but man himself is the only place for the formation of God, hence the name of M. Scheler’s teaching - ethical personalism. Values form the ontological premise of the personality and “are thought of as objective phenomena, prescribing to man the norms of duty and evaluation and forming the realm of transcendental supempirical entities that are outside the spatio-temporal reality.” [6, p. 381] According to the philosopher, values are so objective that they “cannot be created or destroyed. They exist independently of all organizations of certain spiritual entities.” [7, p. 111] Scheler considered values objectively existing, emotionally colored *facts*.

Another version of the justification of the transpersonal and supernatural existence of the world of values is presented in the philosophy of neo-Thomism, in the works of J. Maritain, L. de Reimecker, E. Gilsson and others. This concept is inherent in spiritualism, the assertion of the existence of a “superhuman logos”. A neo-Thomist understanding of values is based on the definition of good as that “what things strive for in order to achieve perfection.” Opening the axiological

meaning of the concept of value, L. de Reimeker wrote: “the term *value* has the same meaning as the expression of the scholastics *tatio boni* and means that such and such a thing is good. Value is something that does not leave you indifferent, worthy of being known, felt, what you should strive for and what you deserve to desire.” [8, p. 252-253] The value of a thing, the Neo-Thomists believed, is a kind of absolute property endowed with a supernatural essence that carries within itself a divine nature, primary with respect to their material existence. The mind is not able to comprehend the supersensible transcendental being of things.

Sociological concept of values was developed by M. Weber, J. Dewey, E. Durkheim. Weber was inclined to interpret value as the setting of a particular historical era, as the direction of interest characteristic of the era, and Durkheim understood values as a product of social consciousness. In this version, values are collective experiences that are not personal but mass in nature. The presence of “value ideas” is the transcendental premise of the cultural sciences. It consists, as Weber believed, in that it is impossible to study the world without appreciating it, without endowing with meaning. Each of the values is decisive in cognition: not the result of an arbitrary decision of a scientist, but a product of time and culture. “The concept of the culture of a particular people and era, the concept of “Christianity”, and ... other formations as concepts of historical research of an object are individual value concepts, i.e. formed through correlation with value ideas.” [9, p. 46]

Cultural-historical relativism, a new tradition in understanding the nature of values, is represented by V. Dilthey, P. Sorokin, A. Toynbee, O. Spengler. According to this approach, value is understood as the basis for the existence and functioning of any culture. Values, and above all - spiritual values, are concentrated in people, they then form the basis of human dignity. Along with spiritual values, the world of values also includes social, moral, aesthetic, and intellectual values. The struggle of man for the acquisition and adoption of a world of values is, in fact, a process of *realization of meaning* in history.

So, Sorokin considered culture "a set of meanings, values and norms that interacting people possess, a set of carriers that objectify, socialize and disclose these meanings." [10, p. 218] Society for a sociologist is characterized not simply by the totality of human interactions, their relationships, but by some internal essence, the meaning of which can be expressed by the concept of *culture*, revealed through values, norms and their carriers. But according to Toynbee, value is the highest degree of spirituality, it is the internal content of personality, which includes concepts of conscience, honor, mercy, etc. In addition, the philosopher argued, a separate culture is value in itself, since it has a unique spiritual appearance, a system peculiar only to her of spiritual, moral and aesthetic ideals. The value system of each individual civilization is determined culturally and historically, has a certain time reference. Toynbee derives the notion of value from an understanding

of history, the inner content of which is personality. A person should be a kind of bearer of spiritual values - this is its core and enormous potential, the key to success. "Personality is a growing factor in the Universe... Its strength and activity are gradually increasing... and often, even in the most adverse conditions, it wins moral victories, which become great milestones of progress." [11, p. 225]

3. Values as a product of human creativity

The author presented his version in numerous publications, and, in particular, in the monograph "Sum of Axiology". [12] Building an understanding of values as elements of culture, they should be considered in the existential (existence) and essential (essence) aspects. In the existential aspect, value consciousness has an emotional nature, and therefore it is binary - "yes - no", "good - bad", "kind - evil." However, values are not personal, but social in nature and they are components of social psychology, and therefore in social ontology they are *social emotions*, i.e. experiences that have acquired a social character. In the *essential* aspect with regard to values, the *principle of social egocentrism* can be formulated: I (a person) value something else because I see myself in this something, and I cannot remain indifferent to myself. Everything else in society is myself in the transformed form of the product of my activity, the result of my efforts, and, therefore, it is I myself in the external — objectified, materialized form.

As a definition of values, the following statement is permissible: *value is a measure of the expenditure of a person's physical or spiritual forces on the creation or development of elements of a natural or social environment.* In the objects of nature and in the products of culture, I see my own face in the mirror, and I can't be impartial to my own: it is myself, depending on circumstances, who I love or hate, approve or reproach, admire myself or dislike.

The transformation of one's own into another's and another's into one's is representable in the form of a *cycle of communication*. The author believes that there is a process of successive stages of objectification of the content of the subject, namely: from the *idea* to its *exteriorization*, then to *objectification* of this idea, then to its *alienation* and, finally, to the *thing* as the embodiment of the idea, separate from the creator of its existence *in flesh*. But this process has the reverse order in the case of bringing the external content into the inner world of the subject: from a *thing* to its *development*, then to *objectification*, then to *interiorizing* meaning and, ultimately, to an idea. Writing a book and reading someone else's book can be a good example. First, I think, then voice, then write, then publish, and then the book does not depend on me - I can't change it, and it finds the reader. I acquire a foreign book, read it, think it over, penetrate the meaning of the text and supplement it with new contexts. In other words, in the *idea*, internalized communication with the text is *personified*, that is, it acquires a personal, intimate, deeply internal modality.

The typology of values in accordance with the elements of the social system is decomposed into a *social square*: people, things, signs, institutions.

People - are intelligent human beings who become such by virtue of their mastery of things as a result of practical activity. The very Russian word for "reason" goes back to the Slavic verbs "*understand*" and "*mark*", which implies the ability to *sign* things, mark them or distinguish from the multitude. People themselves are products of the labor of other people, and since the re-nourishment of the human person requires a huge investment of time and effort of a large number of people, a person is the most labor-intensive product and therefore the greatest value, the type of which is called *personalized* values.

Things - are artificial objects created by people as a result of processing natural material. People acquire human quality solely by virtue of mastering things, and things acquire artificial quality solely by virtue of their creation and mastery by man. Since a person does not do anything "for nothing", and all his actions have a definite meaning - a goal as an idea of a future product of labor, artificial things, unlike fragments of nature, are informative, because the person himself is invisibly (implicitly! Virtually!) present in them. Well, due to the fact that things are designed to satisfy our material needs, that is, the needs for matter and energy, they form a special type of value - *utilitarian* values.

People and things are the primary elements of society. At the same time, secondary elements of society, or transformed forms of people and things, arise on the basis of primary elements. Institutes and signs act as such elements.

Institutions are the organizational forms of social life, the totality of social roles as matrices of human behavior, where these roles are presented as transformed, that is, people transformed into a secondary product. There is a person as an individual - this is any of us; and there is a person as a legal entity - a citizen, official, plaintiff, deputy. And a person as a legal entity does not behave at all as he wants, but as prescribed. This is the what social role is. Due to the fact that the social role is a secondary and transformed form of personality, *represents* one, several, or many personalities. The phenomenon of representation is dialectically accompanied by its reverse side - the *personification* of the social role. The performer of that other social role, occupying some position, not only voluntarily, but also necessarily identifies himself and his social position. The main value in politics is *power*, and the most important element of the system of political relations in society is the *state*, literally in Russian - reign.

Signs - are representative of things. If the word "presentation" is translated as show, demonstration, then the prefix "re" means "again", "once more." When we show someone not the thing itself, but that which replaces and represents it, we use the sign. In the science of signs, *semiotics* (from the Greek *sema* - sign, pointer) there is a basic definition: a sign is a thing that replaces another thing. The

initial in the origin of the signs is an *autosemiotic* attitude, namely: every thing is a sign of itself. Signs are invented when an auto-semiotic attitude is difficult or even impossible to realize. Then people create new things, the sole purpose of which is to represent, to represent things of the first kind that we cannot “*possess*,” that is, to have as such, but about which we receive the possibility of “*know*,” i.e. have an idea about them. By correlating the former with the latter, we will be able to “*understand*” what is at stake. *Ideological values* are presented as spiritual. In all languages, the word “*spiritual*” is derived from the verb “*breathe*”. This is not only the Russian “*duh*”, but also the Latin “*spiritus*” from “*spiro*” - I breathe. Hence the modern European versions like the English “*spirit*” - the soul or the French “*esprit*”. And this is no coincidence. The essence of the matter is that the process of communication of people is associated with breathing, since the main and most common means of communication is spoken language, sound speech, modulated breathing.

Values can be compared with each other, but units do not exist. Although we are constantly engaged in the subordination of values, we build their hierarchies, we rank them according to the principles of “higher - lower”, “more - less”, “better - worse” - all such hierarchies are different. Someone values power above all else, someone is attracted to fame, another pursues wealth, a young girl needs love, and a mature woman needs family and children, while over the years we all begin to value health.

At the same time, the author is convinced that the *direct dependence* of the rank of value, its importance in the existing hierarchy, its place in the subordination of goods is characteristic of the primary elements of society - people and things, and it is determined by *the cost of their production*. Whereas the *inverse dependence* takes place for secondary elements of society, transformed forms of people - social roles as part of institutions, and transformed forms of things - signs and images in the form of ideas and ideals, and it is determined by *the cost of their consumption*.

Mastering the rules and regulations of a hostel, behavioral patterns in various life circumstances, legal settings and economic models, knowledge in the field of education and skills in professional activity, training physical strength and mental abilities is work. To become an educated person, an interesting interlocutor, a partner worthy of love, a friend worthy of respect, a professional in his field is all a lot of work. Talent is work, genius is work and even more work.

Hence the conclusion: *the dignity of the human person is determined by the combined efforts, general and individual, spent on the formation of this person and on the self-realization of its spiritual wealth*. The inner world of a person is only very slightly expressed externally: in facial expressions, in eyes as a mirror of the soul, in clothing and manner of behavior. In its main content, the human soul is revealed in communication. Wise Socrates, entering into a conversation with a man, suggested: speak so that I can see you!

References

1. Sorokin P. A. *About the so-called factors of social evolution // Man. Civilization. Society.* - Moscow: Politizdat. 1992. - p. 521-531.
2. Toffler E. *Third Wave.* - Moscow: AST, 1999. - 784 p.
3. Perry R. B. *Present Philosophical Tendencies // R.B. Perry.* - L., - N.-Y., Toronto, 1929. - 296 p.
4. Perry R. B. *General Theory of Values // R.B. Perry.* - N.-Y., 1926. - 589 p.
5. Rickert G. *Natural sciences and cultural sciences.* - Moscow: Republic, 1998. - (Thinkers of the XX century). - 473 p.
6. Scheler M. *Selected Works.* - Moscow: Gnosis, 1994. - 413 p.
7. Scheler M. *Der Formalismus in der Ethik und die materiale Wertethik.* - Berlin, 1954. - 871 p.
8. Reymecher L. D. *Philosophie de l'etre.* - L., 1947. - 468 p.
9. Weber M. *Critical studies in the field of the logic of the sciences of culture // Culturology: XX century.* - Moscow: Urist, 1995. - 604 p.
10. Sorokin P. A. *About the so-called factors of social evolution // Man. Civilization. Society.* - Moscow: Politizdat. 1992. - p. 218.
11. Toynbee A. *Comprehension of History.* - Moscow: Rolf, 2001. - 640 p.
12. Kryukov V.V. *Sum of axiology / V.V. Kryukov.* - Novosibirsk: NSTU Publishing House, 2018. - 207 p. Ill, 10 col. Ill. (Series "Monographs of NSTU").

两极世界中的俄罗斯和中国
RUSSIA AND CHINA IN BIPOLAR WORLD

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抽象。文章表明现代世界不再被视为资本主义。它是两极的。它有一个进步的部分，由完成社会主义革命的国家 and 由最大的帝国主义国家领导的反动国家组成。社会主义阵营的那些国家正在阻止那些不想成为帝国主义抢劫受害者的资产阶级国家，如俄罗斯，印度，巴基斯坦和其他国家。现代世界是两极的，真正来自东方的风主导着来自西方的风。

关键词：资本主义，帝国主义，辩证法，社会主义，两极世界。

Abstract. *The article shows that the modern world can no longer be regarded as capitalistic. It is bipolar. It has a progressive part, consisting of countries that have completed the socialist revolution, and a reactionary one, led by the largest imperialist states. Those countries of the socialist camp are blocking with those bourgeois states that do not want to be victims of imperialist robbery, such as Russia, India, Pakistan and others. The modern world is bipolar and truly the wind from the East dominates the wind from the West.*

Keywords: *Capitalism, imperialism, dialectics, socialism, bipolar world.*

The Great October Socialist Revolution served as the first impetus to the implementation of new socialist revolutions, including in the east, to the creation of new socialist states that constitute a powerful force. A force that has been constantly evolving since 1917. And, on the other hand, the capitalist adversary has a tendency to rot and die. Therefore, we must accordingly look at the world in which we live, see this world with “dialectical” eyes, consider it as a bipolar world.

After the socialist revolution won in Russia, the whole picture of the world changed. Before that, the world was capitalistic. We could say: "We live under capitalism, we live in a capitalist world." As soon as the socialist revolution in Russia won, and this is its greatness, a new stage of development began. Now the world consists of two parts, of two socio-economic systems. One system is represented by the capitalist world. Another system, the system of socialism, was first represented by Soviet Russia, and then by the Soviet Union and Mongolia. And that's all. In this state, the world existed for a rather long time. The art of foreign

policy and the use of contradictions between imperialist states allowed the Soviet Union to develop.

Fools are trying to tell that Stalin did not know that there would be a war. How did he not know when we switched from a seven-hour working day to an eight-hour working day? We were preparing for war with all our might because we understood: otherwise they would crush us. The requirements for high growth rates were associated with this, and the requirements for industrialization were associated with this.

When the Second World War passed, it ended with the victory of that state, which represented a higher socio-economic formation. Namely, the socialist Soviet Union. The decisive role in the defeat of German fascism was played by the Soviet Union. And the states competing with Germany, such as the United States of America and Great Britain, were forced to enter into an alliance with the Soviet Union, since they had no other choice. Because Germany acted like a large imperialist state, it intended to destroy the Soviet Union, deprive Britain of its colonies, and take away what the United States of America possessed. Therefore, it was not from a good life that Great Britain and the United States entered into an alliance with the Soviet Union. That is, the capitalist countries joined the socialist country in order to save themselves from fascism. Here is a lesson, by the way, from World War II.

And after the Second World War, something similar happened to what happened after the First World War. New revolutions began. In Europe, these revolutions took place more or less peacefully, I mean the revolution in Czechoslovakia in 1948, the revolution in Albania, Bulgaria, Hungary, Poland, Romania, Yugoslavia. With the support of the Red Army, the peaceful development of the revolution was ensured there. This was not the case in Cuba and in such eastern countries as China, Korea, Vietnam, Laos, which, in fact, have a much greater historical significance than the European countries about which there is so much talk. In the east, everything went not without major battles.

The Chinese working class, the working people of China under the leadership of the Chinese Communist Party and its leader, Mao Tse Dong, carried out the second most important socialist revolution in 1949 after the October 1917 revolution. After lengthy battles against the Kuomintang, with the support of the Soviet Union, which left the People's Liberation Army of China with captured Japanese weapons and transferred part of its weapons, the People's Liberation Army of China defeated the Kuomintang. The People's Republic of China was created, the stronghold of the socialist and all progressive forces of the modern world.

Today, the People's Republic of China is the largest power in the world, ranking first in the world in terms of gross domestic product, calculated at purchasing power parity. She is third in the world in terms of territory and first in terms of population.

In the countries that committed the socialist revolution, today more than one and a half billion people live. The population of the People's Republic of China is 1 billion 408 million people. The population of Vietnam is 98 million. The population of the DPRK is 25 million. Add to this the seven millionth population of Laos, which in 1975, after a long struggle against the French colonialists, nevertheless defended its independence and also created a socialist state. Plus, the population of Cuba, which in 1959 became socialist as a result of the revolution led by Fidel Castro, the great leader of the Cuban people. With the tangible support of the Soviet Union, the working people of all these countries selflessly fought themselves and suffered tremendous sacrifices in the struggle for freedom and independence, for the socialist future of their homeland, for liberation from exploitation.

In the struggle against imperialism and internal counter-revolution, the Soviet Union and the European socialist countries were defeated. But it did not disappear, the socialist camp was preserved, strengthened and developed.

All those states that were involved in revisionism, in rejecting the theory of class struggle, from the dictatorship of the proletariat, from dialectics, from Marxism, all these states were defeated. But the camp of socialism, part of which was defeated, is not broken. Today it has over one and a half billion people and the largest economic power. It is a nuclear missile and space rocket power. It launches satellites and space stations herself. It is at the forefront of scientific and technological progress. The Charter of the Chinese Communist Party says: **“The Communist Party of China is the vanguard of the Chinese working class and at the same time the vanguard of the Chinese people and the Chinese nation, guiding the core of the cause of socialism with Chinese characteristics and represents the demands for the development of China's advanced productive forces, the progressive direction of Chinese advanced culture, and the fundamental interests of the widest sections of the Chinese people. The supreme ideal and ultimate goal of the party is the realization of communism.**

The Chinese Communist Party is guided in its activities by Marxism-Leninism, the ideas of Mao Zedong, the theory of Deng Xiaoping, important ideas of triple representation, the scientific concept of development, the ideas of Xi Jinping on socialism with Chinese characteristics of the new era.

Marxism-Leninism discovered the laws of the historical development of human society, its main provisions remain true and have a powerful vitality. Communism as the highest ideal to which the Chinese Communists strive can be realized only on the basis of the full development and high development of socialist society».

And with those people who tried to follow the same path that Gorbachev followed, further Yeltsin, the Chinese Communists acted very harshly. Hu Yaoban, who declared himself a friend of Gorbachev, was, one year after his election, ex-

pelled from the post of general secretary of the CPC Central Committee. And the next general secretary, Zhao Ziyang, who went to Tiananmen Square and told the representatives of the Chinese Maidan they we supported them, was also expelled from this post. After this speech, Zhao Ziyang, Deng Xiaoping, who was considered a pragmatist and was the head of the Military Commission of the CPC Central Committee, gathered the Politburo in his palace, Zhao Ziyang was expelled from his secretaries and put under house arrest, under which he spent 15 years and died. No one offended him, did not suppress him. In the PRC, there was no return to capitalism, which Khrushchev, Gorbachev and Yeltsin tried to impose on the Chinese comrades. The Chinese comrades were wiser, they went, in short, the Leninist road. And not the road of Kautsky or Trotsky.

They did not reject the teachings of Marxism-Leninism, they remained faithful to it. The Chinese comrades creatively use Marxism-Leninism and are struggling with revisionism. Especially valuable is the criticism of Mao Tse Dong of Khrushchev's revisionism, his rejection of the dictatorship of the proletariat. Mao Jie Dong immediately determined that the leading Soviet comrades left Marxism-Leninism and embarked on a road hostile to Marxism-Leninism.

The socialist camp today has become a powerful force. It is formed by socialist states, against which imperialism has repeatedly opposed and waged an armed struggle with them: against China, Korea, Vietnam, Laos, Cuba. All this ended with the fact that imperialism would have to coexist peacefully with them.

In that part of the world that remains capitalist, that is, in the historically backward part of the world that they are trying to present as the only one, they pretend that they do not notice the half billion that are moving forward. And they are moving much faster than the capitalist part, in which, as before, relations of exploitation dominate, the robbery of some countries by others, a handful of rich states. Moreover, if before the Second World War different blocks of imperialist powers fought, now in the imperialist part of the world there is one dominant imperialist state, the United States, and all other monopolistic powers are built on the line. This is Germany, and Japan, and the United Kingdom, and France. All of these words cannot speak against the Americans. They did not oppose the fascist foreign policy imposed by the United States of America, the victims of which were several large bourgeois-democratic states. Carrying out an open terrorist dictatorship of the most reactionary, most chauvinistic circles of financial capital, they destroyed Yugoslavia, divided it into small states, which now mean little in world politics. They attacked Iraq under a far-fetched pretext. As a result of their struggle against Iraq, as a result of the entry of troops there, as a result of hostilities, they destroyed the secular Iraqi state. Now there is a religious state there, as a result, religious wars began, which are the source that gave rise to ISIS. Further, a group of NATO powers led by the United States attacked Libya. In Libya, there was free

education, free medicine. There was not much inequality in Libya, but, unfortunately, the economy was imperialistic. That is, oil was produced by imperialist countries and, in part, shared income with Libya. And, when the Libyans wanted to get a large share, the United States and its satellites destroyed the Libyan state. There is no Libyan state today. Who arranged the current spontaneous movement of migrants to Europe? This was all arranged by the states of the Western bloc, led by the United States. The US is sitting overseas, rubbing their hands. And all the charms of this raid of migrants, who would not have run anywhere, they run because their homeland is destroyed, their houses are burned. Refugees from Libya are moving to Western Europe, to Germany or to France. Naturally, terrorists also make their way along. What Europe is now suffering from, it organized itself under the command and at the initiative of the United States. And do not be surprised that migrants go there if you drove people out of their houses and burned their houses. The Libyan state, like Iraq, was secular. So the agents of fascism in foreign policy destroyed another secular state in the Middle East. There remained only one secular state - the Syrian. Here, Russia found itself among the vehicles of fascism in foreign policy on the way. Because Russia has a military base there and for her this is the only way to enter the Mediterranean Sea. If they removed this base on the Mediterranean Sea, it means that Russia would actually cease to be a great power. Russia, based on its interests, supports the struggle of the Syrian people with those who want to create a religious state in Syria. The tornado that could give rise to ISIS would already exist. In Damascus, the government of this very ISIS would sit. And then the world would have dealt not with some movement called the "Islamic state", banned in Russia, but with the real one, with which it is much harder to wage war, some states would recognize it, and all this would create a host of international problems. Therefore, it is absolutely correct that Russia, without waiting until it comes to this, defends its interests. It protects because otherwise ISIS will come to us in Central Asia.

What to do in this situation for large states that, being in the imperialist part of the world, do not want to be objects of robbery and exploitation, such as Brazil, Russia or South Africa, bourgeois states in which there is everything so that they can develop as independent states. Where do they need to adjoin? To China, otherwise they will be "eaten" by the USA. Where do you need to adjoin India? India, in terms of population, is almost at the same level as China. India used to be at enmity with China a little, but now it understands that it can stay in this world only by cooperating with China, which has first place in the world in terms of scale and pace of production growth. To remain an independent state, you need to block with China. What do we get? BRICS: Brazil, Russia, India, China, South Africa. What is BRICS? This is an alliance of some capitalist states that do not want to be plundered by the United States and their satellites, with socialist states that pursue their independent

line, are developing faster than capitalist ones, and they are not opposed to blocking with those capitalist states that do not go to the wake of an aggressive imperialist US policy. Socialist China, cooperating with other socialist countries, pursues a friendly policy towards Russia, towards Brazil, towards India and South Africa. And Cuba is blocking with Russia, which is very important. It so happens that Russian Prime Minister Medvedev is traveling to Vietnam and meets with the Secretary General of the Communist Party of Vietnam. And the president of bourgeois Russia, Putin regularly meets with chairman Xi Jing Ping. It is also advantageous for the countries of the socialist camp to block with those capitalist countries that do not go in the wake of US aggressive policy. This guarantees peaceful development. After all, the joint nuclear missile potential of Russia and China exceeds the American.

Here is the picture. If we draw this picture for ourselves, what can be seen with the help of dialectics? We must get away from the idea that we live in a capitalist world. This is an old, backward, misconception. In the capitalist world, we lived until 1917. Moreover, already before 1917, starting from the end of the 19th century, we already lived under imperialism. And imperialism is not only fraught with wars, but also it is fraught with revolutions, it is also the highest and last stage of capitalism, dying and decaying capitalism. About this is the book of Vladimir Ilyich Lenin “Imperialism, as the highest stage of capitalism”. Nothing smarter and deeper has been written about modern imperialism. And all that we are told on television, on the radio, these are all descriptions. This is not a theory of the matter. How long does this work, “Imperialism, as the Highest Stage of Capitalism”, have value? It will have value as long as imperialism exists. Maybe it will exist another 100 years. Therefore, today there is a contradiction between the two systems. The capitalist system, the obsolete, the dying, the decaying and the socialist, advanced, developing systems led by the People’s Republic of China, and the balance of power is changing in favor of the advanced socialist system.

This is the modern picture of the world or the answer to the question, “in which world do we live?”, We live in a transitional world. We live in a world in which a significant part of the population already lives in the transition from capitalism to communism and twenty-five million live in the first phase of communism, these are North Koreans. This part of the world is provided economically, intellectually. Nobody is smashing the Academy of Sciences there, they are not cutting education, they are not cutting subsidies to medicine, science and culture. There, the purpose of production is to ensure the welfare and free comprehensive development of all members of society.

After the defeats that some socialist states suffered in retreating from Marxism-Leninism, it became completely clear that there is the only way to save the working people, save humanity, the peoples of the Earth, including from wars and robbery, this movement to socialism. And this movement is unstoppable.

Previously, it could be said that, first of all, the correlation of forces was changing in a military revolutionary way. Another state arose, in the socialist camp then more people became. But the point is that the economic power of the socialist countries is growing and will grow faster than the countries of capitalism. With the growth of the economic power of the socialist countries, more and more states will join them, fleeing from these bandits and robbers who consider themselves to be a civilized world. They yearn for the times when they had colonies, then neocolonies. The same France, she hosted in Vietnam, Cambodia and Laos. And robbed there shamelessly. Robbed and killed. The same Americans dropped 250-260 million air bombs on Laos, along the path along which supplies from Vietnam went. These are people who consider themselves civilized. Probably, the Americans also thought when they killed the American Indians, they killed almost all of them. Few were left for a “divorce”. How were they killed? Those with hatchets, and these with guns came. The same Indians who did not want to be slaves, the Spaniards and the Portuguese chopped off their hands. Go to the Hermitage, see the paintings of artists who reflect picturesquely what was happening then.

That is, the movement goes unambiguously towards the development of socialism, the expansion of the countries of socialism. And the narrowing of the imperialist sphere. Relative, of course. The balance of power has changed, is changing and will continue to change in favor of the socialist countries. One must understand where the “world wind” blows, the “world wind” blows against capitalism, for socialism. Hence the creation, expansion and development of such an international, interstate alliance as the Shanghai Cooperation Organization, in which socialist China and bourgeois Russia so far, which recently joined India and Pakistan, and this international union, in which the socialist China plays the vanguard role, Earth's population is becoming stronger and developing.

But we must be on the alert. When I was in the beautiful North Korea that built socialism in 1992, I was bothered by the thought that suddenly a leadership similar to our North Korean Khrushchev would come to the leadership. After all, then there will be the same collapse as in the Soviet Union. You need to think about it. It must be understood that the struggle against petty-bourgeoisness in all its forms goes on under socialism in the very same North Korea. And in the transition from capitalism to communism. What is the transition from capitalism to communism? This is the formation of communism. And in becoming there is “arising” and “passing”. And one must think and fight so that the “emergence” conquers the “passage”. This is a completely dialectical task. It is clear that to solve this problem with full knowledge and understanding, one can only master dialectics. And the solution of such major historical, gigantic problems is feasible if we master the dialectical method.

生育期平滑肌瘤患者个体心理特征的研究
**STUDY OF THE INDIVIDUAL PSYCHOLOGICAL
CHARACTERISTICS OF WOMEN WITH LEIOMYOMAS
IN REPRODUCTIVE AGE**

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抽象。 本文展示了人格类型和结构的实验心理学研究,其中使用了俄语版的艾森克方法论(EPI)(个人问卷调查(Eysenck方法的改编版),1994)和G. Ammon的I-结构测试(ISTA),俄语版本(G. Ammon的I-结构测试指南,2002; Tupshchyn, Yu.Ya. 等人,2000)。

关键词: 平滑肌瘤, 子宫肌瘤, 子宫肌瘤, 与平滑肌瘤相关的因素, 个体心理特征, 女性患有平滑肌瘤, 生育年龄, 精神和性功能障碍。

Abstract. *The article demonstrates an experimental psychological study of the typology and structure of the personality, where the Russian-language version of the Eysenck methodology (EPI) is used (Personal Questionnaire (adapted version of the Eysenck methodology), 1994) and G. Ammon's I-structural test (ISTA), Russian-language version (G. Ammon's I-structural test Guide, 2002; Tupshchyn, Yu. Ya. et al., 2000).*

Keywords: *leiomyoma, fibroids, uterine fibroids, factors associated with leiomyoma, individual psychological characteristics, women with leiomyoma, reproductive age, mental and sexual disorders.*

The choice of EPI for this study was motivated by numerous indications of the high heritability of extroversion and neuroticism and their relationship with (neuro) biological phenomena (Ziomkiewicz A., et al., 2012; Wright C.I., et al., 2006; Kim S.H., et al., 2008). The use of ISTA is justified by the instructions of its creators and researchers that the estimates of ISTA parameters remain stable over time, since the personality structure (human structure) captured by this tool is partly biologically predetermined and is formed in early childhood symbiosis based on the development of "I" and the identity of the child in the primary group (Ammon G., 1994; Essays on Dynamic Psychiatry, 2003).

Objective clinical and biological data were obtained from stationary case histories, subjective data from a semi-structured interview. The results of RCTs of mean EPI scores in women with LM are presented in Table 1.

Table 1.

Comparison of mean EPI scores in the main and control groups of women (n=66).

EPI Scale	Groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Coef. variations (%)	X2 (normal distribution)	Hypothes error "Differs from the normal distribution." (%)	Criterion	p
Extroversion	TG	6,0	21,0	12,515	3,607	28,818	3,410	80,0	U=506	>0,05
	CG	4,0	17,0	11,727	3,582	30,543	8,590	20,0		
Neuroticism	TG	5,0	21,0	12,273	4,223	34,406	4,628	70,0	U=495,5	>0,05
	CG	3,0	19,0	11,424	4,359	38,157	11,275	10,0		
Lies	TG	1,0	4,0	2,0	1,031	51,539	40,954	0,1	U=466,5	>0,05
	CG	0,0	5,0	2,394	1,413	59,019	39,033	0,1		

Note: min - the minimum value of the variable; max - the maximum value of the variable; M - average; SD - standard deviation; Student t-test (to compare samples with normal distribution); U - the Mann-Whitney criterion.

No significant differences were found between EPI comparison groups ($p > 0.05$). Additionally, a qualitative analysis was carried out in which the entire non-randomized sample ($n = 152$) was analyzed by the composition of personality types (Bleicher V.M. et al., 2002): extraverts (scored 13 or more points on the EPI Extraversion scale) / introverts (scored 11 or less points on the EPI Extraversion scale) and "neurotics" (scored 13 or more points on the EPI Neuroticism scale). The distribution of respondents by personality types based on EPI estimates is presented in Table 2

Table 2.

Distribution of respondents by personality types based on EPI ratings (n=152)

EPI Estimated Personality Types	Whole sample selection (n=152)		TG (n=101)		CG (n=51)	
	n	%	n	%	n	%
Extraverts (13 and > points on the Extraversion scale)	65	49,2	41	47,7	24	52,2
Introverts (11 and < points on the Extraversion scale)	66	50,04	45	52,3	22	47,8
"Neurotics" (13 and > points on the Neuroticism scale)	66	46,8	45	48,4	21	43,8

Extroverts were slightly predominant in CG, while introverts and neurotics predominated in TG. None of the identified personality types found significant correlations with LM (extrovert / introvert: $F = -0.043$; $p = 0.7$; "neurotic": $F = 0.044$; $p = 0.7$). Of those respondents who scored more than 4 points on the EPI Lie Scale, there was only 3 in the TG (3.2%), and 6 in the CG (12.8%), but despite the apparent predominance of respondents with high Lie scores in the CG, no significant correlations of "lying" with LM were revealed ($F = 0.185$; $p = 0.7$).

Women described as unstable extroverts (Eysenck H.J., Eysenck S. B.G., 1964) (high scores on the extroversion and neuroticism scale), with their characteristic emotional instability and high frequency of hysterical personality traits, characterized as communicative, impulsive, with more flexibility in behavior, initiative and social adaptability. Given the low detectability of LM, these personality traits can be considered adaptive and useful from the point of view of early detection of gynecological pathology and, accordingly, earlier exception of the necessary medical care (Jonason P.K., et al., 2011).

Then, a comparative study of the I-structure was carried out in the ISTA human model of personality, in which a randomized sample selection participated (66 women, 33 of them with LM). The results of RCTs of mean ISTA scores in women with LM are presented in Table 3.

Table 3.

Comparison of mean ISTA scores in the main and control groups of women (n=66).

EPI Scale	Groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for norX2 for normal distribution	Hypothes error "Differs from the normal distribution." (%)	Criterion	p
Constructive aggression	TG	2,0	13,0	8,0	2,948	36,843	16,303	1,0	U=443,5	> 0,05
	CG	2,0	13,0	7,0	2,681	38,299	7,491	20,0		
Destructive aggression	TG	0,0	11,0	5,727	2,742	47,871	7,908	20,0	t=1,635	0,2
	CG	1,0	11,0	4,606	2,828	61,392	7,627	20,0		
Deficit aggression	TG	0,0	10,0	3,939	3,031	76,927	19,245	0,1	U=401,5	0,05
	CG	0,0	8,0	3,394	2,207	65,030	11,055	5,0		
Constructive anxiety	TG	0,0	11,0	7,303	2,201	30,133	9,344	10,0	U=401,5	0,05
	CG	3,0	12,0	6,546	2,635	40,257	26,650	0,10		
Destructive anxiety	TG	0,0	8,0	3,0	2,437	81,223	10,719	10,0	t=2,098	0,05
	CG	0,0	6,0	1,940	1,580	81,466	8,240	20,0		
Deficit anxiety	TG	0,0	7,0	3,212	2,088	65,005	9,973	10,0	U=439	> 0,05
	CG	0,0	8,0	2,636	2,356	89,369	28,676	0,10		
Constructive narcissism	TG	0,0	11,0	7,303	2,604	35,655	5,081	50,0	t=0,391	0,7
	CG	3,0	11,0	7,061	2,436	34,500	7,780	20,0		

EPI Scale	Groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for norX2 for normal distribution	Hypothes error "Differs from the normal distribution." (%)	Criterion	p
Destructive narcissism	TG	0,0	10,0	3,333	2,570	77,096	16,075	1,0	U= 436	> 0,05
	CG	0,0	9,0	2,758	2,681	97,234	28,964	0,10		
Deficit narcissism	TG	0,0	11,0	3,121	2,902	92,981	11,345	5,0	U= 368	0,05
	CG	0,0	9,0	1,909	2,227	116,661	0,315	0,10		
Constructive sexuality	TG	0,0	13,0	7,091	3,940	55,563	42,833	0,1	U= 464	> 0,05
	CG	0,0	12,0	8,091	3,330	41,151	7,733	30,0		
Destructive sexuality	TG	0,0	8,0	3,364	2,289	68,046	8,704	10,0	U= 485	> 0,05
	CG	1,0	10,0	3,818	2,038	53,376	14,624	1,0		
Deficiency sexuality	TG	0,0	5,0	1,515	1,302	85,929	37,700	0,10	U= 526,5	> 0,05
	CG	0,0	5,0	1,424	1,324	92,933	31,942	0,10		
External I-delimitation constructive	TG	4,0	10,0	7,121	1,453	20,397	3,617	80,0	U= 505	> 0,05
	CG	3,0	12,0	6,818	2,443	35,824	15,965	2,0		

EPI Scale	Groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for norX2 for normal distribution	Hypothes error "Differs from the normal the normal distribution." (%)	Criterion	p
External I-delimitation destructive	TG	0,0	10,0	3,879	2,547	65,653	4,351	50,0	t=1,387	0,2
	CG	0,0	8,0	3,061	2,235	73,032	9,588	5,0		
External I-delimitation defective	TG	1,0	11,0	4,939	2,609	52,827	4,386	50,0	t=2,015	0,05
	CG	0,0	8,0	3,667	2,521	68,748	9,518	10,0		
Inner Self-delimitation constructive	TG	0,0	12,0	8,485	2,563	30,209	10,700	10,0	t=1,011	0,4
	CG	2,0	11,0	7,848	2,551	32,503	6,894	30,0		
Inner Self-destructive destructive	TG	1,0	9,0	4,061	2,030	49,994	5,571	50,0	t=2,21	0,05
	CG	0,0	8,0	2,909	2,199	75,588	6,148	50,0		

EPI Scale	Groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for norX2 for normal distribution	Hypothes error "Differs from the normal distribution." (%)	Criterion	p
Inner self-delimitation deficient	TG	0,0	9,0	4,333	2,570	59,304	16,087	2,0	U 1,284	0,3
	CG	0,0	9,0	3,546	2,412	68,033	11,249	10,0		

Note: min - the minimum value of the variable; max - the maximum value of the variable; M - average; SD - standard deviation; Student t-test (to compare samples with normal distribution); U - the Mann-Whitney criterion.

As a result, no significant differences were found between the comparison groups on any of the 18 ISTA scales ($p > 0.05$).

A study of the psychological well-being of women with LM was also measured using the symptomatic questionnaire SCL-90-R. RCT on SCL-90-R - TG and CG (total sample selection size - 66 women) was conducted. All SCL-90-R forms were completed by respondents and valid. The results of RCTs of the average SCL-90 scores for women with LM are presented in Table 4.

Table 4.
Comparison of the mean scores of SCL-90-R in the main and control group of women (randomized sample selection, n = 66)

SCSCL-90 Scale		Groups (n = 33)		Linear distribution statistics						Significance of the difference between MO and MK	
				min	max	M	SD	Variation coefficient (%)	X2 for normal distribution	Hypothes error "Differs from the normal distribution." (%) (%)	Criterion
SOM	T	0,0	3,0	0,812	0,632	77,801	7,114	30,0	t=3,894	0,001	
	C	0,0	0,92	0,350	0,233	66,701	5,386	50,0			
O-C	T	0,0	2,9	0,788	0,692	87,806	14,975	2,0	U=292	<0,01	
	C	0,0	1,3	0,352	0,326	92,616	10,158	10,0			
DEP	T	0,0	2,7	0,759	0,762	100,362	0,272	1,0	U=417	>0,05	
	C	0,0	1,4	0,420	0,354	84,267	16,991	2,0			
INT	T	0,0	2,2	0,699	0,646	92,476	18,730	1,0	U=384	0,05	
	C	0,0	2,4	0,414	0,461	111,238	18,877	1,0			
ANX	T	0,0	1,7	0,661	0,503	76,154	33,876	0,10	U=275	<0,01	
	C	0,0	1,1	0,300	0,359	119,606	0,374	0,10			
HOS	T	0,0	4,5	0,555	0,801	144,358	30,064	0,10	U=450	>0,05	
	C	0,0	1,0	0,337	0,316	93,640	6,659	30,0			
PHOB	T	0,0	2,1	0,381	0,515	135,338	39,366	0,10	U=359,5	<0,01	
	C	9,9	0,57	0,112	0,168	150,570	5,940	30,0			
PAR	T	0,0	2,8	0,582	0,810	139,227	60,563	0,10	U=482	>0,05	
	C	0,0	2,17	0,354	0,445	125,835	18,682	0,10			
PSY	T	0,0	2,4	0,449	0,677	151,035	51,478	0,10	U=392	0,05	
	C	0,0	1,0	0,153	0,226	148,222	13,021	5,0			

SCSCL-90 Scale	Groups (n = 33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for normal distribution	Hypothes error "Differs from the normal distribution." (%)	Criterion	p
ADD	T	0,0	2,3	0,658	0,638	96,880	21,051	0,10	U=316	<0,01
	C	0,0	0,85	0,263	0,244	92,590	16,156	1,0		
GSI	T	0,001	2,00	0,629	0,522	82,850	21,061	1,0	U=287	<0,01
	C	0,03	0,86	0,305	0,225	73,758	14,524	5,0		
PST	T	1,0	78,0	36,152	19,012	52,589	3,376	70,0	t=3,233	0,01
	C	3,0	54,0	22,939	13,777	60,059	10,081	10,0		
PDSI	T	0,82	1,50	1,401	0,434	30,971	11,180	10,0	t=2,758	0,01
	C	0,73	1,95	1,142	0,288	25,213	13,187	5,0		

Note: T - test group; C- control group; min - the minimum value of the variable; max - the maximum value of the variable; M - average; SD - standard deviation; Student t-test (to compare samples with normal distribution); U - Mann-Whitney criterion; the names of the SCL-90-R scales are given in the text of the article.

No significant differences were found between the comparison groups ($p > 0.05$) on the SCL-90-R scales DEP, INT, HOS, PAR and PSY. In TG, compared with CG, there were significantly ($p \leq 0.01$) higher scores on the SOM, O-C, ANX, PHOB, ADD, GSI, PST, and PDSI scales. At the same time, global indices of distress, significantly increased in the group of patients with LM compared with the control, make it possible to assess the psychopathological status of patients, regardless of the source of distress. An increase in GSI in patients with LM is an indicator of the severity of the current condition and the depth of the disorder, however, a coexisting high PDSI index may also indicate a tendency to exaggerate symptoms - sources of distress, and a high symptom manifestation index (PST) indicates the number of disturbing symptoms. In general, an increase in indicators of distress indicates the subjective severity of physical and emotional suffering, the intensity and variety of symptoms, which serves as a source of poor health and feelings of patients with LM.

In connection with the identified mental components, within the individual psychological characteristics of women with LM, a study was conducted to quantify anxiety and depression by HADS. In comparative RCT, HADS anxiety and depression questionnaire forms filled out by patients with LM and healthy control were used. HADS mean anxiety and depression values for TG and CG comparisons are presented in Table 5.

Table 5.
Comparison of mean anxiety and depression scores (HADS) in the main and control groups (n=66)

HADS Scale	Comparison groups (n=33)	Linear distribution statistics							Significance of the difference between MO and MK	
		min	max	M	SD	Variation coefficient (%)	X2 for normal distribution	Hypothes error "Differs from the normal distribution." (%) (%)	Criterion	P
Anxiety (score)	TG	1,0	14,0	7,364	3,525	47,871	0,169	30,0	t=2,023	0,05
	CG	0,0	15,0	5,667	3,285	57,972	6,506	30,0		
Depression (score)	TG	2,0	12,0	5,546	2,780	49,404	7,858	20,0	U=361,5	<0,01
	CG	0,0	10,0	3,940	3,082	78,225	24,382	0,10		

Note: min - the minimum value of the variable; max - the maximum value of the variable; M - average; SD - standard deviation; Student t-test (to compare sample selections with normal distribution); U - Mann-Whitney criterion.

A quantitative assessment of anxiety (HADS) in the comparison groups did not reveal a significant difference (p = 0.05), but a quantitative assessment of depression (HADS) revealed a significantly higher score of depression in the test group compared with the control group (p <0.01).

Conclusions: Thus, in the study of the individual psychological characteristics of women with LM, no significant differences were found between these women and healthy controls according to typology (EPI) and personality structure (ISTA), according to SCL-90-R scales DEP, INT, HOS, PAR and PSY. In TG, compared with CG, there were significantly ($p \leq 0.01$) higher scores on the SOM, OC, ANX, PHOB, ADD, GSI, PST and PDSI scales, but a descriptive analysis of each of the scales mentioned above does not allow us to unambiguously judge the presence of psychopathology in the group of patients with LM without a subsequent analysis of the correlations of these "clinical" scales with individual clinical manifestations of the underlying disease (see chapter 4.). Among women with LM, distress indices (SCL-90-R) are significantly increased and they significantly differ from healthy controls in a greater degree of depression, but not anxiety (HADS).

治疗严重骨质疏松症的现代可能性
**MODERN POSSIBILITIES OF TREATMENT
OF SEVERE OSTEOPOROSIS**

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抽象。骨质疏松症 – 由于高患病率和早期残疾，仍然是医疗保健的紧迫问题之一。

本研究的目的是研究特立帕肽治疗对严重绝经后骨质疏松症患者脊柱BMD，股骨近端和骨代谢的影响，以及评估新骨折的发生率。

材料与方法：该研究包括30名女性，平均年龄（ 60 ± 6.0 岁），病程 10.0 ± 5.0 岁。所有患者均有严重的绝经后骨质疏松症，并发多发椎体和非椎体骨折。根据FRAX的风险在所有患者的轴向骨骼中超过30%。

结果。结果显示，特立帕肽治疗12个月后BMD增加，伴随着骨形成过程的激活。根据问卷SF-36，治疗结果为3个月，患者的背部疼痛有统计学意义上的显著降低，患者的生活质量得到改善。

关键词：骨质疏松症，生活质量，背痛，teriparatid

Abstract. *Osteoporosis - remains one of the urgent problems of health care, due to the high prevalence and early disability.*

The purpose of this study was to study the effect of therapy with Teriparatide on the BMD of the spine, proximal femur and bone metabolism in patients with severe postmenopausal osteoporosis, as well as to assess the incidence of new fractures.

Materials and methods: *The study included 30 women whose average age was (60 ± 6.0 years) with a disease duration of 10.0 ± 5.0 years. All patients had severe postmenopausal osteoporosis, complicated by multiple vertebral and non-vertebral fractures. The risk according to FRAX was more than 30% in the axial skeleton in all patients.*

Results. *The results showed an increase in BMD after 12 months of therapy*

with Teriparatide, which was accompanied by the activation of bone formation processes. As a result of therapy, by 3 months, there was a statistically significant reduction in back pain and an improvement in the quality of life of patients according to questionnaire SF-36.

Keywords: *Osteoporosis, quality of life, back pain, teriparapitid*

Osteoporosis (OP) - remains one of the urgent health problems, due to the high prevalence and early disability [1].

Epidemiological data are disappointing - in the Russian Federation, the potential risk group for osteoporotic fractures includes 24% of the population, or 34 million people. According to the Federal Center for the Prevention of Osteoporosis, among the urban population of Russia, 24% of women and 13% of men over the age of 50 already had fractures. In Russia, 9 million low-energy fractures of the peripheral parts of the skeleton occur annually as a result of OP. 10% of the population 50 years and older have osteoporotic vertebral fractures. Osteoporosis in terms of prevalence takes 4th place, second only to cardiovascular pathology, oncopathology and diabetes mellitus [2,4].

The medical and social prevalence of this disease is determined by fractures of the skeleton of different localization. The most severe of which are compression fractures of the vertebral bodies, as well as fractures of the proximal femur.

Untimely medical assistance rendered to this category of patients leads to an increase in mortality within 2 years. The study of OP requires, on the one hand, more detailed studies of the causes of disease development, on the other hand, the purposeful and rational use of therapeutic and preventive measures aimed at preventing its development and progression [3].

Conducted comprehensive studies of OP problems, allowed to detail not only the pathogenetic mechanisms of the disease, but also to develop algorithms for the management of this category of patients.

Over the past 10 years, the possibilities of conservative treatment of OP have expanded with the advent of new osteoporotic drugs that affect different parts of the pathogenesis of the disease. However, the problems associated with the early diagnosis of OP and the appointment of timely comprehensive treatment for this disease have not been completely resolved.

Active prophylaxis and treatment of OP is known to improve bone metabolism and reduce the incidence of fractures.

In this regard, the main objective of the treatment of OP is to normalize the process of bone remodeling. First of all, the suppression of increased bone resorption and the stimulation of reduced bone formation, which leads to an increase in BMD or, at least, to its stabilization, improve bone quality and reduce the frequency of fractures. Clinically, this is manifested by a decrease in pain, an expansion of motor activity, and an improvement in the quality of life [5].

Currently, there are a number of anti-osteoporotic drugs that inhibit bone resorption (bisphosphonates, denosumab, selective modulators of estrogen receptors, as well as drugs with anabolic effects, and the first representative of this class, registered in our country, was Teriparatide (Forsteo, Eli Lilly, USA) [5].

In addition, vitamin D and its active metabolites, calcium preparations, occupy a special place in the treatment of OP.

Teriparatide is a recombinant active fragment of the endogenous human parathyroid hormone, the only drug that significantly stimulates the formation of new bone tissue. Therapy with Teriparatide creates a positive balance of bone remodeling, as evidenced by a significant increase in the level of markers of bone formation during treatment, and to a lesser extent - markers of bone resorption. It is important to note that during Teriparatide therapy, the histological structure of the newly formed bone tissue corresponds to the profile of the young bone [5].

On June 29, 2013, a meeting of the expert council was held in Moscow on the use of the new anabolic drug Forsteo® (Teriparatide) in the treatment of osteoporosis (OP). The meeting was attended by leading Russian experts in the field of OP, including members of the Russian Osteoporosis Association. Contributing to the reduction of the pain syndrome associated with osteoporotic vertebral fractures, Teriparatide has a positive effect on the quality of life of patients [10]. A favorable safety profile of the drug is evidenced by the results of controlled and observational studies. The frequency of dropping out of the study due to adverse events was comparable in the Teriparatide and control groups (respectively, 6% of patients in each. The most common adverse events reported with Teriparatide were pain in the extremities ($\geq 10\%$), leg cramps, nausea, headache, dizziness (1 to 10%). Therapy is not associated with additional inconveniences, especially for elderly patients (time of admission, the need to maintain a vertical position for a long time after administration of the drug). In the Russian Federation, the following indications of Forsteo® (Teriparatide) were recorded: treatment of OP in postmenopausal women and treatment of primary OP or OP due to hypogonadism in men. Teriparatide is a solution for daily subcutaneous injection into the abdomen or thigh for 18 months. Available in pre-filled ready for use syringe pens for the period of 28 days. The drug is widely used worldwide, in 2012, Teriparatide was prescribed to the millionth patient. The unique mechanism of action of the drug, contributing to the formation of new bone tissue, the speed of the onset of the effect, and a significant reduction in the risk of fractures determined the clinical advantages of the drug in the treatment of severe OP [6].

Experts concluded that the advent of Teriparatide opens up additional possibilities in the treatment of severe OP and recommended its use as part of the registered indications in patients of the following groups:

- in patients with severe OP (≥ 1 vertebral fracture or proximal femur fracture, multiple repeated skeleton fractures) as a first-line therapy;
- in patients with the ineffectiveness of previous anti-osteoporotic therapy (new fractures that occurred during treatment and / or an ongoing decrease in BMD);
- in patients with intolerance to other drugs for the treatment of OP or if there are contraindications for their prescription.

Recent multicenter studies have shown the efficacy of teriparatide in patients with severe OP. VERO studies, which evaluated the incidence of new cases of vertebral fractures during treatment with teriparatide and resindronate were conducted. The results of the study showed that during treatment with teriparatide, the relative risk of new vertebral fractures decreased by 56%, clinical fractures - 52%, and was statistically significantly higher than with risendronate treatment [9].

The basic results of a large-scale study of ALAFOS, which is still ongoing in Russia, Asia and Latin America, led to the conclusion that treatment with Teriparatide gives a rapid increase in BMD and effectively reduces the risk of new vertebral fractures, but is characterized by the reversibility of the effect after treatment. The consecutive administration of Teriparatide, and then antiresorptive therapy, primarily bisphosphonates, gives a quick, pronounced and lasting effect to reduce the risk of fractures and the increase in BMD in patients with severe OP [11].

In this regard, further research is needed to evaluate the efficacy and safety of Teriparatide.

The main purpose of this study was to study the effect of Teriparatide therapy for 1 year on BMD of the spine, proximal femur and bone metabolism in patients with severe postmenopausal osteoporosis, as well as an estimation of the incidence of new fractures.

Materials and methods

The study included 30 women whose average age was (60 ± 6.0 years) with a disease duration of 10.0 ± 5.0 years. All patients had severe postmenopausal osteoporosis, complicated by multiple vertebral and nonvertebral fractures. The risk according to FRAX was more than 30% in the axial skeleton in all patients.

It should be noted that all patients included in the study previously received bisphosphonate therapy for more than 4 years (zoledronic acid, alendronate, denosumab). The complex therapy also included preparations of calcium (1000 mg/day) and vitamin D (400-1200 U/day).

Inclusion criteria:

- women aged 55 and over who have been postmenopausal for at least 2 years;
- with established postmenopausal osteoporosis (PMO), in the study of BMD - the detection of its decrease in the lumbar spine (L1-L4) and/or femoral neck by at least 2.5 standard deviations (SD).

Exclusion criteria:

- severe impaired liver or kidney function, diseases of the cardiovascular system in the stage of decompensation, HF III-IV stage, renal osteodystrophy, osteomalacia;
- any other cause of secondary osteoporosis, hyperparathyroidism, malabsorption syndrome
- malignant neoplasms within the previous 5 years;
- uncompensated hypothyroidism and hyperthyroidism;
- concomitant treatment with drugs that can affect bone metabolism or mineral metabolism: androgens, anabolic steroids, calcitonin, glucocorticoids, estrogens, during the previous 1-6 months (depending on the drug) before inclusion in the study.

Study design:

All patients signed written informed consent to participate in the study prior to inclusion in the study.

At the initial visit, the study drug was prescribed for 12 months with visits to the clinic after 3 months, 6 and 12 months. The studied drug Teriparatide was administered at a dose of 20 mg daily subcutaneously in the lower left or right abdomen or on the outside of the thigh using ready-to-use syringe pens. Patients were taught self-administration of the drug using syringe pens.

The effectiveness of therapy with Teriparatide was evaluated by a change in the following indicators: BMD of the lumbar spine, proximal femur; Quality of Life Questionnaire (SF-36) before and after 12 months of therapy, assessing the occurrence of new vertebral and non-vertebral fractures. The change in bone markers in response to therapy was assessed by blood levels of bone formation markers — the P1NP-terminal pro-collagen propeptide of type 1 before therapy and after 3 months.

The dynamics of the BMD was evaluated by dual energy X-ray absorptiometry using a “Prodigy” apparatus on bone densitometers using standardized BMD.

The safety assessment of the treatment was evaluated based on data on adverse events (AEs), clinically significant changes in vital signs, and laboratory test results. AEs were assessed by severity, association with the drug under study, and compliance with the criteria for a serious adverse event (SAE) according to generally accepted definitions.

In the course of the study, standard laboratory tests were performed to assess the safety of therapy (before, after 3 and 12 months of therapy), which included a general blood test, a general urinalysis, and a biochemical blood test (ALT, AST, creatinine, urea).

Statistical analysis was carried out using the statistical package “Statistics 13”.

Study Results: All patients included in the study had severe Osteoporosis with a high risk of new fractures. The average age of the patients was 60.0 ± 0.6 years, the duration of the disease was 10.0 ± 5.0 years. The level of BMD L1-L4 averaged -4.3 ± 0.6 SD, the proximal femur -3.3 ± 0.4 SD.

It is noteworthy that in all patients there were more than 1 vertebral fractures and non-vertebral fractures: in 3 (10%) patients, rib fractures, in 4 (13%) patients, proximal radial bone fractures, in 8 (26%) patients, fracture of the proximal femur (tab. 1).

Tab. 1
Initial characteristics of the group of patients included in the study

Qty	30 n
Average age, years	60,0±6,0
Disease duration, years	10,0±5,0
Average BMD (SD)	
• Lumbar	4,3±0,6
• Hip	3,0±0,4
Patients with > 1 vertebral fracture, n (%)	30 (100%)
Patients with> 1 non-vertebral fracture n (%):	
• Radial bone	4(13%)
• Forearm	6(20%)
• Rib	3(10%)
• Thigh	8(26%)
Therapy prior to n (%):	
• Bisphosphonates	29(96%)
• Denosumab	1(3%)
Blood serum calcium, mmol/l	2,5±0,3
25- hydroxyvitamin D, Ng/ml	36±0,7
P1NP Ng/m	65±0,4

As follows from Table 1, all patients were previously resistant to the bisphosphonate therapy - 29 people (96%) and denosumab -1 (3%). Moreover, initially all patients had a low level of vitamin D, while the calcium level was in the normal range.

Of the concomitant pathologies, 22 patients (73%) patients were diagnosed with diseases of the cardiovascular system (in 10-hypertension, in 12-IHD); 9 - diseases of the digestive system (8 - chronic gastritis, 1 - peptic ulcer, remission); 15 (50%) - diseases of the musculoskeletal system - Osteoarthritis of the knee joints 2-3 stages.

The primary goal of our study was to assess the effect of Teriparatide on L1-L4 BMD after a 12-month course of treatment. The results showed an increase in BMD L1-L4 after 12 months of therapy with Teriparatide from -4.3 ± 0.6 SD to -3.0 ± 0.3 SD (Fig. 1). The increase in this indicator was statistically significant ($p < 0.005$), which corresponded to an increase in IPC by 5%. There was also a statistically significant increase in BMD in the proximal femur from 3.0 ± 0.2 SD to 2.8 ± 0.1 ($p < 0.005$)

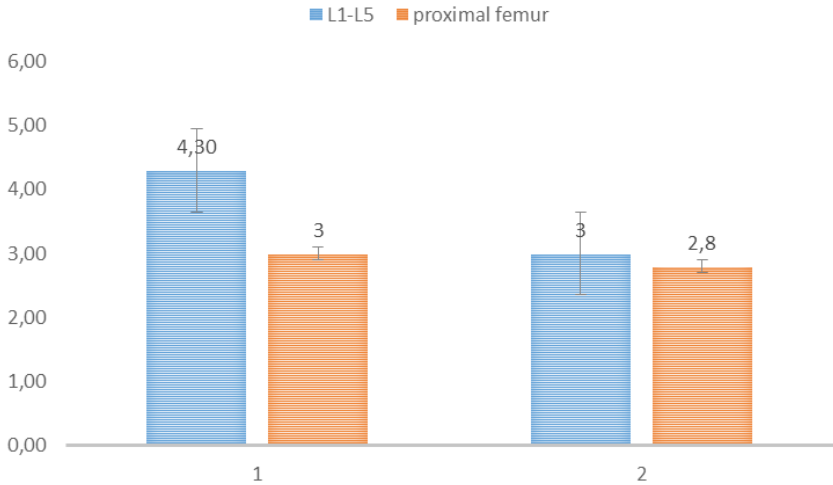


Fig. 1. Indices of BMD in patients treated with Teriparatide ($p < 0.005$, $n = 30$)

The overwhelming majority of patients received a response to treatment, that is, at the end of the course of treatment, the L1-L4 BMD increased by more than 5%, and only 1 patient showed no increase in BMD.

It should be noted that, against the background of Teriparatide therapy, all patients did not have new fractures during the year.

The use of biochemical markers of bone metabolism in the diagnosis and control of the treatment of osteoporosis is an important addition to densitometry. Unlike densitometry, which states the state of bone mineralization at the time of the study, biochemical markers make it possible to judge the speed and direction of bone metabolism processes..

We examined before therapy and after 3 months - a marker of bone tissue metabolism activity - the N-terminal pro-peptide collagen type 1 (P1NP). In our study, the P1NP level increased from 64 ± 0.6 to 158 ± 0.9 ng/ml and was statistically significant ($p < 0.001$) (Fig. 2). Thus, treatment with Teriparatide is accompanied by activation of bone formation processes, which is detected already in the early stages of treatment by determining markers of bone formation in blood serum.

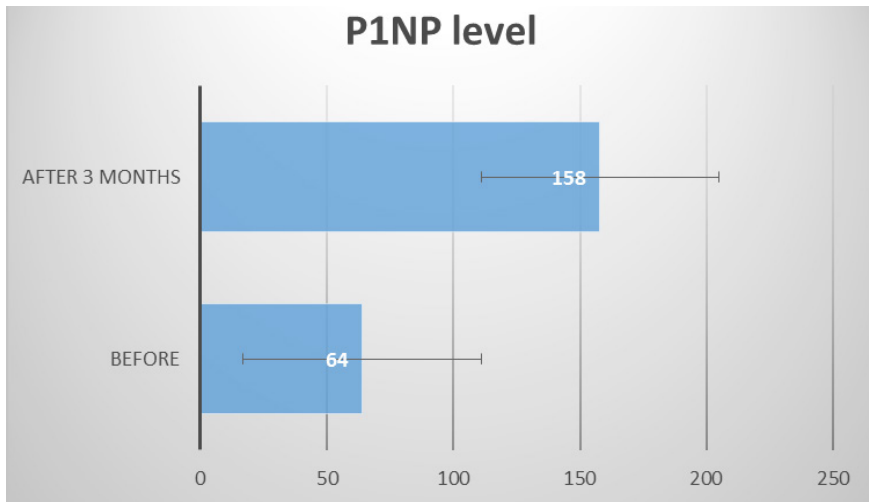


Fig. 2. Change in PINP level with Teriparatide therapy, $p < 0.001$

As a result of the therapy, by the age of 3 months, a statistically significant decrease in back pain was observed from 82 ± 3.5 cm to 53 ± 4.3 cm ($p < 0.005$) (Fig. 2), which was expressed in improving the quality of life of patients according to the SF-36 questionnaire (Fig. 3).

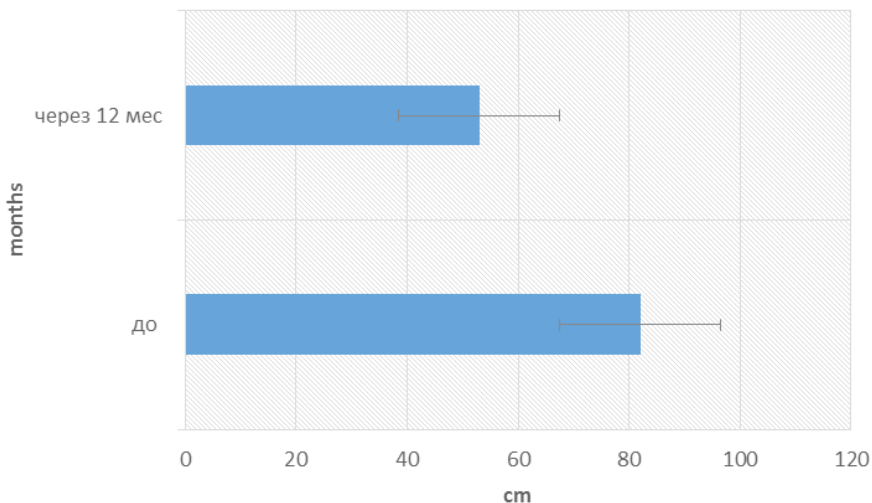


Fig. 2. Change in back pain from baseline ($p < 0.001$, $n = 30$)

An analysis of the data showed that there are improvements in various indicators of the quality of life (reduction of pain and discomfort associated with osteoporosis, increased activity during daily tasks, and patients' overall health status) from the initial level from 1.95 to 12 months of therapy to 1.01 ($p < 0.05$) (Fig. 3).

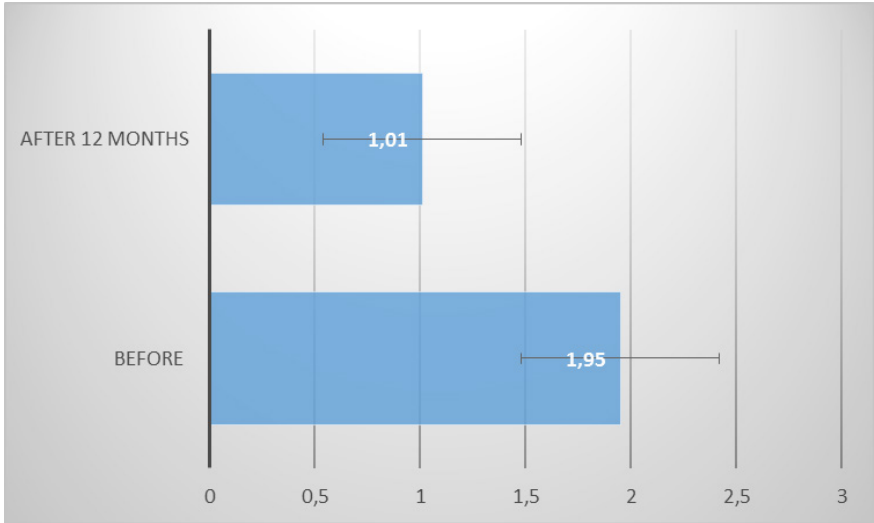


Fig. 3 SF-36 indices, $p < 0.005$

Safety of investigational drug therapy

The population for safety analysis included data from all 30 (100%) patients included in the study. During treatment with the test drug, the following adverse events (AE) were recorded: 6 patients experienced dizziness, which decreased with the administration of the drug in the evening. 3 - nausea, which decreased by the 2nd month of therapy. A 1-instance reaction in the form of limited erythema, which took place 1 hour after injection. All adverse events did not require discontinuation of the drug.

As a result of the analysis, we can draw the following conclusions:

Daily injections of 20 mcg Teriparatide for 12 months in women with postmenopausal osteoporosis increase BMD in the lumbar spine by 5% without significant changes in this indicator in the femoral neck and entire femur. It should be noted that as a result of the therapy in patients with severe Osteoporosis, no new fractures were noted. Teriparatide treatment helps to reduce back pain, which leads to an improvement in the quality of life of patients with postmenopausal osteoporosis. The drug has good tolerance.

References

1. Evstigneeva L.P., Solodovnikov A.G., Ershova O.B., Belova K.Yu., Zotkin E.G., Chernova T.O., Smirnov A.V., Skripnikova I.A., Poddubskaya E.A., Kosmatova O.V., Novikov V.E., Smirnov A.V., Ermakova I.P., Pronchenko I.A., Zotkin E.G., Toroptsova N.V., Baranova I.A., Anikin S.G., Marchenkova L.A., Kryukova I.V., Zazerskaya I.E., Konovalova V.N., Kuznetsova L.V., Estimator V.P., Yureneva S.V., White SAME, Rozhinskaya L.A., Baranova I.A., Dydykina I.S., Lesnyak O.M., Benevolenskaya L.E. *Osteoporosis. Diagnosis, prevention and treatment* Moscow, 2016, *Clinical recommendations (Third edition, revised and updated)*.
2. Curran D¹, Maravic M, Kiefer P, Tochon V, Fardellone P. *Epidemiology of osteoporosis-related fractures in France: a literature review*. *Joint Bone Spine*. 2010 Dec;77(6):546-51.
3. Dennison E¹, Cole Z, Cooper C. *Diagnosis and epidemiology of osteoporosis*. *Curr Opin Rheumatol*. 2005 Jul;17(4):456-61.
4. Middleton RG¹, Shabani F, Uzoigwe CE, Shoaib A, Moqith M, Venkatesan M. *FRAX and the assessment of the risk of developing a fragility fracture*. *J Bone Joint Surg Br*. 2012 Oct;94(10):1313-20.
5. Miller PD. *Management of severe osteoporosis*. *Expert Opin Pharmacother*. 2016;17(4):473-88. 23.
6. Lesnyak O. M. *Russian expert council on the use of the innovative anabolic drug Forsteo® (teriparatide) in the treatment of severe osteoporosis / O. M. Lesnyak // Sovrem. rheumatology. - 2013. - P. 76–78*.
7. *Teriparatide and denosumab, alone or combined, in women with postmenopausal osteoporosis: the DATA study randomised trial / J. N. Tsai [et al.] // Lancet. — 2013. — Vol. 382. — P. 50–56*.
8. *Literature review: The effects of teriparatide therapy at the hip in patients with osteoporosis / E. F. Eriksen [et al.] // Bone. — 2014. — Vol. 67. — P. 246–256*.
9. Kendler, DL, Marin, F, Zerbini, CAF, et al. *Effects of teriparatide and risedronate on new fractures in postmenopausal women with severe osteoporosis (VERO): a multicentre, double-blind, double-dummy, randomised controlled trial*. *Lancet*. 2018; 391: 230–40.
10. Watts, NB, Josse, RG, Hamdy, RC, et al. *Risedronate prevents new vertebral fractures in postmenopausal women at high risk*. *J Clin Endocrinol Metab*. 2003; 88(2): 542–49.
11. Chen C-H, et al. *Study description and baseline characteristics of the population enrolled in a multinational, observational study of teriparatide in postmenopausal women with osteoporosis: the Asia and Latin America Fracture Observational Study (ALAFOS)*. *Curr Med Res Opin*. 2018;1–9.

12. Belaya Zh.E., Rozhinskaya L.Ya. "Possibilities of using parathyroid hormone for the treatment of osteoporosis" *J. Osteoporosis and Osteopathy*, 2004, No. 3, P. 26–33.

13. Robling AG, Kedlaya R, Ellis SN, Childress PJ, Bidwell JP, Bellido T, et.al. Anabolic and catabolic regimens of human parathyroid hormone 1-34 elicit bone- and envelop-specific attenuation of skeletal effects in SOST-deficient mice. *Endocrinology*, 2011, Vol. 152, pp. 2963–2975.

14. Fei Y, Hurley MM.: Role of fibroblast growth factor 2 and Wnt signaling in anabolic effects of parathyroid on bone formation.// *J. Cell Physiol*, 2012, Vol. 227, pp. 3539–3545.

15. Kanis J.A, McCloskey EV, Johansson H, Cooper C, Rizolli R, Reginster R, on behalf of the Scientific Advisory Board of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) and the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF).: European guidance for the diagnosis and management of osteoporosis in postmenopausal women.// *Osteoporosis International*, 2013, Vol. 24, pp. 23–57.

16. Watts NB, Bilezikian JP, Camacho PM, Greenspan SL, Harris ST, Hodgson SF, Kleerekoper M, Luckey MM, McClung MR, Pollack RP, Petak SM.: American Association of clinical endocrinologists medical guidelines for clinical practice for the diagnosis and treatment of postmenopausal osteoporosis.// *Endocrine Practice*, 2010, Vol. 16, suppl 3, pp. 1–37.

高血压心房颤动合并腹部肥胖：一些表型和遗传特征
**ATRIAL FIBRILLATION IN HYPERTENSION IN COMBINATION
WITH ABDOMINAL OBESITY: SOME PHENOTYPIC AND
GENETIC FEATURES**

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抽象。评价心房颤动过程的特征以及CSK和rs2200733基因多态性rs1378942与动脉高血压和腹部肥胖患者的关联材料和方法。在一项观察性队列研究中，观察到116名年龄在45–65岁的男性。其中，57例AF，AH和AO患者，对照组59例AF，AH和无AO。本文评估了临床，人体测量和实验室参数，仪器诊断结果：超声心动图（ECHO-KG “Acuson Aspen”（美国），心电图的每日监测（Holter系统“SCHILLER Medilog”）。测试CSK基因rs1378942和rs2200733的多态性使用染色体4q25进行PCR（聚合酶链式反应），然后分析RFLP（限制性片段长度多态性）。所有统计计算均在Rstudio程序中进行（版本0.99.879 - ©2009–2016 RStudio, Inc., USA结果：当比较染色体4q25的不同基因型rs2200733的携带者亚组的体重指数的平均水平时，证明基因型CC的携带者具有最高的体重指数（ $p < 0.05$ ）。当评估左侧时脑室心肌质量指数与CSK基因的rs1378942和染色体4q25的rs2200733，两组的左心室心肌质量指数相当的增加，并且当比较基因型时，与AS和CC相比，发现AS基因型的显著优势（ $p < 0.003$ ）。在染色体4q25的SNP rs2200733中，观察到CC基因型系列中的指数的增加，而不管AO的存在，但是在具有AO的组中，注意到ST基因型系列中的指数的增加。与没有AO- $193.8 \pm 0.8 \text{ g} / \text{m}^2$ 的组相比，AO患者左心室心肌质量指数的降低为 $145.6 \pm 3.5 \text{ g} / \text{m}^2$ （ $p < 0.05$ ）。事实证明，在AO组中，心房颤动的发生率比没有腹部肥胖的组多出2.57倍（ $p < 0.003$ ）。结论。尽管有样本限制，但我们的研究为现有

数据增加了材料，这些数据有助于评估动脉高血压和腹部肥胖患者心房颤动进展的预后。更大的研究将通过确定评估病原体治疗有效性的额外标准和靶向治疗的可能性，提出预测动脉高血压和腹部肥胖患者心房颤动的发展和进展的可能性。

关键词：心房颤动，高血压，肥胖，CSK基因rs1378942多态性，rs2200733染色体4q25

Abstract. *To evaluate the features of the course of atrial fibrillation and the association of the CSK and rs2200733 gene polymorphisms rs1378942 in patients with arterial hypertension and abdominal obesity* **Material and methods.** *In an observational cohort study, 116 men aged 45-65 years were observed. Of these, 57 patients with AF, AH and AO, and a control group of 59 patients with AF, AH and without AO. The paper evaluated clinical, anthropometric and laboratory parameters, the results of instrumental diagnostics: echocardiography (ECHO-KG “Acuson Aspen” (USA), daily monitoring of ECG (Holter system “SCHILLER Medilog”). Testing polymorphism rs1378942 of CSK gene and rs2200733 using chromosome 4q25 was carried out using PCR (polymerase chain reaction) followed by analysis of RFLP (restriction fragment length polymorphism). All statistical calculations were performed in the Rstudio program (version 0.99.879 - © 2009-2016 RStudio, Inc., USA). Results.* *When comparing the average level of body mass index in subgroups of carriers of different genotypes rs2200733 of chromosome 4q25, it was proved that carriers of the genotype CC have the highest body mass index ($p < 0.05$). When assessing the left ventricular myocardial mass index with rs1378942 of the CSK gene and rs2200733 of chromosome 4q25, a comparable increase in the left ventricular myocardial mass index was found in both groups, and when comparing genotypes, a significant advantage of the AS genotype was found ($p < 0.003$) compared with AS and CC. In SNP rs2200733 of chromosome 4q25, an increase in the index in the series of the CC genotype is observed, regardless of the presence of AO, but in the group with AO, an increase in the index in the series of the ST genotype is noted. A decrease in the left ventricular myocardial mass index in patients with AO was found to be $145.6 \pm 3.5 \text{ g / m}^2$, compared with the group without AO - $193.8 \pm 0.8 \text{ g / m}^2$ ($p < 0.05$). It was proved that in the group with AO, the progression of atrial fibrillation occurred 2.57 times more often than in the group without abdominal obesity ($p < 0.003$). Conclusion.* *Despite sampling limitations, our study adds material to existing data that contributes to the prognostic assessment of the progression of atrial fibrillation in patients with arterial hypertension and abdominal obesity. Larger studies will present the possibility of predicting the development and progression of atrial fibrillation in patients with arterial hypertension and abdominal obesity by determining additional criteria for evaluating the effectiveness of pathogenetic therapy and the possibility of targeted treatment.*

Keywords: atrial fibrillation, hypertension, obesity, rs1378942 polymorphism of the CSK gene, rs2200733 chromosome 4q25

Atrial fibrillation (AF) is the most common of persistent arrhythmias, which has a close relationship with age. [1]. Over the past 20 years, there has been a twofold increase in the incidence of AF among the male population, and the hospitalization of patients with AF has increased by 66%. The reasons for this growth are ambiguous and not quite clear, among the possible ones are the increase in the proportion of elderly people in society, an improvement in the diagnosis of AF at the outpatient stage, an increase in the number of survivors after acute myocardial infarction (MI), etc. [2,3]. It is important that the tendency to increase the frequency of arrhythmias does not disappear, and moreover, the tendency to progression increases. It is predicted that the number of people with this arrhythmia in the United States will increase from 2.5 million in the early 2000s. up to 15 million in 2050 [4].

To date, there are many clinical studies devoted to the study of risk factors for the occurrence of AF, including the main factor AH, which contributes to ventricular hypertrophy and atrial dystrophy [4]. AO is one of the important risk factors for AH and contributes to structural and functional myocardial rearrangements, known to us under the name “lipotoxicity phenomenon” [5]. Lipotoxicity involves the accumulation of blood plasma triglycerides in the myocardium and leads to myocardial steatosis. Thus, with obesity, cardiac cavity dilatation is formed. Consequently, both AH and AO contribute to myocardial dysfunction, the development of electrical instability and the appearance of AF, and with irrational management even a progression to a chronic form.

With new discoveries in the field of genetics, the group of idiopathic AF becomes smaller each time. Most often, genetic AF is autosomal dominant, due to impaired functioning of various potassium channels in phase 3. Less commonly, AF can be autosomal recessive or sex-linked - if sodium channels are damaged. AF forms with mutations in many genes are also known - familial polygenic atrial fibrillation [6].

Genetic AF may be associated with structural genetic cardiomyopathies such as family dilated cardiomyopathy, hypertrophic cardiomyopathy, idiopathic restrictive cardiomyopathy, arrhythmogenic right ventricular dysplasia, and also with unclassified diseases [7, 8].

Several large studies have studied the effect of *rs1378942* polymorphism of the *CSK* gene on the development of various pathological processes [9]. Studies conducted in populations of Japan, East Asia, and Europe revealed an association of the *CSK* gene *rs1378942* polymorphism with the development of EH and AF [10]. The role of this *CSK* gene polymorphism in the formation of EH has also been confirmed in the Russian Federation [11]. The important role of *rs1378942* polymorphisms of the *CSK* gene and *rs2200733* of chromosome 4q25 in the occurrence of vascular dysfunction in patients with AO has been identified [12]. However, there are no studies that link the pathogenetic causes of AF, AH, and AO.

Purpose. To evaluate the features of the course of atrial fibrillation and the association of polymorphisms rs1378942 of the CSK gene and rs2200733 (xp 4q25) in patients with arterial hypertension in combination with abdominal obesity.

Material and methods. In an observational cohort study, 116 men aged 45-65 years were observed. Of these, 57 patients with AF (paroxysmal and persistent form), AH (stage II) and AO and a control group of 59 patients with AF, AH and without AO. The diagnosis of AF is based on documented episodes of this arrhythmia according to electrocardiography (ECG). The AF form is defined according to the National Guidelines for the diagnosis and treatment of atrial fibrillation (RKO / VNOA / ACCX, 2017). Arterial hypertension was diagnosed in accordance with the clinical recommendations of ACC / AHA, 2017. Abdominal (AO) was verified on the basis of the body mass index (BMI) (25.00-29.99 kg / m² - excess BMI and BMI \geq 30 kg / m² - obesity) the use of AHA / ACC / TOS, 2014 is recommend). Exclusion criteria: CKD, pathology of the liver and lungs with impaired function, thyroid disease, strokes, coronary heart disease. The paper evaluated clinical, anthropometric and laboratory parameters, the results of instrumental diagnostics: echocardiography (ECHO-KG “Acuson Aspen” (USA), daily ECG monitoring (Holter system “SCHILLER Medilog”). To characterize the structural and functional adjustment, the left myocardial ventricle mass index was calculated. In the first method, the left ventricular myocardial mass index was calculated as the ratio of the left ventricular myocardial mass to the body surface area. The surface area of the body is calculated by the Du Bois formula: BSA(m²) = 0,007184 x height 0,725 (m) x body mass 0,425(kg); where 0,007184— empirically found constant coefficient. Left ventricular hypertrophy was diagnosed with a left ventricular myocardial mass index > 134 g / m² for men and 110 g/m² for women. The polymorphism rs1378942 of the CSK gene and rs2200733 of the 4q25 chromosome was tested using PCR (polymerase chain reaction) followed by RFLP analysis (restriction fragment length polymorphism).

Statistical analysis. Empirical data distributions were tested in accordance with the law of normal distribution according to Shapiro-Wilk criteria. To compare binary and categorical indicators, Fisher's exact two-sided criterion was used. Statistical hypotheses were tested at a critical significance level of $p = 0.05$, i.e. the difference was considered statistically significant if $p < 0.05$. The lower limit of the evidence power was taken equal to 80%. All statistical calculations were carried out in the program Rstudio (version 0.99.879 – © 2009-2016 RStudio, Inc., USA, 250 Northern Ave, Boston, MA 02210 844-448-121, info@rstudio.com)

Results and discussion.

The average age of all studied patients was 53.3 ± 7.1 years. When dividing patients with AF and AH into groups based on the presence / absence of AO, it turned out that in the subgroups of carriers of different genotypes of the CSK gene

rs1378942 polymorphism (Table 1), there were significant differences in the average BMI level. In the group with normal BMI, an increase in the indicator in the series of CC, AC, AA genotypes is observed. The highest BMI value for carriers of the CC genotype in the group AF + AH + AO, the data are statistically significant ($p < 0.05$).

Table 1.

Average BMI levels in carriers of different genotypes of the CSK gene rs1378942 polymorphism with normal BMI and AO

Variables	Normal BMI n = 57	AO n = 59	Fisher exact two-sided criterion, p level
CC	50%	69%	<0.05*
AA	6,23%	24,17%	
AC	4%	5%	

Note: ‘*’ stands for statistically significantly different indicators.

When comparing the average BMI level in subgroups of carriers of different genotypes of rs2200733, it was shown that the highest BMI was observed in the group of patients with AO in carriers of the CC genotype, significance level ($p > 0.007$) (Table 2).

Table 2.

Average BMI levels in carriers of different genotypes of rs2200733 polymorphism with normal BMI and AO

Variables	Normal BMI n = 57	AO n = 59	Fisher exact two-sided criterion, p level
CC	45%	65%	0.007*
CT	34%	54%	
TT	1%	1%	

Note: ‘*’ stands for statistically significantly different indicators.

The study proved that in the group of patients with AF, AH and AO, when compared with the control group, an increase in the frequency of the AA genotype was noted (24.17% versus 6.23%, $p = 0.05$).

A decrease in LVMI in patients with AO was found to be $145.6 \pm 3.5 \text{ g/m}^2$, compared with the group without AO - $193.8 \pm 0.8 \text{ g/m}^2$, ($p < 0.050$). The results of new studies show that overweight sometimes has protective properties, in particular, it reduces mortality from cardiovascular causes [12]. A multivariate analysis revealed that mortality was lower among patients with overweight and AO, but significantly higher among patients with low BMI compared with patients with normal BMI [13]. Perhaps this is a "paradox of obesity" [14]. Lowering LVMI

in patients with AO may be associated with metabolic processes that can slow compensatory muscle myocardial hypertrophy. As a result of correlation analysis, a positive relationship was found between BMI and LVMI [15,16]. As shown by experimental and clinical studies, the presence of increased body weight can affect the increase of LVMI [17,18]. According to the results of our study, which showed that patients with AF and AH are characterized by higher LVMI and a deterioration in its contractile function, which is the cause of myocardial electrical instability and the development of AF, no significant difference in AO was detected. The association of LVMI with a SNP marker rs1378942 in the CSK gene was evaluated. In the general group of patients, the highest level of LVMI was found in carriers of the AS genotype compared to carriers of two other genotypes ($p < 0.003$). However, when comparing groups with AO and without AO in terms of LVMI in carriers of different genotypes, no significant differences were obtained ($p < 0.62$) (Fig. 1).

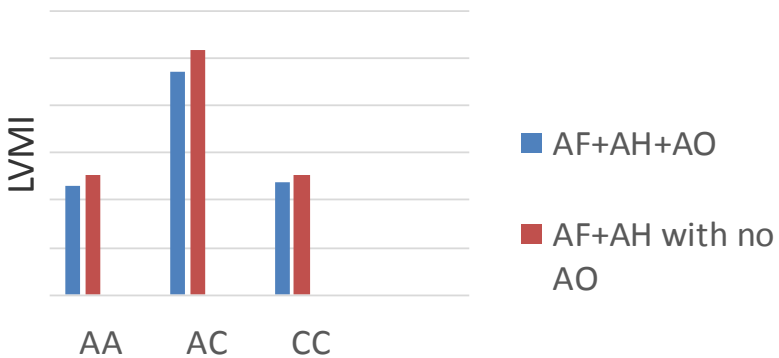


Figure 1. LVMI in carriers of the rs1378942 genotypes in the CSK gene in the group of patients with AF and AH with AO and without AO

When assessing the association of LVMI with SNP rs2200733, it turned out that the highest LVMI in both groups was in carriers of the CC genotype (Fig. 2). In the group with AO, the difference between carriers of the two genotypes is insignificant, while in the group without AO there is a tendency to increase LVMI in the series of TT, CT, and CC genotypes.

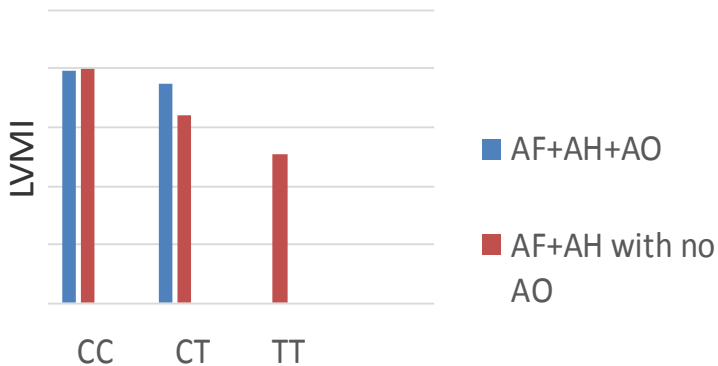


Figure 2. LVMI in carriers of rs2200733 polymorphism genotypes in the group of AF and AH patients with and without AO

When assessing the progression of AF within 12 months, it was revealed that in the group with AF + AH + AO, the transformation of the paroxysmal form of AF into chronic AF occurred 2.57 times more often than in the group without AO ($p < 0.003$)

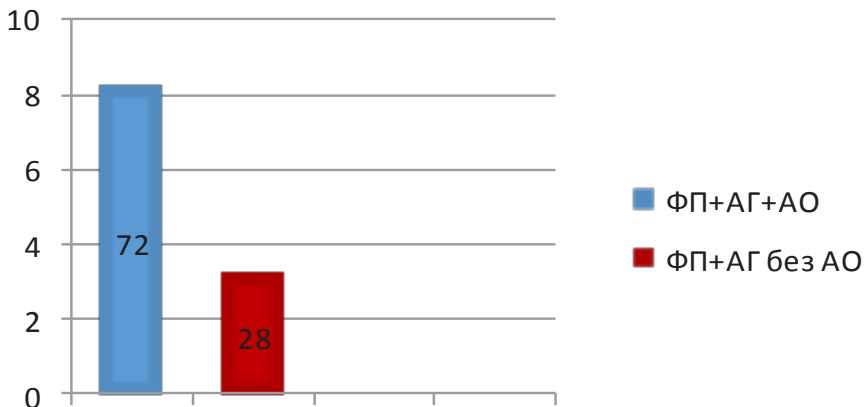


Fig 2. AF progression in patients with AF and AH with and without AO

Conclusion

In the present study, it was first revealed that in men with AF and AH SNPs rs1378942 of the CSK gene and rs2200733, chromosomes 4q25 are associated with BMI and LVMI. The heterozygous AC rs1378942 genotype in the CSK gene is significantly more common in patients with atrial fibrillation and arterial hypertension, regardless of the presence of abdominal obesity. It was proved that in the group with AO, AF progression occurred 2.57 times more often than patients without AO.

Despite sample selection limitations, our study adds material to existing data that contributes to the prognostic assessment of the progression of atrial fibrillation in patients with arterial hypertension and abdominal obesity. Larger studies will present the possibility of predicting the development and progression of atrial fibrillation in patients with arterial hypertension and abdominal obesity by determining additional criteria for evaluating the effectiveness of pathogenetic therapy and the possibility of targeted treatment.

References

1. Heeringa J., Hoogendoorn E., Van der Deure W. et al. High-normal thyroid function and risk of atrial fibrillation the Rotterdam Study // *Arch. Intern. Med.* 2008; 168 (20): 2219–24. DOI:10.1001/archinte.168.20.2219.
2. Belluzzi F., Sernesi L., Preti P. et al. Prevention of recurrence lone atrial fibrillation by the angiotensin II converting Enzyme inhibitor ramiprillin in normotensive patients // *JACC.* 2009; 53:24–9. DOI: 10.1016/j.jacc.2008.08.071
3. Boss Ch., Lip G. Targeting the renin-angiotensin-aldosterone system in atrial fibrillation: from pathology to clinical trials // *J. Hum. Hypertens.* – 2005; 19: 855–9. DOI:10.1038/jhh.2014.125
4. Lip G., Coca A. A consensus document from the European Heart Rhythm Association (EHRA) and European Society of Cardiology (ESC) Council on Hypertension, endorsed by the Heart Rhythm Society (HRS), Asia-Pacific Heart Rhythm Society (APHRS), and Sociedad Latinoamericana de Estimulación Cardíaca y Electrofisiología (SOLEACE), 2016
5. Ahmad T., Fiuzat M., Neely, B. et al. Biomarkers of myocardial stress and fibrosis as predictors of mode of death in patients with chronic heart failure // *JACC Heart Failure.* 2014;2(3):260–8. DOI: 10.1016/j.jchf.2013.12.004
6. Ertugrul D., Yavuz B., Ata N. et al. Decreasing brain natriuretic peptide levels after treatment for hyperthyroidism // *Endocr. J.* – 2009; 56 (9): 1043–8. DOI:10.1507/endocrj. K09E-159

7. Vasan R., Magnani J., Ellinor P. et al. *Galectin 3 and incident atrial fibrillation in the community* // *Am. Heart J.* 2014;167 (5):729–34. https://escholarship.umassmed.edu/umccts_pubs/17/

8. Ионин В.А., Листопад О.В., Нифонтов С.Е. и др. *Галектин-3 у пациентов с метаболическим синдромом и фибрилляцией предсердий // Артериальная гипертензия.* 2014; 5:101–8 [Ionin V.A., Listopad O.V., Nifontov S.E. et al. *Galectin-3 in patients with metabolic syndrome and atrial fibrillation // Arterial Hypertension J.*2014;5:101–8 (in Russ.)]. <https://doi.org/10.18705/1607-419X-2014-20-5-462-469>

9. Mansourian A. *A review on cardiovascular diseases originated from subclinical hypothyroidism* // *Pak. J. Biol. Sci.* – 2012; 15 (2): 58–67.

10. Schmidt M., Schicha H. *Thyroid disorders* // *Versicherungsmedizin.* – 2011; 63 (4): 176–9.

11. Corvilain B. *Subclinical hyperthyroidism: from diagnosis to treatment.* *Rev. Med. Brux.* – 2012; 33 (4): 241–5.

12. Hen K., Czarnywojtek A., Stangierski A. et al. *Effect of amiodarone on the thyroid function and safety of the therapy – what's new* // *Przegl. Lek.* – 2012; 69 (10): 1135–9.

13. Collet T., Gussekloo J., Bauer D. et al. *Subclinical hyperthyroidism and the risk of coronary heart disease and mortality* // *Arch. Intern. Med.* – 2012; 172 (10): 799–809. DOI:10.1001/archinternmed.2012.402

14. Duntas L., Brenta G. *The effect of thyroid disorders on lipid levels and metabolism* // *Med. Clin. North Am.* 2012;96(2):269–81. DOI: 10.1016/j.mcna.2012.01.012

15. Ari H., Girdogan M., Erdogan E. et al. *Short-term outcome of early electrical cardioversion for atrial fibrillation in hyperthyroid versus euthyroid patients* // *Cardiol. J.* – 2012; 19 (1): 53–60.

16. Patane S., Marte F. *Revelation of changing axis deviation at the end of atrial fibrillation associated with endogenous subclinical hyperthyroidism* // *Sturiale Intern. J. Cardiol.* 2012;155 (1): 1- 4. DOI:10.1016/j.ijcard.2009.10.001

17. Shlyakhto EV, Ezhov AV et al. *Clinical portrait of a patient with atrial fibrillation in the Russian Federation. global register data gloria af. Russian Journal of Cardiology.* 2017; (9): 21-27. (Шляхто Е.В., Ежов А.В и др. *Клинический портрет пациента с фибрилляцией предсердий в российской федерации. данные глобального регистра GLORIA AF. Российский кардиологический журнал.* 2017;(9):21-27). <https://doi.org/10.15829/1560-4071-2017-9-138-142>

18. Unger RH, Scherer PE. *Gluttony, sloth and metabolic syndrome: a roadmap to lipotoxicity.* *ends Endocrinol. Metab.* 2010;21(6):345–352. doi: 10.1016/j.tem.2010.01.009

豆科植物的根瘤菌感染和活性氧 (ROS) 和氮 (RNS) 的参与
**RHIZOBIAL INFECTION OF A LEGUME PLANT AND
PARTICIPATION OF ACTIVE FORMS OF OXYGEN (ROS) AND
NITROGEN (RNS)**

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抽象。总结了ROS和RNS在豆科植物（豆科植物）和根瘤菌（Rhizobiaceae）的共生相互作用中的生理作用的文献资料。需要强调的是，基于信号分子（ $O_2\cdot^-$ ， H_2O_2 ，NO， Ca^{2+} ）作为系统信号的波传播，ROS和RNS作为受应激影响的植物的关键代谢物。膜NADPH氧化酶作为 $O_2\cdot^-$ ， H_2O_2 等信号分子的发生器起着特殊作用，影响其功能活性和NO和 Ca^{2+} 。提供一氧化氮（NO）-多功能信号分子作为RNS的代表特征。阐述了植物在其渗透初始阶段对病原菌和根瘤菌侵入的过程的相似性。考虑到 H_2O_2 和NO对豆科植物-根瘤菌共生形成的依赖性。提示细胞中NO， H_2O_2 ， $O_2\cdot^-$ 和ONOO $^-$ 的比例决定细胞的超敏感反应-在发病机制和共生相互作用中对植物极端因子的活性。

关键词：根瘤菌，豆科植物-根瘤菌共生，活性氧（ROS），活性氮（RNS），信号分子（ $O_2\cdot^-$ ， H_2O_2 ，NO， Ca^{2+} ）。

Abstract. *The literature data on the physiological role of ROS and RNS in the mutualistic interaction of legumes (Fabaceae) and nodule bacteria (Rhizobiaceae) are summarized. It is emphasized that ROS and RNS act as key metabolites in plants affected by stress based on the wave propagation of signal molecules ($O_2\cdot^-$, H_2O_2 , NO, Ca^{2+}) as a system signals. A special role is played by membrane NADPH oxidase as a generator of such signal molecules as $O_2\cdot^-$, H_2O_2 and affecting its functional activity and NO and Ca^{2+} . The nitric oxide (NO) – multifunctional signal molecule is provided characteristics as a representative of RNS. Similarity of the processes of*

plant resistance to invasion of pathogenic bacteria and rhizobia at the initial stages of their penetration is stated. Dependence of formation of the legume-rhizobial symbiosis on H_2O_2 and NO considered. It is suggested that the ratio of NO, H_2O_2 , $O_2^{\cdot-}$ and ONOO $^-$ in the cell determines the cell super-sensitive response – to the activity of extreme factors on plant both in the pathogenesis and in symbiotic interaction.

Keywords: *Rhizobium*, legume-rhizobial symbiosis, reactive oxygen species (ROS), reactive nitrogen species (RNS), signal molecules ($O_2^{\cdot-}$, H_2O_2 , NO, Ca^{2+}).

The symbiosis of legume plants (*Fabaceae*) with nodule bacteria (*Rhizobiaceae*) is a mutualistic interaction where both organisms take advantage: the plant in getting mineral nitrogen in the form of NH_3 , and the nodule bacteria in getting dicarboxylic acids necessary for their life in symbiotic formations (root nodules). At the initial stages of rhizobial invasion and in the case of regulation violation, legume-rhizobial symbiosis (LRS) is similar to the phytopathogenic system in the formation and development of which ROS and (RNS) – active radical and non-radical forms of oxygen and nitrogen – play an important role [1, 2].

ROS (H_2O_2 , $O_2^{\cdot-}$ and others) are key components in stress signaling of plants [3, 4]. A close interaction of ROS and calcium (Ca^{2+}) during a signal sending from cell to cell is noted [5, 6]. RNS which include nitric oxide (NO), a lipophilic molecule that diffuses readily through membranes, interact with ROS. NO is a multifunctional signaling molecule in plant, animal, and bacterial organisms that exerts both positive and negative effects on metabolism [7, 8]. NO is involved in the regulation of the remote transport of ROS and Ca^{2+} by affecting NADPH oxidase, the main regulator of the modulation of ROS waves in cells [1]. NO is now accepted to be formed in plants from several sources as compared to animal organisms where it is synthesized from arginine in the oxidative reaction catalyzed by the enzyme nitric oxide synthase (NO synthase). In particular, NO is synthesized in plants with the participation of nitrate- and nitrite-reductases, with an enzyme system similar to animal arginine-dependent NO synthase, and with other synthesis pathways [9, 10].

The possible role of ROS and RNS in LRS and arbuscular-mycorrhizal interaction is discussed in the literature and is associated not only with the loss of resistance of legumes to rhizobia invasion but with the necessity of these molecules for LRS formation and functioning, too [11, 12]. ROS and RNS formation during LRS development is the main factor in the similarity of the plant's early responses to infection with pathogens and symbiotrophs [12]. Thus, the functional activity of NADPH oxidase is believed to be one of the components of ROS formation regulation mechanism at the initial stages of pathogenesis and symbiosis [13, 14].

Hydrogen peroxide is necessary for the expression of the *rip1* gene which encodes the synthesis of early nodulin – peroxidase, and as a substrate for peroxidase which catalyzes the synthesis of lignin and callose to strengthen the cell wall from bacterial invasion. A decrease in peroxidase activity in the rhizobia-sensitive part of the root has been shown to contribute to rhizobia penetration into the root. Its increase in the resistant part of the root has a direct antibacterial effect aimed at preventing the systemic spread of rhizobia and protecting the root from excessive infection [15, 16].

ROS accumulation in the form of H_2O_2 и $O_2^{\cdot-}$ was found to occur in other organs of the host plant (in pea epicotyl) in response to inoculation with rhizobia [17, 18]. In this case, the macrosymbiont (host plant) is believed to develop “systemic induced resistance” which occurs in non-leguminous plants when they are infected with non-pathogenic microorganisms [19]. A similar resistance in a legume plant occurring in response to rhizobia introduction is probably aimed at preventing bacteria invasion into other organs and functions with the participation of the plant innate immune systems: MTI (MAMP-triggered immunity) and ETI (effector-triggered immunity) which respond to certain bacterial compounds by starting or stopping defense reactions [20].

The dependence of the formation and functioning of LRS on NO was viewed in a number of studies [11, 21]. Nitric oxide reacts with various biological compounds with the formation of molecules. Not unlike NO, these molecules have either toxicity or the properties of regulatory molecules. Thus, in the interaction of NO and $O_2^{\cdot-}$, peroxynitrite ($ONOO^-$), a more toxic compound than the NO molecule, is formed [22]. $ONOO^-$ can initiate tyrosine nitration of proteins that are found in various subcellular cell compartments: peroxisomes, chloroplasts, mitochondria, and cytosol [23]. In the presence of oxygen, nitric oxide reacts with reduced glutathione in the S-nitrosylation reaction to form S-nitrosoglutathione (GSNO). This compound is an important mobile reservoir of bioactive NO [24]. The presence of NO, GSNO, and $ONOO^-$ molecules in plant tissues is believed to be an important feature of post-translational modification of proteins under the influence of biotic and abiotic factors [25].

290 of 999 genes expressed under the influence of NO in alfalfa roots are involved in the development of a root nodule. That indicates the participation of NO in LRS formation [26]. According to Hichri et al. [27], NO functions as a multipurpose regulator involved in many mechanisms of the symbiotic process. In addition, NO interacts with other regulators of plant growth and development – phytohormones, ROS and others.

Thus, ROS and RNS play a key role in intracellular and extracellular relationships, but there is insufficient knowledge about ROS and RNS signaling initiation, sensory and responsive mechanisms, and the balance between the production of reactive oxygen and nitrogen forms and their neutralization, especially during LRS formation. Studying these issues in the formation of legume-rhizobial symbiosis is extremely important for understanding the local and systemic resistance of a legume plant to rhizobial infection as well as for their role in these processes [28].

References

1. Del Rio, L.A. (2015) *J. Exp. Bot.* 66, 2827-2837.
2. Turkan, I. (2018) *J. Exp. Bot.* 69, 3313-3315.
3. Baxter, A., Mittler, R., & Suzuki, N. (2014) *J. Exp. Bot.* 65, 1229-1240.
4. Kolupaev, Yu. E. & Karpets, Yu. V. (2014) *Ukr. Biochem. J.* 86, 18-35.
5. Glyan'ko, A. K. & Ischenko, A.A. (2010) *Appl. Biochem. Microbiol.* 46, 509-518.

6. Steihorst, L. & Kudla, J. (2013) *Plant Physiol.* 163, 471-485.
7. Glyan'ko, A.K., Mitanova, N.B. & Stepanov, A. V. (2010) *Bulletin Kharkiv Nat. Agrarian Univer. Series Biology.* 1(19), 6-20.
8. Castillo, M-C., Coego, A. & Costa-Broseta, A. (2018) *J. Exp. Bot.* 69, 5265-5278.
9. Guo, F.Q., Okamoto, M. & Crawford, N.M., (2003) *Science.* 32, 100-103.
10. Glyan'ko, A.K. (20013) *Biochemistry (Moskow).* 78, 471-476.
11. Puppo, A., Pauly, N., Boscari, A. et al. (2013) *Antioxidants Redox Signal.* 18, 2202-2219.
12. Deakin, W. J. & Broughton, W. J. (2009) *Nature Rev. Microbiol.* 7, 145-168.
13. Purrut, B., Percher, G., Silvestre, J. et al. (2008) *J. Plant Physiol.* 165, 571-579.
14. Montiel, J., Arthikala, M-K., Cardenas, L. & Quinto, C. (2016) *Inter. J. Mol. Sci.* 17, No 5: 680.
15. Glyan'ko, A. K., Akimova, G. P., Sokolova, M. G., et al. (2007) *Appl. Biochem. Microbiol.* 43, 289-27.
16. Catford, J.-G., Staehelin, C., Lerat, S. et al. (2003) *J. Exp. Bot.* 54, 1481-1487.
17. Vasil'eva, G. G., Glyan'ko, A.K. & Mironova, N. V. (2005) *Appl. Biochem. Microbiol.* 41, 547-550.
18. Vasil'eva, G. G., Glyan'ko, A.K., Mironova, N. V. et al. (2007) *Appl. Biochem. Microbiol.* 43, 217-221
19. Pieterse, M.J., van Wees, S.C.M., van Pelt, J.A. et al. (1998) *Plant Cell.* 10, 1571-1580.
20. Gourion, B., Berrabah, F., Rater, P. & Stacey, G. (2015) *Trends Plant Sci.* 20, 186-194.
21. Berger, A., Brouquisse, R., Pathak, P. K. et al. (2018) *Plant Cell Environ.* 41, 2057-2068.
22. Romero, N., Denicola, A. & Radi, R. (2006) *IUBMB Life.* 58, 572-580.
23. Barroso, J., Valderrama, R. & Corpas, F. J. (2013) *Acta Physiol. Plantarum.* 35, 26-35-2640.
24. Yu, M., Lamatina, L., Spoel, S.H. & Loake, G. J. (2014) *New Phytol.* 202, 1142-1156.
25. Corpas, F. J., del Rio, L. A. & Barroso, J. B. (2013) *Front. Plant Sci.* 4:29. DOI: 10.3389/fpls.2013.00029
26. Ferrarini, A., de Stefano, M., Baudouin, E. et al. (2008) *Mol. Plant Microbe Interact.* 21, 781-790.
27. Hichri, I., Boscari, A., Castella, C., et al. (2015) *J. Exp. Bot.* 66, 2877-2887.
28. Glyan'ko, A. K. & Ischenko, A. A. (2017) *Appl. Biochem. Microbiol.* 53, 140-148.

苯甲酰丙酮和二苯甲酰丙酮的溴衍生物的2,4-二硝基苯腙
**2,4-DINITROPHENYLHYDRAZONES OF BROMO DERIVATIVES
OF BENZALACETONE AND DIBENZALACETONE**

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抽象。在本文中，我们讨论苯并丙酮和二苯并丙酮衍生物与苯部分中的溴原子的物理化学性质的合成和研究的结果。这项工作的目的是开发合成方法和研究2,4-二硝基苯腙4-(4-溴苯基)丁烯-3-酮-2(苯甲酰丙酮衍生物)和1,5-双(4-溴苯基)戊二烯的性质-1,4-一-3(二苯并丙酮衍生物)。这项工作的相关性取决于寻找创造具有潜在有价值特性的新有机材料的方法。在研究的第一阶段，利用量子化学的方法，观察了所研究化合物的几何和电子结构，揭示了原子空间排列和分子中电子密度分布的特征。计算上述酮的2,4-二硝基苯腙形成反应的热效应，两个反应都是放热的。然后进行了化合物的合成，研究了一些因素对反应过程的影响。根据实验结果，建议在盐酸存在下在热水 - 醇溶液中进行合成。合成的化合物是橙色固体，易溶于DMF和丙酮。为了控制产物的纯度，使用薄层色谱法。测定化合物的熔点。在光谱研究阶段，获得物质的振动光谱，确定主要特征谱带，并使用公布的数据进行分配。

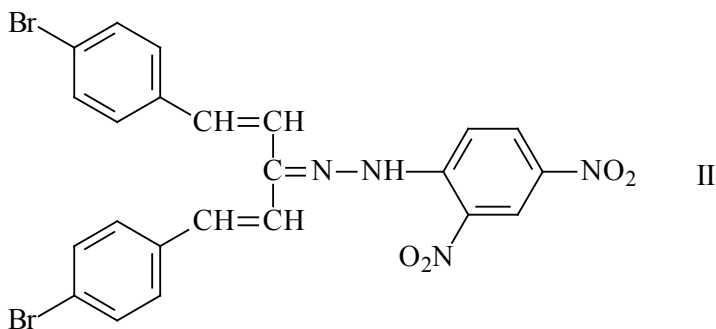
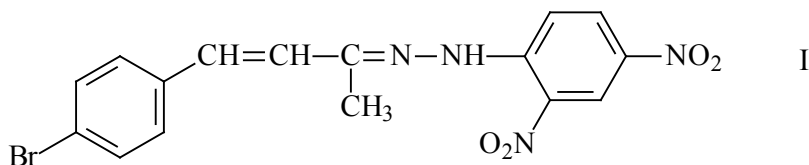
关键词：苯甲酰丙酮，二苯甲酰丙酮，溴衍生物，2,4-二硝基苯腙，量子化学方法，几何和电子结构，红外傅立叶光谱，特征谱带

Abstract. *In this paper, we discuss the results of studies on the synthesis and study of the physicochemical properties of benzalacetone and dibenzalacetone derivatives with bromine atoms in benzene moieties. The aim of the work is to develop synthesis methods and study the properties of 2,4-dinitrophenylhydrazones 4-(4-bromophenyl) buten-3-one-2 (benzalacetone derivative) and 1,5-bis(4-bromophenyl) pentadiene-1,4- one-3 (dibenzalacetone derivative). The relevance of the work is dictated by the search for ways to create new organic materials with potentially valuable properties. At the first stage of the study, using the methods of quantum chemistry, the geometric and electronic structures of the compounds under study were observed, and features of the spatial arrangement of atoms and the distribution of electron density in molecules were revealed. The thermal effects of*

the reactions of the formation of 2,4-dinitrophenylhydrazones of the above ketones were calculated, both reactions are exothermic. Then the synthesis of compounds was carried out, the influence of some factors on the course of reactions was studied. According to the results of the experiments, it was proposed to carry out the synthesis in a hot water-alcohol solution in the presence of hydrochloric acid. The synthesized compounds are orange solids that are readily soluble in DMF and acetone. To control the purity of the products, thin layer chromatography was used. The melting points of the compounds are determined. At the stage of spectral studies, vibrational spectra of substances were obtained, the main characteristic bands were identified, and their assignment was carried out using published data.

Keywords: benzalacetone, dibenzalacetone, bromine derivative, 2,4-dinitrophenylhydrazone, quantum chemistry methods, geometric and electronic structure, IR Fourier spectrometry, characteristic bands

Currently, much attention is paid to the synthesis and study of the properties of 2,4-dinitrophenylhydrazones of carbonyl compounds. They are widely used for identification and quantification of aldehydes and ketones [1,2], for synthetic purposes [3-6]. Their physicochemical properties are also being actively studied [7-10].



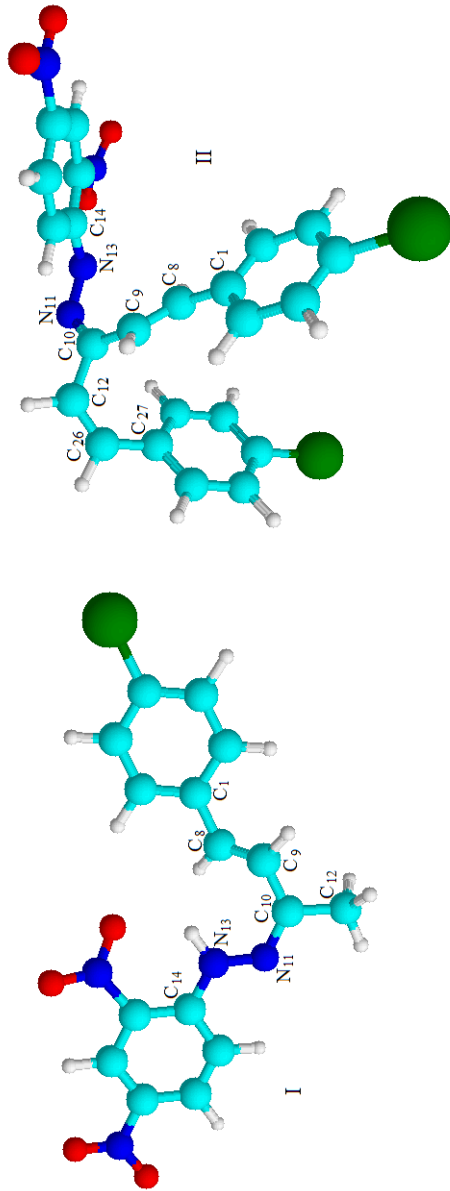


Fig. 1 3D models of molecules of compounds (I) and (II)

The presented work is a continuation of studies of 2,4-dinitrophenylhydrazones derivatives of benzalacetone [11]. As the objects of study, 2,4-dinitrophenylhydrazones 4- (4-bromophenyl) buten-3-one-2 (I) and 1,5-bis (4-bromophenyl) pentadiene-1,4-one-3 (II) were selected. The purpose of the work involves the development of methods for the synthesis and purification of compounds (I), (II) and the study of some of their physicochemical properties.

The research included several stages: theoretical study of the geometric and electronic structure of molecules, synthesis of compounds and practical study of a number of their physicochemical properties. At the first stage of the work, quantum chemical calculations of molecules (I), (II) were performed using semiempirical methods. Based on the calculation results, 3D models are presented, shown in fig. 1. From fig. 1 it is apparent that the chains connecting the benzene moieties have spatial distortions. This is evidenced by the values of valence angles given in tab. 1.

The electronic parameters of the molecules are also calculated. The tab. 2 shows the charges on the atoms in the chains connecting the benzene moieties, and fig. 2 - distribution of electron density in molecules.

Table 1 - Valence angles in molecules (I) and (II)

Valence angle	Value,	
	Compound I	Compound II
$C_{14}-N_{13}-N_{11}$	121,9	125,6
$N_{13}-N_{11}-C_{10}$	121,4	123,8
$N_{11}-C_{10}-C_{12}$	118,4	116,9
$C_{12}-C_{10}-C_9$	113,3	114,1
$N_{11}-C_{10}-C_9$	128,3	128,9
$C_{10}-C_9-C_8$	124,6	123,2
$C_9-C_8-C_1$	123,9	124,7
$C_{10}-C_{12}-C_{26}$	-	126,8
$C_{12}-C_{26}-C_{27}$	-	128,1

The data in tab. 2 show clear differences in charges for molecules (I) and (II). It can be seen from fig. 2 that the electron density in the molecule (I) is distributed more evenly throughout the structure, while in the molecule (II) the distribution of electron density is uneven. An explanation of this phenomenon can serve as a more planar structure of the molecule (I). It was also found that the energy parameters of the molecules are significantly different, but the dipole moments are almost equal (Table 3).

From the calculated values of the heats of formation of the initial and final products, the thermal effects of the synthesis reactions were determined, amounting to -84.1 kJ/mol (for compound I) and -62.8 kJ/mol (for compound II). Thus, the formation reactions of both compounds are exothermic.

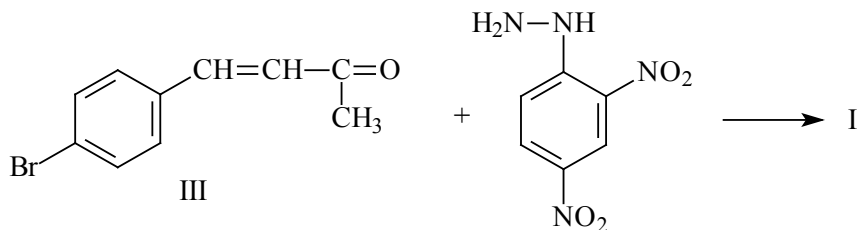
Table 2 - Atom charges

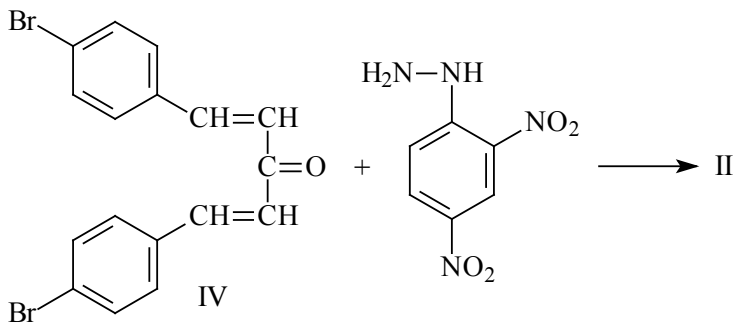
Atom	Value, charge units	
	Compound I	Compound II
C ₁₄	0,2348	0,1814
N ₁₃	-0,2402	-0,2250
N ₁₁	-0,0548	-0,0843
C ₁₀	-0,0351	0,0467
C ₁₂	-0,1716	-0,1365
C ₉	-0,1894	-0,1954
C ₈	-0,0800	-0,0574
C ₁	-0,0576	-0,0554
C ₂₆	-	-0,0808
C ₂₇	-	-0,0514

Table 3 - Energy parameters of molecules

Energy parameter	Compound I	Compound II
Total energy	-452028 kJ/mol	-576523 kJ/mol
Bond energy	-16816 kJ/mol	-22338 kJ/mol
Electron energy	-2931470 kJ/mol	-4449405 kJ/mol
Heat of formation	469,12 kJ/mol	722,06 kJ/mol
Dipole moment	7,283 D	7,328 D

At the second stage of the work, the considered compounds were synthesized, which was based on the reaction of the interaction of 2,4-dinitrophenylhydrazine and ketones (III), (IV) in an aqueous-alcoholic medium; the synthesis scheme is represented by the following scheme.





The initial ketones (III), (IV) were synthesized by the Kleisen-Schmidt reaction by the interaction of 4-bromobenzaldehyde with acetone in an aqueous-alcoholic medium in the presence of an alkaline catalyst.

Synthesis of compound (I): 0.86 mmol of 2,4-dinitrophenylhydrazine was dissolved in a mixture of 30 cm³ of distilled water, 25 cm³ of isopropyl alcohol and 2 cm³ of concentrated hydrochloric acid with heating (solution 1). Upon heating, 0.86 mmol of ketone (III) was dissolved in 40 cm³ of isopropyl alcohol (solution 2). To the hot solution 2, solution 1 was added in one go and mixed vigorously. Almost immediately, the reaction product floats in the form of a colored precipitate. The mixture was allowed to cool to room temperature. The precipitate was filtered off, washed with water until neutral and dried in an oven at a temperature of 100 ° C. From the dried product, the target compound was extracted with acetone at room temperature, followed by evaporation of the acetone extract.

The yield of compound (I) is 67%, the melting point is 127 ° C. Compound (I) is a red-orange powder, insoluble in water, soluble in acetone and DMF, soluble in ethanol. TLC R_f = 0.80.

Compound (II) was obtained by a similar method with a yield of 64%, melting point 203 ° C. Compound (II) is an orange powder, insoluble in water, soluble in acetone and DMF, soluble in ethanol. TLC R_f = 0.88.

The purity of the synthesized compounds was controlled by thin layer chromatography on Silufol plates, the solvent was DMF, and the eluent was acetone. Melting point was determined on a Stuart SMP40 instrument. To dry the samples, a VACUTherm VT-6130-M Thermo Scientific drying oven was used. IR spectra were recorded on an FSM 1201 IR Fourier spectrometer in KBr pellets in the wavelength range 400–4000 cm⁻¹; absorption bands were assigned based on the data of [12–15] and ZAIRTM Information Search System for IR Spectroscopy, version 1, 0.

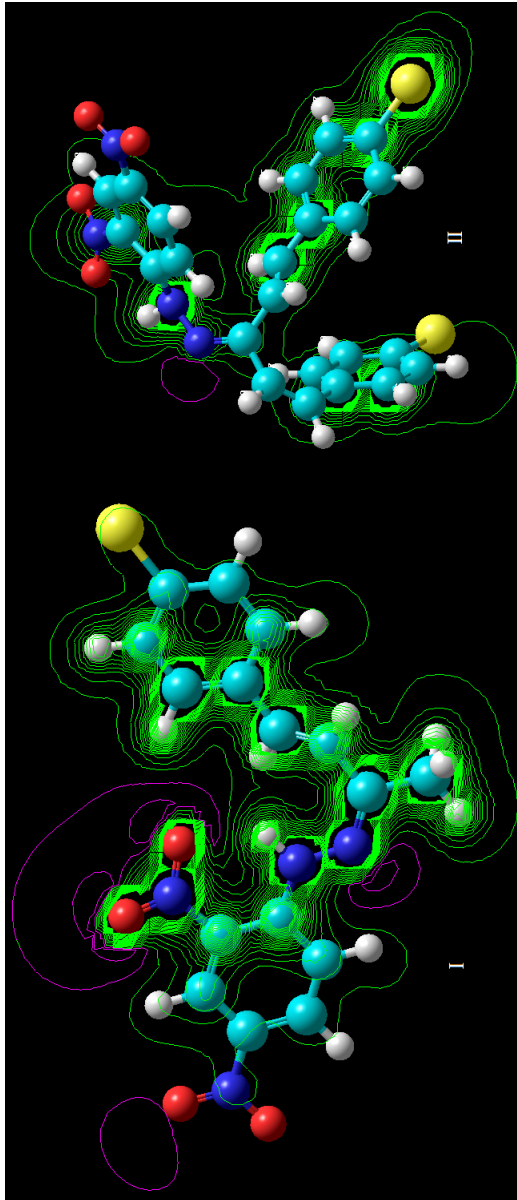


Fig. 2 electron density distribution diagrams

Various conditions are proposed in the literature for the synthesis of 2,4-dinitrophenylhydrazones of carbonyl compounds, the main of which is the solubility of the starting compounds in aqueous, alcoholic and aqueous-alcoholic media. Ketones (III) and (IV) are not soluble in water, hardly soluble in alcohols at room temperature, but at temperatures close to boiling alcohol, their solubility increases, which was taken into account in the work.

When developing synthesis methods, the influence of factors such as temperature, medium (solvent) and the presence of hydrochloric acid as an additive were studied. Studies have established that the reaction proceeds most smoothly when an acidified hot aqueous-alcohol solution of 2,4-dinitrophenylhydrazine is mixed with a hot solution of ketone in isopropyl alcohol. The synthesized 2,4-dinitrophenylhydrazones, unlike the initial ketones, dissolve well in acetone. This made it possible to propose an extraction method for purification of target products.

The following characteristic bands are identified in the IR spectra of the synthesized compounds, which correspond to vibrations of atoms, groups of atoms and bonds in molecules (Table 4). Most bands can be interpreted quite accurately, but for some the assignment is difficult. For example, a band of about 1590 cm⁻¹ can relate to both ethylene bond vibrations and C = C vibrations in the benzene ring. For the compounds under consideration, this band has a high intensity, which may indicate the imposition of these vibrations.

Table 4 - Wave numbers of IR spectra

Vibrations	Frequency, cm ⁻¹	
	I	II
NH stretching vibrations	3313	3315
stretching vibrations of CH of benzene rings	3020	3025
C = N stretching vibrations	1651	1651
C = C stretching vibrations	1590	1596
stretching vibrations in the benzene ring	1615, 1491	1610, 1485
planar deformation vibrations of CH in 1,2,4-substituted benzene	1134, 1190	1137, 1193
plane deformation vibrations of CH in 1,4-substituted benzene	1100, 1008	1104, 1010
out-of-plane deformation vibrations of CH in 1,4-substituted benzene	825	825
asymmetric stretching vibrations C – NO ₂	1510	1513
stretching symmetric vibrations C–NO ₂	1333	1331
stretching C–Br	1071	1074

Thus, using the methods of quantum chemistry, the geometric and electronic structure features of 2,4-dinitrophenylhydrazones of bromo derivatives of benzalacetone and dibenzalacetone were studied. The features of the spatial arrangement of atoms and the distribution of electron density in molecules are established. Calculation of thermal effects for the reactions of the formation of 2,4-dinitrophenylhydrazones is carried out. For the compounds under consideration, synthesis methods were proposed by reacting the starting ketones with 2,4-dinitrophenylhydrazine in a hot water-alcohol solution in the presence of hydrochloric acid. Acetone extraction was used to isolate the desired products; purity was controlled by thin layer chromatography. The spectral characteristics of compounds in the infrared region were studied, the main characteristic bands were identified, and their assignment was carried out using published data.

References

1. *Burmistrova A.A. Analytical capabilities of the reaction of 2,4-dinitrophenylhydrazine with some carbonyl compounds in micellar surfactant media: abstract of thesis. dis. ... Cand. Chem. Sci. - Saratov, 2010. - 21 P.*
2. *Volkova N.V., Vernigora A.N., Frolov A.V. Spectrophotometric determination of 2-furaldehyde using 2,4-dinitrophenylhydrazine // University proceedings. Volga region. - 2017. - № 4 (20). - P. 105-115.*
3. *Abdurrahmanoglu S., Bulut M. Synthesis of crown ethers bearing 2,4-dinitrophenylhydrazone // Journal of heterocyclic Chemistry. – 2007. – Vol. 44. – Iss. 1. – P. 205-209.*
4. *Bao F. 2,4-Dichlorobenzaldehyde 2,4-dinitrophenylhydrazone // Acta Crystallographica. Section E – Crystallographic Communications. – 2008. – Vol. 64. – Part 8. – P. O1433-U1740.*
5. *Panasenko A.I., Elzova L.Yu. The interaction of hydroxy and methyl chalcones with 2,4-dinitrophenylhydrazine // Bulletin of TSU. - 2005. - V. 10. - Issue. 1. - P. 37-38.*
6. *Keremov A.F. New phenylhydrazones based on 2,4-dinitrophenylhydrazine and some carbonyl compounds // Bulletin of the Dagestan state. un-ta. Series 1. Natural sciences. - 2017. - V. 32. - Issue. 4. - P. 70-76.*

7. Cusu J.P., Musuc A.M., Oancea D. Kinetic analysis of thermal decomposition in liquid and solid state of 3-nitro and 4-nitro-benzaldehyde-2,4-dinitrophenylhydrazones // *Journal of thermal Analysis and Calorimetry*. – 2012. – Vol. 109. – Iss. 1. – P. 255-263.

8. Zhang B., Li Yu., Sun W. Anion-Sensitive 2,4-Dinitrophenylhydrazone-Containing Terpyridine Derivative and Its Platinum Chloride Complex // *European Journal of inorganic Chemistry*. – 2011. – Iss. 32. – P. 4964 – 4969.

9. Li J., Wang Yu., Lin H., Lin Hu. A novel, simple, colorimetric receptor based on 2',4'-dinitrophenylhydrazone for acetate ion in organic medium // *Journal of inclusion Phenomena and macrocyclic Chemistry*. – 2009. – Vol. 63. – Iss. 3-4. – P. 281-285.

10. Gurskaya G.V., Zavodnik V.E., Zhukhlistova N.E., Kozlov M.V. Molecular structures of antiviral agents, 2,3-dihydroxybenzaldehyde 2,4-dinitrophenylhydrazone and 4-[(4-methylpiperazin-1-yl)imino]methyl-1,2-benzodiol // *Crystallography Reports*. – 2008. – Vol. 53. – Iss. 4. – P. 626-630.

11. Kulikov M.A. Synthesis and study of the properties of 2,4-dinitrophenylhydrazone 4- [4- (dimethylamino) phenyl] buten-3-one-2 // *The Scientific Heritage*. - 2019. - №. 37 (37). - P. 3-7.

12. Prech E., Bulmann F., Affolter K. Determination of the structure of organic compounds. Spectral data tables. - Moscow: World; BINOMIAL. Laboratory of Knowledge, 2006. – 438 P.

13. Günzler H., Gremlich H.-U. IR-Spektroskopie. – Wiley-VCH GmbH & Co. KGaA, 2003. – 352 P.

14. Larkin P. Infrared and Raman Spectroscopy: principles and spectral interpretation. – Elsevier, 2011. – 228 P.

15. Tasumi M., Sakamoto A. Introduction to Experimental Infrared Spectroscopy. Fundamentals and Practical Methods. – Wiley, 2015. – 389 P.

视觉分析仪作为飞机飞行危险因素的疲劳
**FATIGUE OF THE VISUAL ANALYZER AS A DANGEROUS
FACTOR OF THE AIRCRAFT FLIGHT**

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抽象。 分析了人员的视觉能力对飞行员和航空调度员的专业活动中的技术因素的依赖性。 揭示了导致航空专家操作可靠性资源减少的条件，制定了控制其心理生理状态的建议。 限制视觉分析仪的功能被认为是危险的飞行因素。

关键词：飞机驾驶员，空中交通管制经理，视觉分析仪，疲劳，敏锐度，飞行威胁因子，安全管理系统（SMS）。

Annotation. *The dependence of visual capabilities of a person on technogenic factors in the professional activity of a pilot and an aviation dispatcher is analyzed. The conditions leading to reduction of operational reliability resources of aviation specialists are revealed, recommendations on control of their psycho-physiological state are formulated. Limiting the functioning of the visual analyzer is considered as a dangerous flight factor.*

Keywords: *he pilot of the aircraft, air traffic control Manager, visual analyzer, fatigue, acuity, threat factor of the flight, safety management system (SMS).*

Aviation systems cannot be completely free from hazards and associated risks. The problem of the "human factor" in aviation remains relevant.

The purpose of the work is to analyze the influence of physiological and psycho-physiological qualities of a person on professional qualities, depending on the influence of physical factors.

The object of the research was the activity of the pilot of the aircraft and the air traffic control controller.

The subject was psychophysiological factors affecting the man-machine-environment system, namely: "man (pilot) - machine (aircraft) - machine (technological equipment of an air traffic controller) - man (air traffic control specialist)".

In July 2011, ICAO presented the “Operator's Guideline for the Implementation of a Fatigue Risk Management System” (“Fatigue Risk Management Systems) of pilots during the flight [1].

The activity of the pilot in flight is associated with continuous monitoring of aircraft instruments and navigation aids with the help of a visual analyzer. The natural mobility of the eyes while a long time is limited, since the dashboard is at a short distance. At the same time, the visual capabilities of a person depend on man-made factors in flight.

The analyzed situations were long flights of transport aircraft. It is established that the workload on the visual analyzer pilots in night flights significantly increased compared with day flights. The intersection of several time zones also led to an overstrain of the visual apparatus and a decrease in the speed of visual perception. Strong turbulence, low pressure, low humidity in the cockpit, homogeneous activity also influenced the visual capabilities of the pilot. The minimum levels of illumination at the level of the dashboard was 2 lux. It is noted that the above factors led to a decrease in visual acuity due to a significant strain of the visual system of the eye, which required a period of relaxation after the flights. However, it should be noted that irreversible phenomena in the work of the visual analyzer were not observed.

However, a change in visual acuity in long night-time flights with a reduced level of illumination at the workplace should be considered as a psycho-physiological hazard that, if visually landing, can lead to accidents. Especially if the landing is carried out in difficult meteorological conditions (rainfall, inversion in the atmosphere, etc.) Changes in the optical properties of the atmosphere lead to the deviation of light rays from the straight-line propagation, which should be considered by aviation specialists.

In May 1991 at the airport Pulkovo (St. Petersburg), the crash of the Tu-154B-1. According to the commission that investigated the incident, one of the reasons was the visual illusion of a higher position of the aircraft relative to the imaginary line of the glide path, caused by the refraction of light rays due to the presence of a band of heavy rainfall. As a result, the pilots took a maneuver to increase the rate of descent, which led to a rough landing of the aircraft to the runway end, exceeding the calculated value of strength under vertical overload. This led to the destruction of the structure [2].

With poor visibility there is the likelihood of visual illusions. At the San Francisco airport on the night of July 8, 2017, the dispatchers managed to prevent the largest air crash in civil aviation history. Air Canada's Airbus 320 aircraft mistakenly began to descend onto a taxiway, where there were four aircraft with passengers waiting for their turn to take off, instead of the runway. The pilot found the pilot's error when the plane touched the runway. He was instructed to gain altitude. The pilot followed the instructions of the dispatcher, went to the second circle and landed in the right place [3].

On December 18, 1977, the crew of the Sud Aviation SE-210 Caravelle 10R aircraft of the Swiss airline, during an approach during a night-time landing over the sea, lost its runway lights, but continued to decline. The evaporation of water led to a local increase in air density, which led to a change in the refractive index of the air and an illusion of the spatial position of the sun above the glide path. After the third turn, the plane came into contact with the sea, causing the landing gear and flaps to come off. Killed 35 passengers and 1 crew member [2].

Analysis of the documents on the investigation of aviation accidents and accidents confirmed that mixing the image in the presence of even thin inversion layers, thin and transparent when observed from the earth, but opaque in the horizontal or inclined direction can be 10-15 m. The situations that the pilots describe low value of the distance to the ground in the visual assessment, the wrong position of the aircraft relative to the runway when leaving a thin layer of inversion fog, clouds, rain. Such situations have repeatedly led to aviation accidents.

The other side of the interaction with the pilot are air traffic control experts. They should be aware of the decrease in visual acuity of pilots after long night flights and provide the most complete support when landing the aircraft.

Adverse factors for the professional activity of a dispatcher that negatively affect vision are: reduced level of illumination, leading to eye strain and rapid fatigue; excessively high illumination causes fatigue; the wrong direction of light contributes to the appearance of sharp shadows or strong glare.

The similar situation became the accompanying cause on February 6, 1970, when the Il-18B crashed while landing at Samarkand airport. During the investigation of the actions of the Office of Internal Affairs, it was found that the approach controller incorrectly conveyed information to the crew about the distance of the aircraft from the airfield in high ambient light conditions at the workplace (the approach controller combined the functions of the launch controller) [2].

Observation of the work of aviation controllers allows us to conclude that the functionality of the visual analyzer is limited due to the monotony of actions for continuous monitoring of incoming signals can lead to a decrease in concentration after 30-40 minutes of a continuous process.

The practical significance of the work lies in the fact that the analysis made it possible to identify the conditions leading to a decrease in the operational reliability resources of aviation specialists and to formulate recommendations for monitoring the conditions of their activities and monitoring their psycho-physiological state.

Currently, in accordance with ICAO Annex No. 19, a safety management system (SMS) is being implemented, which aims to identify potential security threats and take corrective measures to reduce risks. Fatigue aviation specialists (pilots and controllers) is one of the dangerous factors of flight, which should be considered when organizing air traffic.

References

1. *[Electronic resource]*: - Access mode: <http://www.mak-iac.org/rassledovaniya/>.
2. *Doc 9966. A guide for regulators: a system for managing risks associated with fatigue*. Montreal: ICAO, 2012.
3. *[Electronic resource]*: - Access mode: <http://tass.ru/proisshestiya/4407861>.
4. *Annex 19 to the Convention on International Civil Aviation. ICAO Flight Safety Management - 2nd ed.* - Montreal: ICAO, 2016.

使用化学燃料处理来改善船用内燃机的经济和环境性能
**THE USE OF CHEMICAL FUEL PROCESSING TO IMPROVE
THE ECONOMIC AND ENVIRONMENTAL PERFORMANCE
OF MARINE INTERNAL COMBUSTION ENGINES**

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抽象。考虑了添加剂在船用发动机燃料中的应用结果。该研究确定了特定燃料油消耗量，废气温度，废气中NO_x和SO_x的浓度，以及燃料设备和气缸 - 活塞组元件的技术条件。结果表明，燃料添加剂的使用有助于降低特定燃料油消耗量的3.5 ... 5.8%，这取决于柴油的负荷和燃料中添加剂的浓度。建立了柴油机运行环境特性的增加 - 减少了NO_x浓度的1.4 ... 4.3%和废气中SO_x浓度的15.6 ... 22.9%。结果表明，添加剂浓度具有最佳值，通过实验确定并取决于柴油发动机的特性和所用燃料。

关键词：船用内燃机，船用柴油机燃料，燃料添加剂，燃油经济性，柴油机环境性能，比燃油消耗，烟气中NO_x和SO_x浓度

Abstract. *The results of the application of additives to marine motor fuels are considered. The study determined Specific Fuel Oil Consumption, the temperature of the exhaust gases, the concentration of NO_x and SO_x in the exhaust gases, as well as the technical condition of the elements of the fuel equipment and cylinder-piston group. It is shown that the use of fuel additives contributes to a decrease of 3.5 ... 5.8% of Specific Fuel Oil Consumption depending on the load on the diesel and the concentration of the additive in the fuel. An increase in the environmental characteristics of diesel operation was established — a decrease by 1.4 ... 4.3% of the concentration of NO_x and by 15.6 ... 22.9% of the concentration of SO_x in the exhaust gases. It was shown that the additive concentration has an optimal value, is determined experimentally and depends on the characteristics of the diesel engine and the fuel used.*

Keywords: *marine internal combustion engine, fuel for marine diesel engines, fuel additives, fuel economy, environmental performance of a diesel engine, Specific Fuel Oil Consumption, concentration of NO_x and SO_x in flue gases*

The main source of energy for the heat engines of marine power plants (diesel engines, gas turbines and boilers) is liquid fuel. The results of the implementation of various studies on the possibility of using coal dust, dimethyl ether, rapeseed oil and a number of other alternative fuels in power plants of marine vessels are isolated. In addition, similar studies were carried out for internal combustion engines of relatively low power (up to 50 kW) used in stationary power plants [1].

One of the ways to process fuel is to change its physicochemical composition, which can be divided into: 1) purification from impurities; 2) chemical treatment.

The first group includes sedimentation, separation and filtration; and the second - the use of fuel additives.

At present, the design and technological composition of marine internal combustion engines has reached its perfection, which provides the minimum specific fuel consumption of these types of heat engines compared to others (steam boilers and gas turbines). Therefore, the use of fuel additives is considered one of the ways to increase the fuel efficiency of diesel engines.

Additives to marine fuels are currently quite widespread on ships, but the result of their application does not always receive an unambiguous assessment. This is due to various reasons, which, first of all, depend on the characteristics of marine diesel and elements of its fuel system, as well as on ensuring the correct technology for the use of additives [2].

Thereby, the purpose of the study was to determine the effect of chemical processing of fuel (the use of fuel additives) on the energy, economic and environmental parameters of the marine internal combustion engine.

The use of fuel additives is especially relevant for auxiliary engines, which are drives of electric generators. These types of engines have increased (compared to the main engines) crankshaft rotation speed, as well as continuous operation as part of a ship's power plant (both in running and standing ship's operating modes). The first (increased frequency) reduces the time of fuel injection, the second (work during stops in the water area of seaports) imposes additional requirements to ensure environmental performance of engines [3].

Studies in the conditions of a marine vessel with a deadweight of ~ 50,000 tons were carried out in the fuel system of a 6N21L diesel engine manufactured by Yanmar with the following main characteristics: type – vertical, water-cooled, 4-cycle diesel engine; cylinder bore – 210 mm; stroke – 290 mm; rated speed of revolution – 720 min⁻¹ (rpm); number of cylinders – 6; power – 680 kW.

The marine power point included three named diesel engines used as diesel generators. This allowed two diesel engines to be used for experiments, and one to leave as a “control”.

During research, the engines worked in parallel mode, which made it possible to maintain the same load on both “experimental” and “control” diesel engines. Its value was $N_e = 300 \dots 600$ kW at a rated power of $N_{enom} = 680$ kW. The determination of Specific Fuel Oil Consumption (SFOC) was carried out using marine instrumentation.

Diesels had a separate gas exhaust system, this allowed to mount gas analyzers in both the “control” and the “experimental” ones. Gas analyzers were installed at a distance of 1.5 m from the level of gas exit from the diesel engine, which ensured the uniformity of temperature and the uniformity of the gas flow entering their measuring unit.

The main parameters to be monitored and determined were Specific Fuel Oil Consumption, the temperature of the exhaust gases, the content of NO_x and SO_x in the exhaust gases, as well as the technical condition of the elements of the fuel equipment and cylinder-piston group [4].

A comprehensive study of the effect of fuel additives on the energy, economic and environmental performance of the ship gave the following results.

The initial parameter determined during the experiments was Specific Fuel Oil Consumption. Its measurement was carried out at a diesel load of 335, 390, 460, 530 and 585 kW, which corresponded to 0,49, 0,57, 0,68, 0,78 and 0,86 N_{enom} .

Fig. 1 shows the dependences of Specific Fuel Oil Consumption on the relative power of a N_e/N_{enom} diesel engine for a diesel engine running on “clean” fuel (2) and a diesel engine running on fuel with an additive (1). The data presented indicate that the use of fuel additives significantly reduces SFOC, especially at load conditions in the range of (0.55 ... 0.7) N_{enom} , the most characteristic for the operation of diesel generators [5].

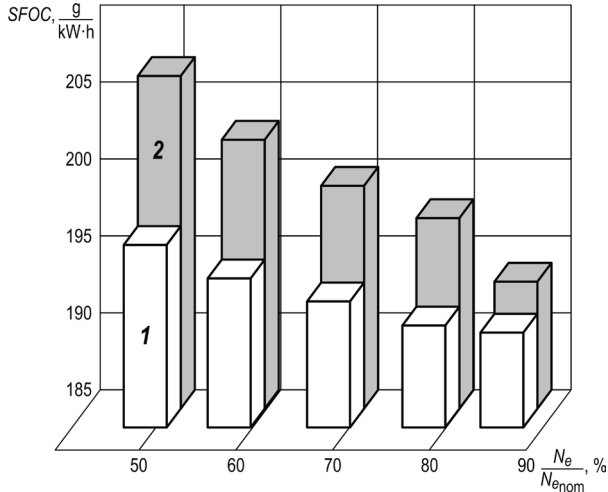


Fig. 1. Dependences of Specific Fuel Oil Consumption of 6N21L Diesel from its relative power N_e/N_{enom} :

1 - "experimental" diesel engine running on fuel with an additive;
2 - "control" diesel

The dosage level of additives varies widely and depends on the purpose of the additive and the characteristics of the fuel system in which it is used. Additives that are introduced into the fuel tanks or individual sections of the fuel lines for biological effects on the fuel or to reduce hydraulic losses are dosed in a ratio of 1: 8000 ... 1: 12500. Additives that provide an improvement in the fuel combustion process are introduced into it in a ratio of 1: 1000 ... 1: 8000. In both cases, the dosage can vary depending on the engine design, the operational state of the fuel system, the level of fuel pollution in the tanks, the elemental composition of the fuel (depending on the content of vanadium, sodium and sulfur impurities). The optimal dosing range of the additive is determined experimentally, in connection with this, the following ratios of the additive and the base fuel were selected in the studies - 1: 2000, 1: 3500, 1: 5000, 1: 6500 and 1: 8000. The lowest SFOC value was obtained at concentrations of 1: 3500 and 1: 5000, which were accepted for further studies. The graphical dependences of the SFOC of the 6N21L diesel on its relative power N_e/N_{enom} for various concentrations of the additive in the fuel are shown in Fig. 2.

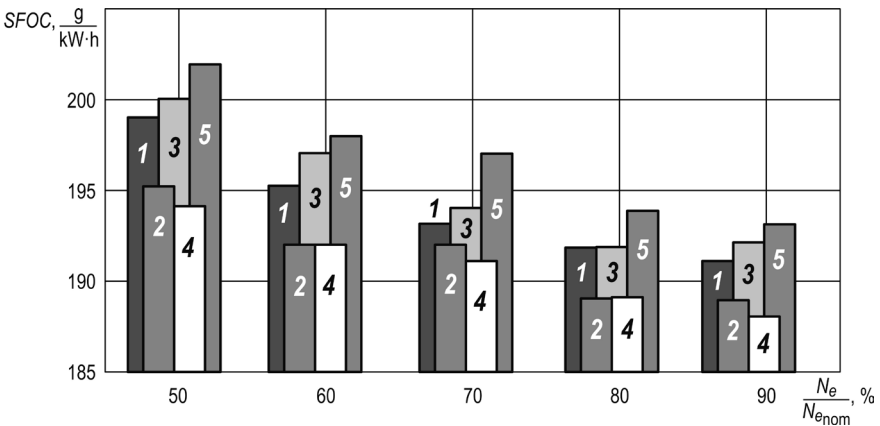


Fig. 2. Dependences of the SFOC of a 6N21L diesel engine on its relative N_e/N_{enom} power for various additive concentrations in the fuel:
 1 - concentration 1: 2000; 2 - concentration 1: 3500; 3 - concentration 1: 6500;
 4 - concentration of 1: 5000; 5 - concentration 1: 8000

The above results indicate a better mixture formation and combustion, as well as a more complete use of the calorific value of fuel with an additive.

The establishment of optimal ranges of the concentration of the additive in the fuel made it possible to carry out the following research stage in the variant: “control” diesel, “experimental” diesel operating with an additive concentration of 1: 3500 and “experimental” diesel operating with an additive concentration of 1:

5000. The gas temperature after the gas turbocharger t_{gas} , as well as the concentration of NO_x and SO_x in the exhaust gases were determined.

One of the characteristics that determine both the quality of the flow of the working cycle in the diesel cylinder and the degree of thermal tension of its parts is the temperature of the gases leaving the engine. Most often it is measured at the exhaust line after the gas turbocharger. Fig. 3 shows the dependences of the gas temperature averaged over all cylinders at the diesel outlet t_{gas} on its relative power N_e/N_{enom} . The measurements were carried out both for the “control” diesel engine and for the “experimental” diesel engines that operated on fuel with the optimum additive concentration (1: 3500 and 1: 5000). As can be seen from fig. 3, the use of fuel additives helps to reduce the temperature of the gases leaving the diesel engine, which indicates a more complete combustion of the fuel and the maximum use of the thermal energy of the gases in the cylinder [6].

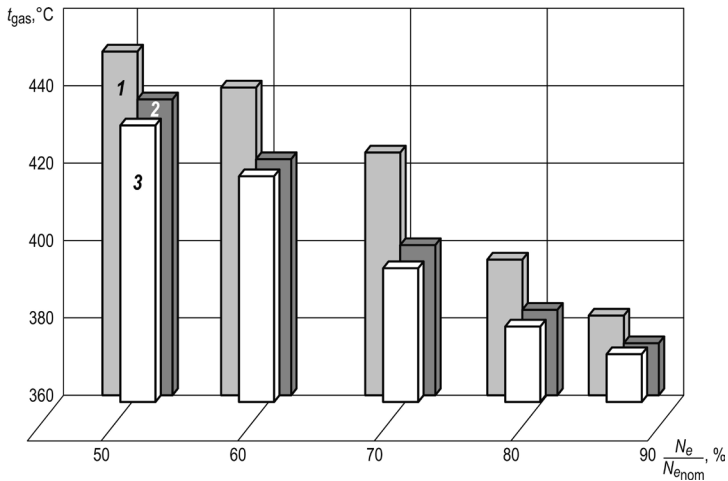


Fig. 7. Dependences of the average flue gas temperature t_{gas} over the 6N21L diesel cylinders on its relative power N_e/N_{enom} :

- 1 – “control” diesel;
- 2 – “experimental” diesel (additive concentration 1: 3500);
- 3 – “experimental” diesel (additive concentration 1: 5000)

A smaller deviation of the temperature of the gases along the cylinders of the diesel engine from its average value Δt_{mid} when using a fuel additive should also be noted. So, for a “control” diesel engine (with a relative diesel power of $N_e/N_{\text{enom}}=78\%$) with $\Delta t_{\text{mid}}=397^\circ\text{C}$ this parameter was $\Delta t_{\text{mid}}^+=13^\circ\text{C}$, $\Delta t_{\text{mid}}^-=10^\circ\text{C}$, and for one of the “experimental” ones at $Dt_{\text{mid}}=380^\circ\text{C}$ – $\Delta t_{\text{mid}}^+=8^\circ\text{C}$, $\Delta t_{\text{mid}}^-=6^\circ\text{C}$ (Fig. 4).

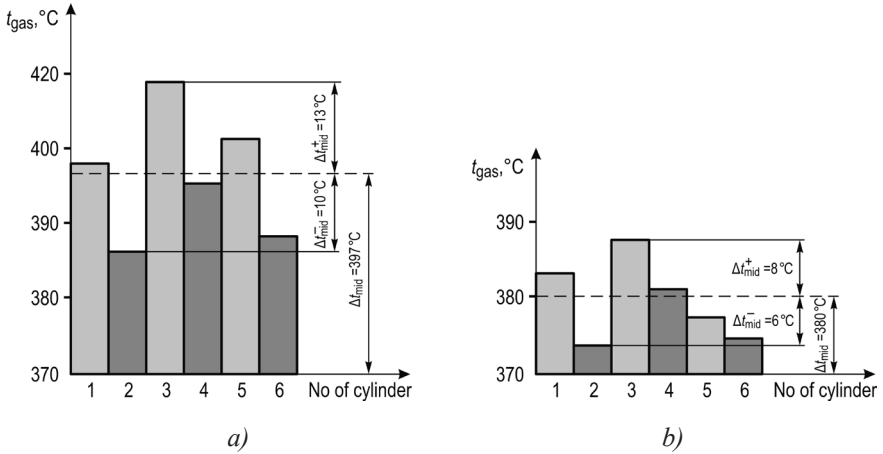
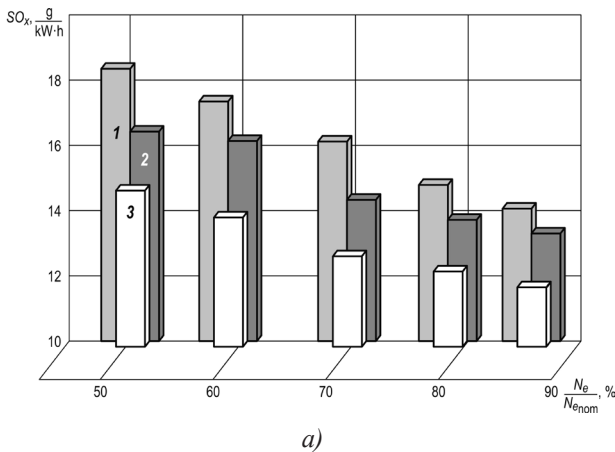


Fig. 4. The mismatch of the temperature of the exhaust gases on the cylinders of marine diesel engine 6N21L under different conditions of the experiment:

- a) “control” diesel (without the use of a fuel additive);
- b) “experimental” diesel (when using a fuel additive)

Ship emission of harmful substances in exhaust gases is an urgent problem; its solution should provide environmental parameters for the operation of marine diesel engines in their operation both in the oceans and in special water bodies. In connection with these, the study determined the effect of fuel additives on the environmental performance of a diesel engine — the content of SO_x and NO_x in exhaust gases. The results of these studies are shown in Fig. 5.



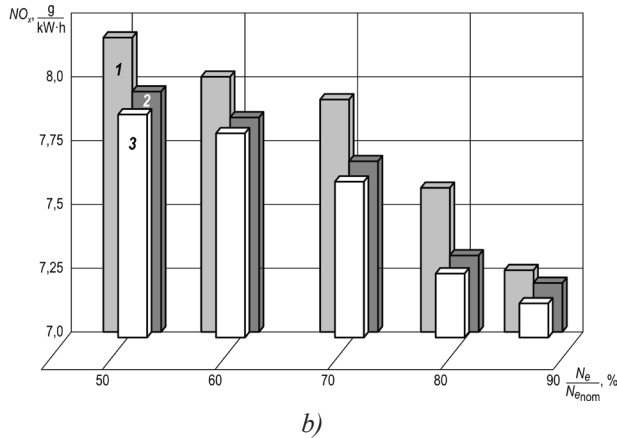


Fig. 5. Change in the concentration of SOx (a) and NOx (b) in the exhaust gases of marine diesel 6N21L from its relative power N_e/N_{nom} :

- 1 - "control" diesel;
 2 - "experimental" diesel (fuel with an additive concentration of 1: 3500);
 3 - "experimental" diesel (fuel with an additive concentration of 1: 5000)

Results shown in fig. 5 indicate an improvement in the environmental parameters of diesel operation, while the largest reduction in the level of harmful emissions between the "experimental" and "control" diesel engines is observed in the load range of 65 ... 80% - the most typical for the operation of auxiliary engines of marine vessels.

Thus, the above results allow us to draw the following conclusions.

1. One of the methods for improving the operational properties of fuel is the use of fuel additives that can be introduced into the fuel system at various points: a slop tank, a consumable tank, fuel lines, as well as before it is directly fed to the diesel cylinder (in front of the high pressure fuel pump).

2. The use of fuel additives leads to an increase in the fuel efficiency of marine diesel. So, when using fuel additives in various operating modes of a marine four-stroke diesel engine, it is possible to achieve a reduction in SFOC from 3.5 to 5.8%. Moreover, the maximum increase in fuel efficiency occurs in the range of 50 ... 60% of the diesel load, i.e. modes characterized by the largest operational period of operation, as well as increased thermal tension. The use of fuel additives not only reduces the overall fuel consumption, but also helps to reduce the temperature of the exhaust gases by 3.3 ... 7.2% and reduces its deviation along the diesel cylinders, thus balancing the heat load on the individual cylinders.

3. In the case of the use of fuel additives, the environmental performance of a diesel engine is significantly improved. So the use of additives helps to reduce by 1.4 ... 4.3% the concentration of NO_x in the exhaust gases. In addition, when using fuel additives, the concentration of SO_x in the exhaust gases is reduced by 15.6 ... 22.9%. The above facts are especially important in the context of fulfilling the requirements of Annex IV of MARPOL73 / 78 and are relevant specifically for four-stroke diesel engines operating for a long time in coastal and seaport waters.

4. The use of fuel additives improves the technical condition of the details of the cylinder-piston group of the diesel engine and its gas exhaust system and reduces the laboriousness of work on diesel engine cleaning by 20 ... 25%.

5. The concentration of the additive is optimal, determined experimentally and depends on the characteristics of the diesel engine and the fuel used.

References

1. Sagin S. V. *Cavitation Treatment of High-Viscosity Marine Fuels for Medium-Speed Diesel Engines* / S. V. Sagin, V. G. Solodovnikov // *Modern Applied Science; Published by Canadian Center of Science and Education*, Vol. 9, № 5. – 2015. – P. 269-278. DOI:10.5539/mas.v9n5p269 (Indexed by Scopus)

2. Zablotsky Yu. V. *Enhancing Fuel Efficiency and Environmental Specifications of a Marine Diesel When using Fuel Additives* / Yu. V. Zablotsky, S. V. Sagin // *Indian Journal of Science and Technology*, Published by Indian Society of Education and Environment. – December 2016. – Vol. 9. – Iss. 46. – P. 353-362. DOI: 10.17485/ijst/2016/v9i46/107516.

3. Kuropyatnyk O. A. *Exhaust Gas Recirculation as a Major Technique Designed to Reduce NO_x Emissions from Marine Diesel Engines* / O. A. Kuropyatnyk, S. V. Sagin // *OUR SEA : International Journal of Maritime Science & Technology*. – 2019. – Vol. 66. – № 1. – P. 1-9. <https://doi.org/10.17818/NM/2019/1.1>

4. Zablotsky Yu. V. *Reducing of thermal factor of exit-gas system of marine medium-speed diesel engine due to the usage of fuel additives* / Yu. V. Zablotsky // *Science and Education : material of the XIII international research and practice conference, Munich, November 2nd – 3rd, 2016 / publishing office Vela Verlag Waldkraiburg – Munich – Germany 2016. – P. 96-103.*

5. Zablotsky Yu. V. *Management of border friction processes in precision varieties of ship's medium-durable diesels* / Yu. V. Zablotsky // *American Scientific Journal*, 2017. – № 15. – Iss. 2. – P. 56-59.

6. Zablotsky Yu. V. *Use of organic coatings to increase the reliability of fuel injection equipment work for marine diesel engines* / Yu. V. Zablotsky // *European Science and Technology : material of the XVI international research and practice conference, Munich, March 14th – 15th, 2017 / publishing office Vela Verlag Waldkraiburg – Munich – Germany 2017. – P. 104-112.*

减少船用柴油机高压燃料设备的机械损失
**DECREASE IN MECHANICAL LOSSES
IN HIGH-PRESSURE FUEL EQUIPMENT
OF MARINE DIESEL ENGINES**

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抽象。考虑了在柱塞的摩擦副中发生的流体动力和边界润滑的影响 - 船用内燃机的高压燃料泵的套筒。为了确定燃料边界润滑层的厚度,提出了一种基于光学各向异性现象的光学双折射方法。作为对摩擦三元组的摩擦学特性的估计,提出了一种测量磨损的电脉冲法的柱塞 - 燃料 - 套管,其允许人们确定摩擦力和磨损率。实验证明,根据运行条件,燃料边界层的厚度在4 ... 12 mkm范围内,有助于润滑状态,即流体动力学和边界不接触表面。提出了增加边界层分子的有序度及其厚度的方法。结果表明,使用燃料边界层的液晶特性可以用于精密的高压燃料泵对,以减少机械损失。

关键词: 船用内燃机, 高压燃油泵, 柱塞, 衬套, 船用燃油, 流体动力润滑, 边界润滑, 边界层, 摩擦力, 磨损率

Abstract. *The effects of hydrodynamic and boundary lubrication occurring in a friction pair of a plunger - a sleeve of a high-pressure fuel pump of marine internal combustion engines are considered. To determine the thickness of the boundary lubricating layer of fuel, an optical birefringence method is proposed, which is based on the phenomenon of optical anisotropy. As an estimate of the tribotechnical characteristics of the friction triad, the plunger - fuel - bushing, an electro-pulse method of measuring wear is proposed, which allows one to determine the friction force and wear rate. It was experimentally established that the thickness of the boundary layer of fuel, depending on operating conditions, is within 4 ... 12 mkm, contributing to the lubrication regimes that are hydrodynamic and boundary without contact of surfaces. Ways are proposed to increase the degree of ordering of the molecules of the boundary layer and its thickness. It is shown that the use of the liquid crystal properties of the boundary layers of the fuel can be used in precision pairs of high-pressure fuel pumps to reduce mechanical losses.*

Keywords: *marine internal combustion engine, high-pressure fuel pump, plunger, bushing, marine fuel, hydrodynamic lubrication, boundary lubrication, boundary layer, friction force, wear rate*

High pressure fuel pumps are one of the elements that ensure the operation of internal combustion engines, and are used both on marine diesel engines and on diesel engines used in stationary power [1].

The functional purpose of high-pressure fuel pumps is dosing and supplying a certain portion of fuel to a diesel cylinder for a certain period of time. In modern marine diesels, fuel injection pressures of the order of 1200 ... 1300 bar are ensured, which imposes special requirements on the quality of the mating friction surfaces of high-pressure fuel pumps (namely, a precision sleeve – plunger pair). In such operating conditions, the sleeve – plunger friction pair operates in the boundary friction mode, and the fuel in the gap of this precision pair performs lubricating functions. Given the above, requirements for ensuring the reliability of high-pressure fuel pumps should be presented both to the friction surfaces (bushings and plungers), and to the fuel. In this case, the discharge surfaces of the plunger and fuel must be considered as a single tribological system operating in the regimes of hydrodynamic or boundary lubrication [2].

During the operation of diesel engines, there is a continuous wear of parts of the fuel equipment and, above all, precision pairs: the needle — the nozzle guide of the nozzle and the plunger — the sleeve of the fuel pump. Wear of these parts leads to an increase in the gaps in them, and, consequently, to a loss in hydraulic density, an increase in leakage, and a corresponding decrease in the cyclic fuel supply. Subsequently, this leads to a decrease in the power of an individual cylinder and uneven load distribution across all cylinders. In addition, products of increased wear of the plunger-sleeve mating can cause increased adhesion contact and further violation of the geometry of the discharge surfaces.

Given the foregoing, the aim of the article is to develop a methodology for assessing the boundary and hydrodynamic lubrication modes by indirect indicators - the characteristics of the lubricating layer of the liquid in the interface between the sleeve and the plunger of the high pressure fuel pump.

As a hypothesis of the study, the assumption was made that the monomolecular layers of fuel formed near the friction surfaces of the high-pressure fuel equipment (in particular between the plunger and the sleeve of the high-pressure fuel pump) contribute to the additional elasticity of the fuel and provide a hydrodynamic or boundary (without contact of friction surfaces) lubrication modes [3].

Marine fuels used in marine diesels are a mechanical mixture of various hydrocarbons (C – H groups) of sulfur and its compounds (S – R groups), water and ash, and also include organic acids, resins, surface-active and other elements. The complex interaction of these components under the conditions of the catalyzing effect of a metal surface changes the properties of the fuel located in the immediate vicinity of the surface of the plunger-sleeve friction pair and creating thin micron interlayers. These interlayers are characterized by orientational ordering of molecules, which leads to anisotropy of a number of their properties. In this regard, fuels, like lubricating oils, form a boundary phase of a quasicrystalline structure on metal surfaces, the thickness of which can reach several microns.

The thickness of this boundary phase (boundary layer) can be determined by the optical birefringence method, the scheme of which is shown in fig. 14].

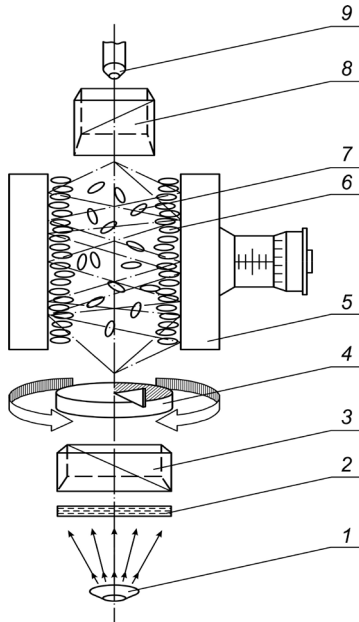


Fig. 1. The experimental setup for determining the optical anisotropy of the wall layers:

- 1 - light source; 2 - filter; 3 - polarizer; 4 - compensator; 5 - optical fiber;
- 6 - wall layer; 7 - isotropic liquid; 8 - analyzer; 9 - microscope

The studied lubricant is placed in the inner cavity of the fiber, formed by two parallel flat polished surfaces. To ensure maximum experiment identity, the surface material is the same as the material used to manufacture the plunger of the high pressure fuel pump. The fiber width is changed using a micrometer screw in the range of 5 ... 100 microns and is controlled using a microscope. The light from the source 1 is monochromatized by filter 2, polarized by a polarizer 3, and fed to the input end of the fiber of variable thickness 5, after passing through the compensator 4. Light rays move in the fiber along a zigzag path, reflected from its walls, and successively pass through ordered wall layers 6 and isotropic fluid 7. To exclude meniscus effects, the ends of the fiber are covered with glasses. Leaving the fiber, the light enters the analyzer 8 and then the microscope 9. The lateral surfaces of the fiber and glass are cleaned before each measurement [5]. To determine the phase shift δ between the light components E_p and E_s , polarized in parallel and perpendicular to the plane of incidence of the light rays, the extinction azimuth φ (the angle of rotation of the compensator from the

initial position at which the light intensity at the output is minimal) was determined for each fixed fiber width. After which the value of δ was found by the expression

$$\delta = \arctg(2 \sin 2\varphi).$$

The dependence of the phase shift δ on the inverse fiber width $1/d$ is linear

$$\delta = \frac{2\pi}{\lambda} (2ld_s \Delta n) \frac{1}{d},$$

and can be represented by the following equations

$$\delta = k \frac{1}{2d} \quad \text{when } 2d > 2d_s, \quad \text{where } k = \frac{4\pi}{\lambda} ld_s \Delta n; \tag{1}$$

$$\delta = \delta_{\max} \quad \text{when } 2d \leq 2d_s, \quad \text{where } \delta_{\max} = \frac{2\pi}{\lambda} l \Delta n.$$

where l – fiber length, microns;

d – fiber width, microns;

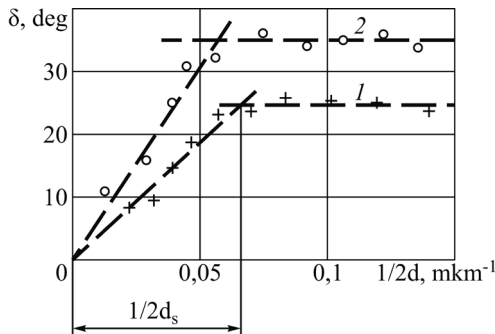
d_s – width (thickness) of an orientationally ordered boundary layer, microns;

Δn – average value of the optical anisotropy of the wall layer [6].

The experimental determination of the value of δ and the subsequent graph-analytical solution of the dependence $\delta=f(1/2d)$ allows us to determine the thickness of the formed boundary layer of fuel

The main parameter determined using the optical birefringence method was the thickness of the boundary layer of the fuel d_s . Its value can be determined by graphically solving expression (1) based on construction of experimental values.

For the study, we assessed fuels used for the operation of marine internal combustion engines: RMK380, RMK420, RMK460, RMK500 and having a viscosity of 380, 420, 460, 500 sSt at 40°C. The measurements were carried out while maintaining a constant temperature in the fiber within $30 \pm 1^\circ\text{C}$. The results of optical measurements in the boundary layers of fuel are presented in Fig. 2 in the form of the dependence of the phase shift δ on the inverse fiber width $1/2d$.



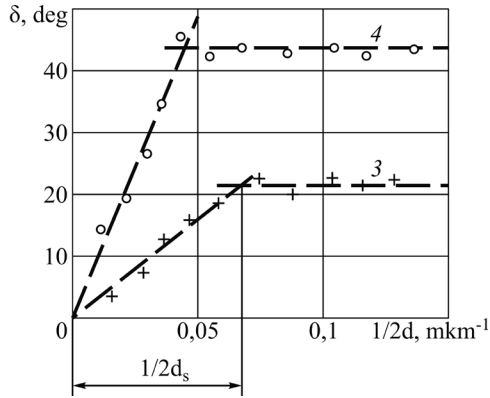
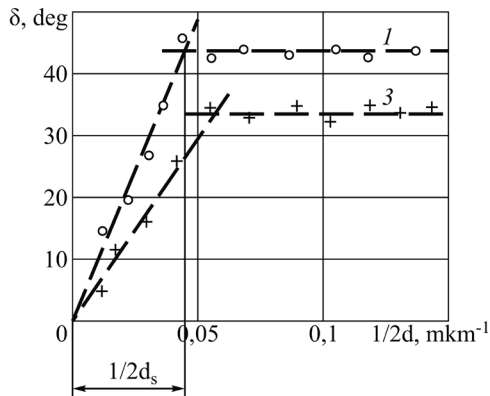


Fig. 2. Experimental dependences of the phase shift δ on the inverse fiber width $1/2d$ for marine fuels 1 – RMK420; 2 – RMK460; 3 – RMK380; 4 – RMK500

In all cases, the phase shift in the bulk liquid region increases linearly, and subsequently reaches its maximum and does not change in the range of the fiber width d corresponding to twice the thickness of the fuel boundary layer (at the time when the fiber is filled with an orientationally ordered boundary fuel layer on both sides). Thus, the intersection point of these two lines determines the doubled layer thickness d_s and characterizes the liquid crystal properties of the fuel boundary layer.

In order to determine the temperature resistance of the boundary layers of fuels, similar measurements were carried out for various temperatures in the contact zone. To this end, temperature control of the fiber region was performed. That made it possible to maintain a temperature of 25 ... 70 °C in it. The results of measuring optical anisotropy for this case are shown in Fig. 3.



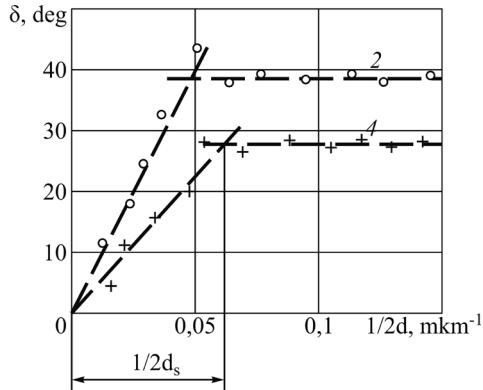


Fig. 3. Experimental dependences of the phase shift δ on the inverse fiber width $1/2d$ for marine fuel RMK500 at different temperatures:
 1 – 30° C; 2 – 40° C; 3 – 50° C; 4 – 60° C

The complex of studies confirmed the formation of ordered multimolecular layers in thin films of marine fuels formed on the metal surface of a friction pair of a plunger - high pressure fuel pump sleeve. The formation of such layers can be considered the boundary phase, which provides a hydrodynamic lubrication regime, as well as a boundary lubrication regime that excludes the formation of adhesive contacts. The thickness of the boundary layers of fuel used in marine diesels lies within 4 ... 12 microns and depends on the temperature in the friction zone. However, even the lower values are commensurate with the technological gap in the friction pair of the plunger - sleeve. Given this, the elastic-damping properties of the boundary layers of fuel can be used to exclude direct contacts of the friction surfaces [7].

As one of the options for enhancing the action of the Van der Waals forces, the use of surface-active additives, as well as profile grinding and applying regular microrelief on the surface of the sleeve and plunger of a high-pressure fuel pump, can be considered. The first contributes to an increase in the degree of orientation of fuel molecules in the boundary layer and the thickness of the boundary layer, and the second leads to the appearance of additional hydrodynamic forces between the surfaces. Both options contribute to stable hydrodynamic lubrication, or boundary lubrication without direct contact of the surfaces. The use of such methods reduces energy losses on the drive of high-pressure fuel pumps, provides the required fuel injection pressures and minimizes fuel losses through the diametrical clearance in the plunger-sleeve pair during injection.

References

1. Sagin S. V. *Cavitation Treatment of High-Viscosity Marine Fuels for Medium-Speed Diesel Engines* / S. V. Sagin, V. G. Solodovnikov // *Modern Applied Science; Published by Canadian Center of Science and Education*. – 2015. Vol. 9. – № 5. – P. 269-278. DOI: 105539/mas.v9n5p269.
2. Zablotsky Yu. V. *Maintaining Boundary and Hydrodynamic Lubrication Modes in Operating High-pressure Fuel Injection Pumps of Marine Diesel Engines* / Yu. V. Zablotsky, S. V. Sagin // *Indian Journal of Science and Technology, Published by Indian Society of Education and Environment, May 2016*. – Vol. 9. – Iss. 20. – P. 208-216. DOI: 10.17485/ijst/2016/v9i20/94490.
3. Sagin S. V. *Motor Oil Viscosity Stratification in Friction Units of Marine Diesel Motors* / S. V. Sagin, O. V. Semenov // *American Journal of Applied Sciences, Published by Science Publication, 2016*. – Vol.13. – Iss. 2. – P. 200-208. DOI: 10.3844/ajassp.2016.200.208
4. Sagin S. V. *Determining the thickness of the boundary layer lubrication of marine motor oils by optical methods* / S. V. Sagin, O. V. Semenov // *Science and Education: material of the XIII international research and practice conference, Munich, November 2nd – 3rd, 2016* / publishing office Vela Verlag Waldkraiburg – Munich – Germany 2016. – P. 82-89.
5. Sagin S. V. *Estimation of Operational Properties of Lubricant Coolant Liquids by Optical Methods* / S. V. Sagin, V. G. Solodovnikov // *International Journal of Applied Engineering Research*. – 2017. – Vol. 12. – Num. 19. – P. 8380-8391. Research India Publication
6. Kiriyan S.V. *Rheology of motor oils with quasi-liquid crystalline layers in the friction triad* / S.V. Kiriyan, B.A. Altoiz // *Friction and wear*. - 2010. - Vol. 31; No. 3. - P. 312-318.
7. Zablotsky Yu. V. *Use of organic coatings to increase the reliability of fuel injection equipment work for marine diesel engines* / Yu. V. Zablotsky // *European Science and Technology: material of the XVI international research and practice conference, Munich, March 14th – 15th, 2017* / publishing office Vela Verlag Waldkraiburg – Munich – Germany 2017. – P. 104-112.

确保船用柴油机的环境性能指标

ENSURING ENVIRONMENTAL PERFORMANCE INDICATORS OF MARINE DIESEL ENGINES

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抽象。 考虑了船用低速柴油机废气再循环对其环境, 经济和能源性能参数的影响。 结果表明, 使用再循环系统时废气中NOHO浓度的降低可达37.9 ... 53.5%。 建议以EGR系统为主要途径, 降低NOX排放水平, 确保该参数水平符合国际组织的要求。

关键词: 船用低速柴油机, 柴油机环境性能, 废气中氮氧化物浓度, 废气再循环系统

Abstract. *The influence of exhaust gas recirculation of a marine low-speed diesel engine on its environmental, economic and energy performance parameters is considered. It is shown that a decrease in the concentration of NOX in exhaust gases when using a recirculation system can reach 37.9 ... 53.5%. It is proposed to use the EGR system as the main way to reduce the level of NOX, emission, ensuring the level of this parameter in accordance with the requirements of international organizations.*

Keywords: *marine low-speed diesel, environmental performance of a diesel engine, concentration of nitrogen oxides in exhaust gases, Exhaust gas recirculation system*

The problem of ensuring the environmental safety of heat engines is constantly attracting the attention of both researchers and designers. Moreover, as a rule, technical solutions that provide improved environmental performance lead to an increase in the cost of a power plant and an increase in fuel consumption for efficient operation.

The most common type of heat engines currently are internal combustion engines (diesels), which are installed on the vast majority of means of transport: road, rail, river, sea. Moreover, diesel power plants of marine vessels are the most powerful, and their operation is carried out not only in accordance with the requirements of manufacturers, but also international environmental standards. So, for example, the International Maritime Organization (IMO) controls the maintenance of strict requirements, the implementation of which ensures the environmental performance of diesel engines of sea and river vessels [1].

The operation of any heat engine (including diesel) is impossible without the release of exhaust gases into the environment, the final element in the chain liquid fuel - air - gas-air mixture - combustion products. By their nature, diesel exhaust gases are a very complex mixture of vapors, gases, droplets of liquids and particles and contain about 270 substances, some of which are non-toxic. When using hydrocarbon fuels of petroleum origin and atmospheric air as an oxidizing agent, the exhaust gases of marine power plants consist of 99.2% of non-toxic components - products of incomplete combustion (carbon dioxide CO_2 and water vapor H_2O) and air with a low oxygen content of O_2 . All toxic components that form in marine diesels can be divided into two groups. The first group includes products of incomplete combustion of fuel - these are carbon monoxide, hydrocarbons, aldehydes, soot. The toxic components of the second group are formed as a result of the complete oxidation of the chemical elements that make up the fuel and air - these are nitrogen NO_x and sulfur SO_x oxides [2].

Despite the development of heat engines that use natural gas or biodiesel, the vast majority of ships use liquid fuel for their movement [3], therefore, the task of reducing the concentration of harmful atmospheric emissions resulting from its combustion will be relevant, by a minimum assessment, throughout the next decade.

Reducing the concentration of NO_x in exhaust gases is achieved: by influencing the working process occurring in the cylinder of the diesel engine; a change in the design and operation parameters of high-pressure fuel equipment; the introduction of reagents into the exhaust gases as they pass through special reactors; using an exhaust gas control system that provides either exhaust gas recirculation (EGR) or exhaust gas bypass (Exhaust gas wastegate).

In the last decade of the exhaust gas recirculation system, they are increasingly used both in stationary and marine power to reduce the concentration of nitrogen oxides NO_x in exhaust gases of diesel engines. The development of these systems and their installation are carried out for newly designed vessels. Extensive experience in the technical operation of these systems does not currently exist, and recommendations for their use are mainly based on theoretical studies and modeling of the processes occurring during this [4].

One of the features of the operation of ships is their accountability to international classification societies (for example, Lloyd's Register of Shipping - England, Bureau Veritas - France, Det Norske Veritas & Germanischer Lloyd - Germany, The American bureau of shipping - USA). Moreover, one marine vessel may be under the supervision of several companies. Based on empirical experience, statistical accounting and scientific research, these organizations develop their own Rules for the classification of ships and maintain a system of continuous monitoring of compliance with these rules on classified vessels. This limits the possibility of making structural changes in the design of marine power equipment

(both thermal and mechanical engines, and systems that ensure their operation) without appropriate coordination with these supervisory authorities. The ship's crew, in the performance of their functional duties, is deprived of the possibility of independent re-equipment of both the power plant itself and the systems serving it. Therefore, the task of both ship mechanics and representatives of research organizations is to determine the optimal operating conditions for a ship power plant without making any improvements and upgrades to its design [5].

Therefore, this article proposes the results of experimental studies performed on a Mitsubishi 7UEC60LS marine low-speed diesel engine (equipped with a standard ERG system) which made it possible to determine the effect of the exhaust gas recirculation system on the environmental, energy, and economic indicators of its operation. Main characteristics of the diesel engine: type - push-pull; cylinder diameter - 600 mm; piston stroke - 2400 mm; number of cylinders - 7; rated power - 12600 kW; the speed corresponding to the rated power is 82 rpm. The schematic diagram of a Mitsubishi 7UEC60LS diesel engine with an exhaust gas recirculation system is shown in Fig. 1.

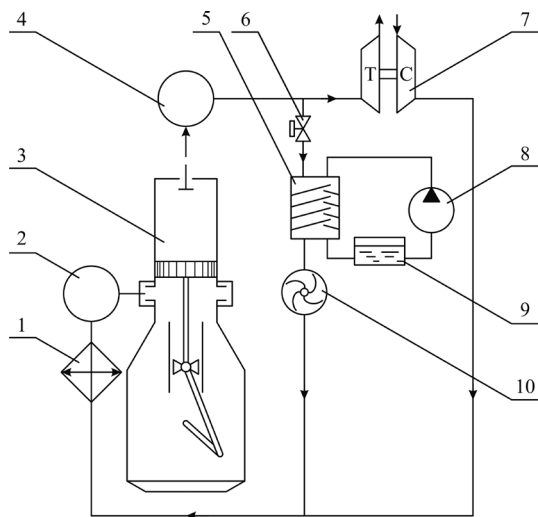


Fig. 1. Schematic diagram of the exhaust gas recirculation system for low-speed marine diesel 7UEC60LS from Mitsubishi:

- 1 - air cooler; 2 - air receiver; 3 - diesel cylinder; 4 - exhaust manifold;
- 5 - scrubber; 6 - control valve of the exhaust gas recirculation system;
- 7 - gas turbocharger; 8 - water pump; 9 - water tank;
- 10 - gas supercharger with electric drive; T, C - gas turbine and air compressor

Exhaust gases from the cylinder of the diesel 3 enter the exhaust manifold 4 and then to the gas turbocharger 7, after which they are removed to the atmosphere through the exhaust pipe. The gas turbocharger 7 takes air from the engine room and, after compression, directs it through the cooler 1 and receiver 2 to the blow-down windows of the diesel engine. The exhaust gas recirculation system consists of a control valve 6, a gas scrubber 5, a supercharger 10, a water tank 9 and a water pump 8. In the case of using an exhaust gas recirculation system, their amount is regulated by valve 6. The exhaust gases are cleaned and pre-cooled in the scrubber 5, after which, with an additional supercharger, are fed into the mixture with air (coming from the gas turbocharger 7) and fed to the cooler 1 and receiver 2 and then through the purge windows into the cylinder of the diesel 3.

The aim of the study was to determine the effect of the degree of exhaust gas recirculation on the change in the following diesel engine performance indicators: NO_x concentration in exhaust gases, Specific fuel oil consumption (SFOC), effective power N_e .

Monitoring the concentration of harmful components in exhaust gases is most appropriate to determine using portable gas analyzers. In our experiments, the concentration of NO_x (as well as the concentration of O_2) in the exhaust gases was determined using a German gas analyzer Testo350XL, which allows us to determine the concentrations of the following substances: CO , O_2 , N_2 , NO_x , CH_4 , SO_2 , H_2S in the temperature range $-40 \dots 1200 \text{ }^\circ\text{C}$, which completely covers the temperature range of the exhaust gases of the diesel engine in all modes of its operation.

The degree of exhaust gas recirculation during the experiments varied in the following values: $\text{EGR}=4.7 \%$, $\text{EGR}=9.8 \%$, $\text{EGR}=14.6 \%$, $\text{EGR}=18.8 \%$ and was calculated by the expression

$$\text{EGR} = \frac{\alpha_{\text{EGR}}}{\alpha},$$

where α – is the current value of the coefficient of excess air depending on the diesel load;

α_{EGR} – is the excess air ratio when using an exhaust gas recirculation system.

The experiments were performed for the following high-speed diesel operation modes: 55, 65, 75, and 80 rpm, which corresponded to the values of the relative diesel power: $0.3N_{enom}$, $0.5N_{enom}$, $0.77N_{enom}$ and $0.93N_{enom}$. As N_{enom} the rated power corresponding to its value of the coefficient of excess air α .

To determine the energy performance of a diesel engine, it was indexed using the Doctor's ship diagnostic system, which allows determining the effective diesel power in any of the considered modes [6].

To determine the economic performance of a diesel engine, the Specific fuel oil consumption value was calculated. At the same time, for each mode of operation of a diesel engine, the hourly fuel consumption was determined using marine measuring means.

The research results are shown in Fig. 3-5.

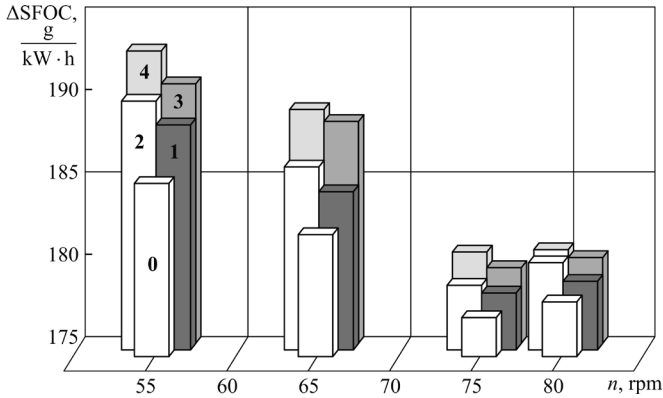


Fig. 3. Change in SFOC, g/(kW·h) in the exhaust gases of Mitsubishi marine diesel engine 7UEC60LS, depending on the rotation speed n, rpm and the degree of EGR, %:
 0 – work without recirculation (EGR=0 %); 1 – EGR=4.7 %; 2 – EGR=9.8 %;
 3 – EGR=14.6 %; 4 – EGR=18.8 %

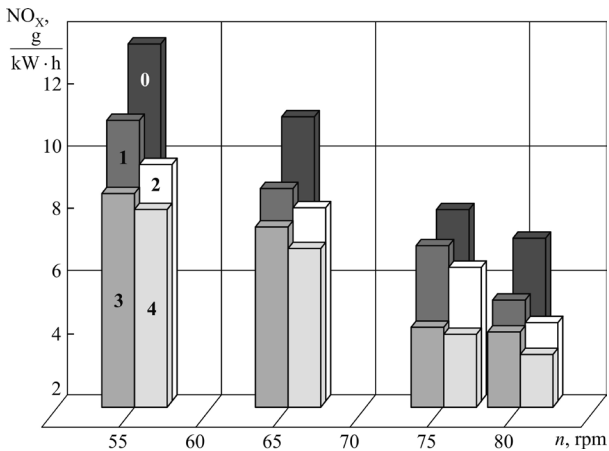


Fig. 4. Change in the concentration of nitrogen oxides NO_x, g/(kW·h) in the exhaust gases of Mitsubishi marine diesel engine 7UEC60LS, depending on the rotation speed n, rpm and degree of EGR, %:
 0 – work without recirculation (EGR=0 %); 1 – EGR=4.7 %;
 2 – EGR=9.8 %; 3 – EGR=14.6 %; 4 – EGR=18.8 %

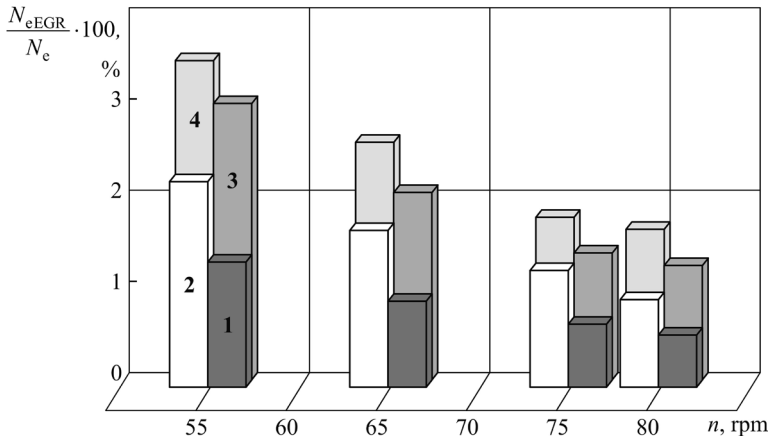


Fig. 5. The relative decrease in the effective power $\frac{N_{eEGR}}{N_e} \cdot 100, \%$ of a Mitsubishi 7UEC60LS marine diesel engine, depending on the crankshaft speed n , rpm and the degree of gas recirculation EGR: 1 – 4.7 %; 2 – 9.8 %; 3 – 14.6 %; 4 – 18.8 %

The following things should be noted as the main conclusions from the results of the studies.

Currently, such a method of reducing the level of NO_x emissions of marine diesel engines such as the use of exhaust gas recirculation is most optimal in the first place from the point of view of its technological design and ensures compliance with international environmental standards [7].

The EGR system provides a forced supply of exhaust gases to the diesel cylinder, while the ratio between the combustible components of the fuel (carbon, hydrogen and sulfur) and the oxidizer (oxygen contained in the air) changes in the cylinder. This (with a constant amount of fuel supplied to the cylinder) worsens the combustion process, reduces the maximum temperature in the cylinder and reduces the amount of nitrogen oxides. The NO_x emission level is inversely related to the degree of recirculation of the EGR system.

The solution of tasks on ensuring the environmental parameters of marine diesel engines is associated with maintaining the required cost-effectiveness and efficiency of the diesel engine. The use of additional methods to reduce the emission of nitrogen oxides in exhaust gases simultaneously leads to an increase in the specific effective fuel consumption and to a decrease in diesel power. In our opinion, a decrease in diesel power is associated with a decrease in the amount of exhaust gases entering the gas turbocharger, and a simultaneous proportional increase in

the number of exhaust gases entering the diesel cylinder (through the recirculation system). The first reduces the power of the gas turbocharger, and the second leads to a decrease in the coefficient of filling of the cylinder with fresh air. In both cases, there is a direct proportional dependence of the diesel power on these parameters, which leads to a drop in effective power with increasing degree of ERG.

Decrease in effective power $\frac{N_{eEGR}}{N_e} \cdot 100\%$ when using EGR system at

modes close to the nominal frequency of the crankshaft $n_{work} = 0.975n_{nom}$ (which corresponds to operational load $N_{ework} = 0.93N_{enom}$) amounts to 0.36...1.2 % (with a corresponding change in EGR level 18.8...4.7 %) and with high-quality technical operation of the diesel engine does not significantly affect the speed characteristics of the vessel. When operating a diesel engine at speed modes $n_{work} = 0.91n_{nom}$ (when $N_{ework} = 0.77N_{enom}$), $n_{work} = 0.79n_{nom}$ (when $N_{ework} = 0.5N_{enom}$), $n_{work} = 0.67n_{nom}$ (when $N_{ework} = 0.3N_{enom}$) a decrease in effective power can reach 2.48 ... 3.43%. In our opinion, this is facilitated by the deterioration of the gas exchange process in the cylinder and the increase in the intensity of heat removal from the air-gas mixture in the cylinder walls at lower rotational speeds of the crankshaft.

An increase in the amount of exhaust gas entering the diesel cylinder while increasing the degree of EGR recirculation and a deterioration of the gas exchange process in the cylinder are also the main reason for the increase in SFOC when using the EGR system. In our opinion, the reason for this is a change in the stoichiometric ratio, as well as an increase in heat loss from incomplete combustion of fuel. The largest increase in specific effective fuel consumption corresponds to diesel operating modes with a minimum crankshaft speed.

References

1. Golikov V. A. *A simple technique for identifying vessel model parameters / V. A. Golikov, V. V. Golikov, Ya. Volyanskaya, O. Mazur, O. Onishchenko // IOP Conference Series (Scopus): Earth and Environmental Science. 4th International Scientific Conference SEA-CONF 2018, Published by IOP Publishing Ltd, 2018. – Vol. 172. – № 012010. – P. 1-8. – doi :10.1088/1755-1315/172/1/012010*
2. Sagin S. V. *The Use of Exhaust Gas Recirculation for Ensuring the Environmental Performance of Marine Diesel Engines / S. V. Sagin; O. A. Kuropyatnyk // OUR SEA : International Journal of Maritime Science & Technology. – June 2018. – Vol. 65. – № 2. – P. 78-86. doi.org/10.17818/NM/2018/2.3.*
3. Zablotsky Yu. V. *Maintaining Boundary and Hydrodynamic Lubrication Modes in Operating High-pressure Fuel Injection Pumps of Marine Diesel Engines / Yu. V. Zablotsky, S. V. Sagin // Indian Journal of Science and Technology, Published by Indian Society of Education and Environment, May 2016. – Vol. 9. – Iss. 20. – P. 208-216. DOI: 10.17485/ijst/2016/v9i20/94490.*
4. Kuropyatnyk O. A. *Reduction of NO_x emission in the exhaust gases of low-speed marine diesel engines / O. A. Kuropyatnyk // Austrian Journal of Technical and Natural Sciences, Vienna-2018. – № 7-8 (July-August). – P. 37-42. doi.org/10.29013/AJT-18-7.8-37-42*
5. Sagin S. V. *Cavitation Treatment of High-Viscosity Marine Fuels for Medium-Speed Diesel Engines / S. V. Sagin, V. G. Solodovnikov // Modern Applied Science; Published by Canadian Center of Science and Education, Vol. 9, № 5. – 2015. – P. 269-278. DOI:10.5539/mas.v9n5p269 (Indexed by Scopus)*
6. Sagin S. V. *Motor Oil Viscosity Stratification in Friction Units of Marine Diesel Motors / S. V. Sagin, O. V. Semenov // American Journal of Applied Sciences. – 2016. – Vol. 13. – Iss. 2. – P. 200-208. DOI: 10.3844/ajassp.2016.200.208*
7. Kuropyatnyk O. A. *Exhaust Gas Recirculation as a Major Technique Designed to Reduce NO_x Emissions from Marine Diesel Engines / O. A. Kuropyatnyk, S. V. Sagin // OUR SEA : International Journal of Maritime Science & Technology. – 2019. – Vol. 66. – № 1. – P. 1-9. https://doi.org/10.17818/NM/2019/1.1*

利用X射线分析分析突出和冲击带煤矿石煤研究中的不同处理方法

**ANALYSIS OF DIFFERENT METHODS OF TREATMENT
IN THE STUDY OF STONE COAL FROM OUTBURST AND IMPACT
ZONES COAL MINE WITH THE HELP OF X-RAY ANALYSIS**

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注解。 通过X射线荧光分析 (XRF) 研究了煤矿突出和冲击区煤样制备效果的研究结果。 使用便携式RF分析仪通过快速方法进行测试。 考虑各种等级的煤谱的例子。 结果表明, 煤尘的分散组成和来自高岩石压力区域的煤颗粒的大小不会影响RF光谱中K α 线铁的能量峰值。

关键词: 煤, 样品制备, 光谱, 气动现象, 突出危害, 电击危害, X射线荧光分析。

Annotation. *The results from research of the effect of coal samples` preparation from outburst and impact zones of coal mines by X-ray fluorescence analysis (XRF) are presented. Tests were carried out by the express method using a portable RF analyzer. The examples of coal spectra of various grades are considered. It is shown that the dispersed composition of coal dust and the size of coal particles from areas of high rock pressure do not affect the peaks of the energy of the K α -line of iron in the RF spectrum.*

Keywords: *coal, sample preparation, spectrum, gas-dynamic phenomena, outburst hazard, shock hazard, X-ray fluorescence analysis.*

Introduction

During mining coal and penetrating development workings, it is necessary to consider both the composition of the substance and mineral inclusions. In this regard, there is interest of works, which are related to the development of ideas about the role of minerals in the formation of coal properties [1-6,8,10].

Coal research methods using an RF analyzer have an increasing scope in the study of fire, industrial safety and forecasting gas-dynamic phenomena (hereinafter referred to as GDF). Gas-dynamic phenomena, such as rock bursts, sudden emissions of coal and gas, sudden coal extrusions and dynamic destruction of soil rocks, cause accidents and cause significant environmental, technological and social damage. Therefore, a topical issue remains a thorough study of the theory of the occurrence and development of hazardous manifestations of rock pressure for the development of reliable methods for predicting HDT and protective measures aimed at preventing the occurrence of gas-dynamic phenomena [1-6,8,10].

Theory of the Question

In recent years, work has emerged related to the use of nuclear magnetic resonance (hereinafter referred to as NMR), IR spectroscopy, X-ray analysis, Mesbauer and X-ray fluorescence spectroscopy, demonstrating the effect of iron-containing inclusions on the characteristics of coal substance in predicting outburst zones of coal seams in working faces and mining formations development workings [1,5-8].

In the rapid methods, it is effective to use portable X-ray fluorescence analyzers (RF analyzers) of various manufacturers with energy dispersive spectrum recording. The metrological and technical characteristics of the spectrometers allow for the qualitative and semi-quantitative analysis of selected coal samples in field and laboratory conditions [11].

One of the most important part of an analysis is the preparation of coal samples for the instrument. There is no single approach to the grain composition of lump samples of coal and dispersion mixtures of coal dust. Some researchers [1,3] work with samples in the form of small solid lumps of coal 5–15 mm in size on the largest side and even relatively large pieces of up to 40 mm in size (Fig. 1).

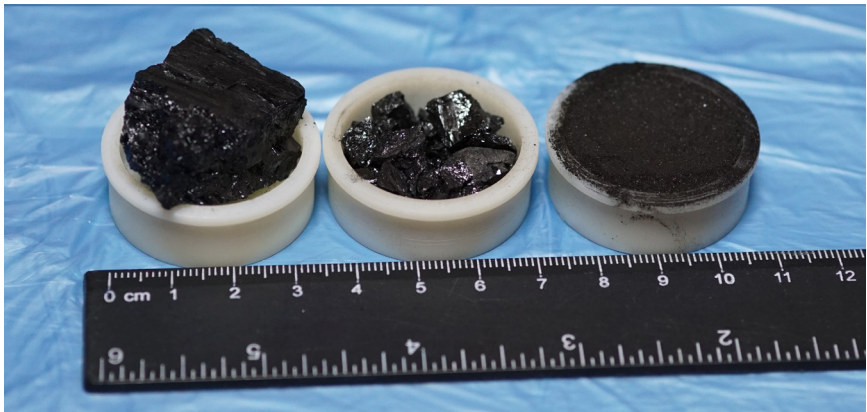


Figure 1. Samples of coal and dust, size the largest side is 5-15 mm and 30-40 mm

Most researchers work with fractions of 71 (63) μm prepared according to GOST [10] tablets, representing a cylinder with a diameter of 20 mm and a height of 3-4 mm with a substrate glued on one side (Fig. 2). This technique was developed to determine the ash content of mineral fuels and requires quite time-consuming and lengthy preparatory work using special equipment (presses, molds, etc.).

Despite this, such samples are recommended by the manufacturer of the RF analyzer for the study of bulk materials, as they fit freely into the cuvette, are easily labeled, are well transported and can be stored for a long time in a packaged form.



Figure.2. Coal sample prepared in accordance with GOST

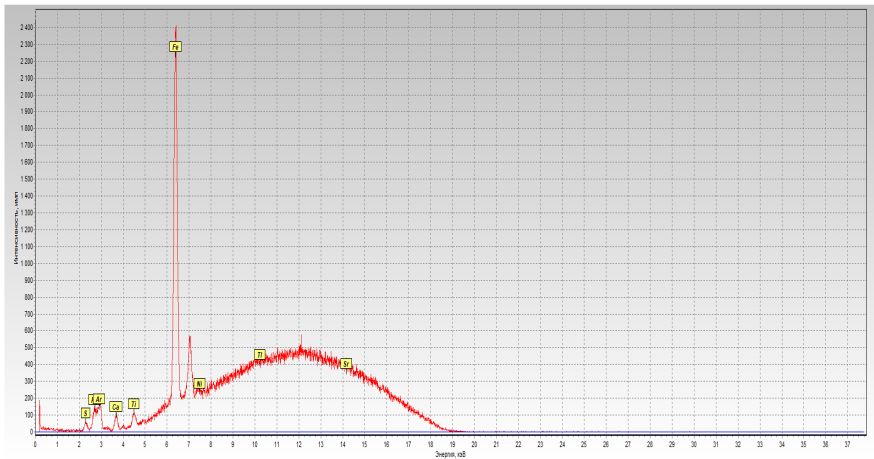
The described variants of sample preparation suggest that there are no standard methods for working with portable RF analyzers of standard methods and it is proposed to determine the sample preparation by the researchers themselves. This raises the question of the feasibility of complex preparatory operations, and most importantly, determining the degree of influence of the method of sample preparation on the test results.

Experimental technique

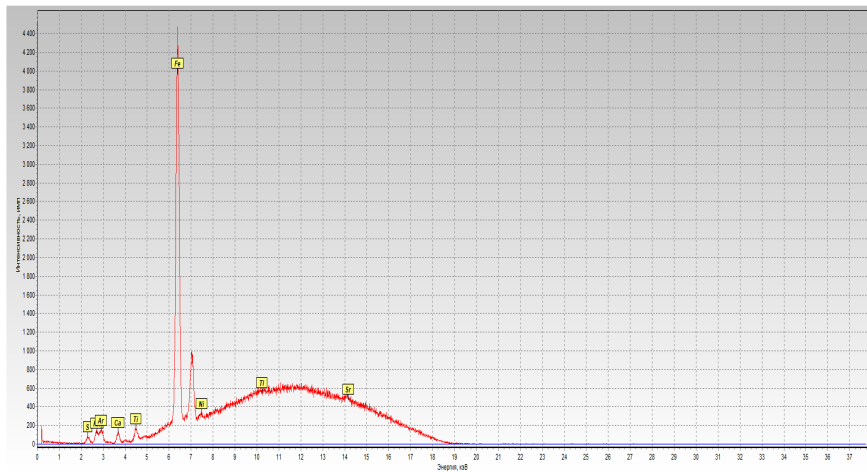
The authors proposed to simplify preparation of samples and place in the cuvette coal obtained as a result of sampling directly from the well (drilling fines) while predicting the outburst hazard of the seams or ground pieces of coal repulsed from the same seams that are pre-crushed and sieved to the 315 micron fraction. Coal in this form of powder is poured into the cuvette to the edges and slightly pressed down from the top with a metal ruler to level the surface (Fig.3). It turns out an even layer of powdered coal, which allows to obtain similar results from several measurements to determine the average value, which is obtained by moving and turning the cuvette relative to the radiator.



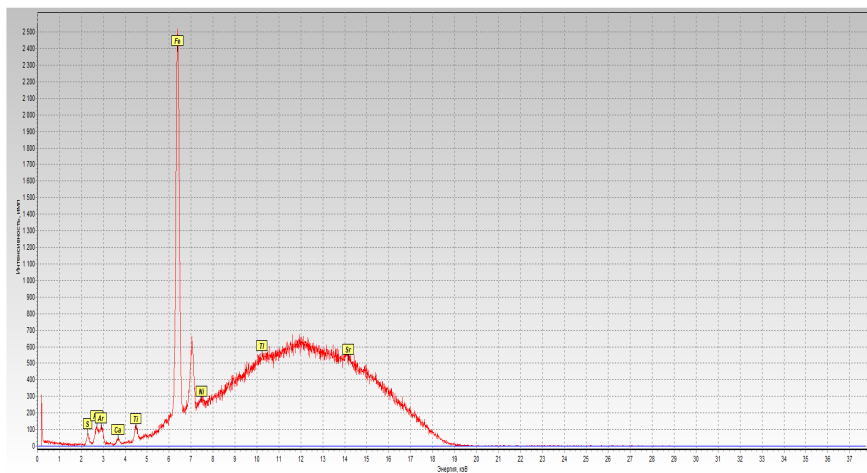
Picture. 3. Ground coal dispersion 315 microns prepared for testing



Picture. 4. XRF spectrum of compressed coal samples (tablet)



Picture. 5. XRF spectrum of crushed coal samples



Picture. 6. XRF spectrum of large samples of coal

As part of the study, an RF analysis was performed (hereinafter referred to as XRF) of coal samples taken from outburst-hazardous strata of the Pechora and Kuznetskii area. The coal of the grades Zh, KO, SS and K was investigated. All samples of coal are prepared using the methods listed in this article. The analysis was carried out on the X-Spec-50H RF analyzer manufactured by Scientific Instruments JSC (St. Petersburg) [11]. As an example, the spectra of coal from the Anzherskaya South mine of reservoir 27 (Kuzbass) at a depth of 420 m is shown (Fig.4, 5).

RF analysis was used by the authors to determine the primary signs of outburst hazardous areas using qualitative and semi-quantitative analysis of coal samples from these zones. This article does not consider a detailed spectrum analysis. The main idea of this work is to show the effect of sample preparation on the character of RF analysis.

The analysis of the samples was carried out with the same shooting parameters, regardless of the method of sample preparation. The spectra were obtained with shooting parameters: $U = 20 \text{ kV}$, $I = 10 \mu\text{A}$, exposure time 100 sec.

In [1,3,5,6], the difference in the spectra of coal from outburst zones is shown, the presence of the $K\alpha$ -line peak of iron, exceeding the background of other elements and the primary X-ray radiation produced by the device 6-10, and sometimes 10-20 times. Therefore, in studies assessing the propensity of coal to emissions, the focus is precisely on the characteristics of the iron lines.

All three spectra show that the energy value for iron lines is between 6.2–6.4 keV ($K\alpha$) and 7.0–7.1 ($K\beta$) keV for three samples, regardless of grain and dispersion of ground coal. The same coincidence of energy values is observed for the other elements. Moreover, for pressed and crushed samples, the intensities of the iron lines are the same. A surge in the intensity of iron lines for large samples requires a separate explanation, especially since for some types of coal the difference in intensity is not so significant.

Conclusion

Researches were carried out on coal of various grades of outburst zones of the Kuznetsk (named after Dzerzhinsky, Berezovskaya, Anzherskaya-Yuzhnaya, Pervomaiskaya) and Pechora basin (named Zapolyarnaya and Komsomolskaya). When comparing the spectra, a complete coincidence of the energy lines of iron was observed, regardless of method of sample preparation.

Researches of the effect of sample preparation on the nature of the X-ray fluorescence spectrum showed the possibility of using both pressed, and crushed and even coarse-grained coal without a significant change in the energy of the iron lines. The dependence of the main indicators of the spectrum on the method of sample preparation was not detected. The proposed approach to sample preparation simplifies the preparation of samples and facilitates the applicability of rapid methods in both laboratory and field conditions.

References

1. Ulyanova E. *Structural and compositional restructuring in fossil coals. The relationship of the microstructure with the kinetics of rock processes: monograph.* - Saarbrücken: Palmarium Academic Publishing, 2012. – 304 p.
2. Malinnikova O. *Formation conditions and methodology for prediction of gas-dynamic phenomena with technogenic impact on coal seams. Thesis for the degree of doctor of technical sciences number.25.00.20.* - M., 2011. – p.269.
3. Alekseev A., Ulyanova E. etc. *Features of the structure of coal outburst zones // Collection of scientific papers GIAB.* – 2010. – №11. – p.165-177.
4. Podgaretsky A., Epstein S. etc. *The role of iron-containing mineral components in the formation of coal properties // Collection of scientific papers GIAB.* – 2012. – №7. – p.306-318.
5. Burchak O., Gordienko A., // *Collection of scientific papers geomechanical mechanics* 2012. – №98. – p.84-89.
6. Krivitsky A., Rodionov V., Pikhkonen L., Zhiharev S. *Increasing fire and industrial safety of coal mines on the basis of expresses of evaluation of the degree emissions // Tulsky state university.T.2 – Tula, 2018. – p.154-162.*
7. Krivitsky A., Rodionov V., Vagapov R. *Possibilities of X-ray fluorescence analysis for the prevention of fire/ explosion as a result of the manifestation of gas-dynamic phenomena // Life safety: problems and solutions - 2017. Saint-Petersburg. - p. 163-166, 2017.*
8. *GOST R 55661-2013 (ISO 1171:2010). Topливо tverdoe mineral'noe. Opre-delenie zol'nosti M.: Standart-form, 2014.*
9. *Spektrometry rentgenofluorescentnye portativnye «X-SPEC». Tekhnicheskoe opisanie I rukovodstvo po ehkspluatatsii SPNP.412.RFP.02.00.000 REH. SPb: ZAO «Nauchnye pribory», 2012. – 131 p.*

计算涂层系统未破坏元素的算法
**ALGORITHM FOR CALCULATING
NON-DESTROYED ELEMENTS OF A COATING SYSTEM**

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抽象。根据法规要求，在北部地区运输建筑和结构涂层的设计支撑结构中，确定了它们对渐进（链）坍塌的抵抗力。为确保安全，北部地区建筑物的结构系统必须确保其耐用性和稳定性，至少在疏散人员所需的时间内。为了提高涂层支撑结构的可靠性，提出并研究了类型sprengel的冗余系统。提出了塌陷的情景和用于计算涂层系统的完整元素的算法。给出了研究结果，表明通过改变备用系统的刚性参数，可以实现系统各个元件坍塌的最小损害。

Abstract. *At design supporting structures for coatings of transport buildings and structures for northern areas in accordance with regulatory requirements, their resistance to progressive (chain) collapse is determined. To ensure safety, the structural system of the building in the northern areas must ensure its durability and stability, at least for the time necessary to evacuate people. To improve the reliability of the supporting structures of coatings proposed, developed and researched the system of redundancy of the type-sprengel. The scenario of collapse and an algorithm for calculating the intact elements of the coating system are proposed. The results of the study are given, which indicate that by varying the rigid parameters of the backup system it is possible to achieve minimal damage from the collapse of individual elements of the system.*

1. Introduction

The history of occurrence of the term "progressing collapse" and possible ways of prevention of its emergence in the northern areas.

Among the main properties that must be possessed by buildings and structures is “survivability”. Under the survivability refers to the property of the object to maintain a limited performance under the effects not stipulated by the operating conditions, or the property of the object to maintain a limited performance in the presence of defects or damage of a certain type, as well as the failure of some components.

The term “progressive collapse” and the formulation of the problem of protection against it (understood as an analogue - “survivability”) of buildings arises in 1968 in the report of the commission investigating the causes of the accident at the 22-storey Ronan Point residential building in London [1-2].

After the publication of the report, in almost all developed countries, studies of this problem were initiated, and by the end of the 70th years an analysis of possible means of protection against the progressive collapse of buildings of various structural systems, taking into account economic indicators, was largely completed.

The main conclusions drawn by various researchers and the changes that followed the other’s design standards of other countries (mostly Western European states) turned out to be similar. During the subsequent development of parameters for rationing the level of protection of buildings and structures from such situations, another term “disproportionate destruction” which is characterized by the volume and the area of the building which can collapse during the destruction or failure of (any) each individual carrier element.

Currently, this is the value of disproportionate destruction in the form of the permissible total square near the site of local destruction of the element, which is normalized in European countries - in Eurocodes and relevant national standards, construction laws and construction codes [3-4].

At the moment, the main documents describing solutions to the current issue of progressive destruction throughout the world are:

- United Kingdom - BS 5950 2001, BS 8110 2005a, 2005b, BS 5628 2005;
- Eurocode - EN 1990, EN 1991-1-7;
- Canada - NBCC;
- USA - ACI 318, GSA 2003, DOD 2005;
- RF - recommendations for the protection of buildings and structures. Since 2017, a set of rules “protection of buildings and structures from progressive collapse” has been developed.

Also, with regard to the Russian practice of recent years in the regulatory and methodological literature is mainly used only the term "protection from progressive collapse" and does not provide other possible approaches to ensure the reliability of buildings and structures. In the listed regulatory documents there is no uniform approach to defining the problem and forming possible solutions, but the following provisions unite all the listed standards:

- all the supporting elements that form the building system should be resistant to collapse after the local collapse of individual elements of the system under different environmental or any other nature;
- local destruction of individual structures of the system is possible, but the redistributed load must be perceived by the remaining elements of the system without the danger of their destruction;
- the constructive system of the building must ensure its durability and stability, at least for the time necessary for evacuation of people;
- calculation on the progressing (avalanche) destruction is carried out on a special combination of loads and impacts (permanent and temporary long-term loads). Load reliability factors should be taken to be 1.

2. Methods

Methods for assessing the degree of damage or the operational suitability of structures throughout in the northern districts are somewhat different, in some documents the area of damaged floor structures is limited; in others, the state of the structures that have not left work is assessed; as well as the economic benefits of building a new one or restoring an old building.

The main means of a building from progressive collapse is a method of reservation the strength of load-bearing structures, ensuring the bearing capacity of the elements of a framework of the building (structures of coatings and floors, structure nodes, creating continuity and continuity of floor reinforcement, etc.).

As mentioned above, reservation is a method of increasing the reliability of an object by installing additional elements that exceed the minimum required for the normal execution by the object of its functional purpose. In this case, the system failure occurs only if the main and all backup elements fail. The system of reservation can be represented from a number of stages, each of which performs certain functions of the system. The task of redundancy is to find such a number of backup samples at each stage, which will provide a given level of reliability of the system at the lowest cost [5-6].

3. Results and discussion

The proposed technical solution:

There is a number of technical solutions which application allows to increase viability of the carrier systems in the conditions of collapse. The following new technical solutions which can help to increase bearing capacity of a framework of the one-storey industrial building.

The frame of a one-storey industrial building includes single-span frames, a system of vertical and horizontal stiffness links. The frames consist of columns and rigels, which are truss. Neighboring frames are interconnected by a system of horizontal and vertical cover links. In addition to the structurally designed communication systems and spacers of the coating, additional ties are established along the upper belt of the trusses along the perimeter of the building, forming a closed rigid contour (Figure 1).

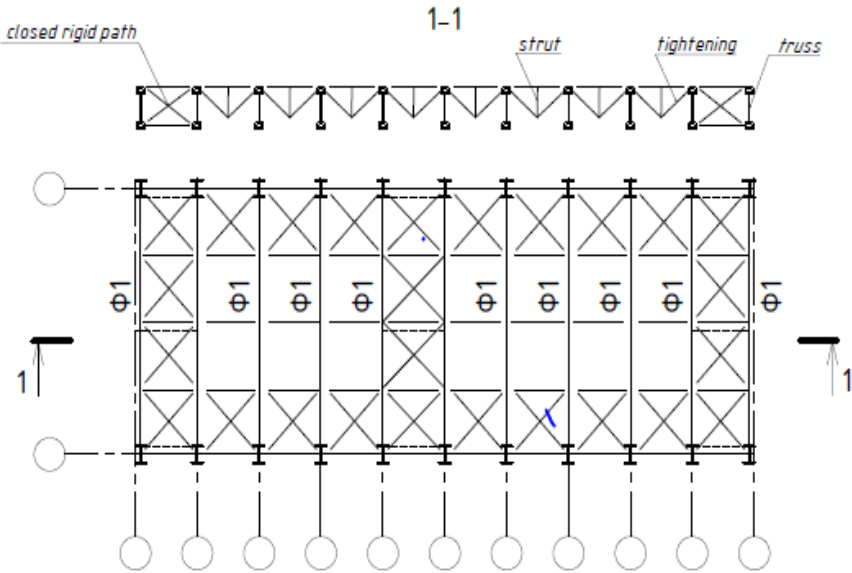


Figure 1. The plan of the industrial building and the scheme of elements of reservation

This goal is achieved by the fact that the trusses are connected between themselves with spacers and puffs, which are fastened through sliding racks with the possibility of slipping to the struts of the upper belt of the trusses, and to the trusses themselves at the points of their mutual intersection.

The reservation system can be represented as a core system with shearing bolts or with bursting inserts.

Due to the presence of these signs, the expected effect is achieved, which consists in the fact that with progressive collapse, when one of the trusses of the building frame is destroyed (figure 2), under the action of the weight of the truss, a load is transferred to the rope (tightening) and a shear bolt is cut (for the first system of reservation), or the bolt joints of the core system with a discontinuous liner "along the chain" and the loss of stiffness of the liner itself (for second version of the system of reservation), the truss falls onto the rope, which absorbs the weight of the truss with the overlying structures. This will prevent the fall of structures on people and equipment [7-8].

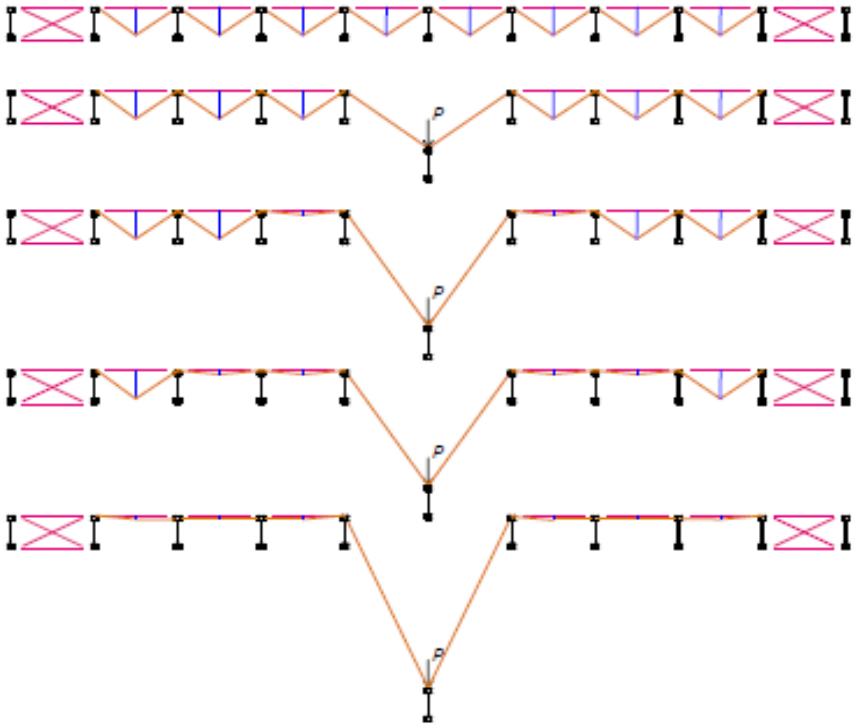


Figure 2. Of the system of reservation operation diagram

4. Calculation of the proposed system

For convenience of calculation, we replace the system of reserved racks with a system consisting of springs.

The elastic work of the safety tightening will be presented in the form of springs with equivalent rigidity equal to

$$c(x) = \frac{EA_t}{l_t} \quad (1)$$

where E is the modulus of elasticity of tightening, N/m²

A_t - is the cross-sectional area of a tightening, m²;

l_t - puff length, m

To find the speed and length, each tightening is considered separately, and the final data obtained in the calculation for the previous spring will be initial for the subsequent ones.

The potential energy with a vertical downward movement is:

$$E = mgh, \tag{2}$$

where m is the mass of the truss, kg;
 g - acceleration of gravity, m/c^2 ;
 h - free fall of the truss, m

The potential energy of a deformed body is

$$E_p = \frac{c(x)h^2}{2}, \tag{3}$$

where $c(x)$ is the rigidity of the safety tightening, N/m;
 h - elongation, m

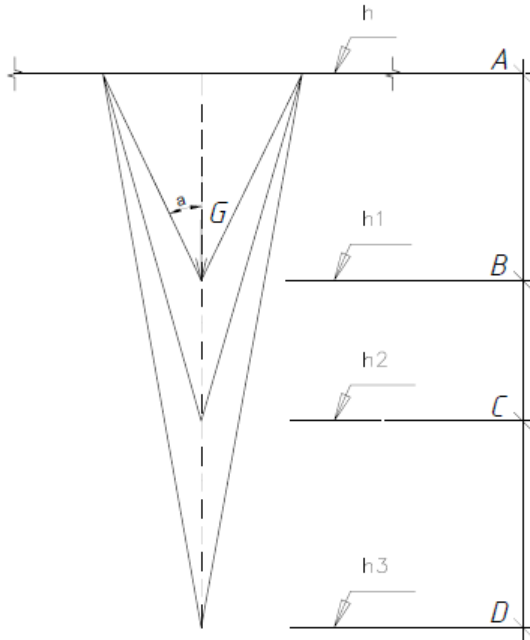


Figure 3. A schematic image of the fall of the truss

The calculation is carried out in stages (Figure 3):

- 1) The beginning of the fall of the truss (a segment AB).
- 2) The work is included insuring tightening and bolted connection (a segment BC).
- 3) Free fall truss (a segment CD).

Consider the scenario of progressive collapse of truss structures (trusses) of a one-storey industrial building in the middle span of a building;

When performing the calculations, the following parameters of the one-storey industrial building were assumed: the span of the building 24, m, the column pitch in the longitudinal direction is 6.0 m, the length of the building is 48.0 m.

The graph in Figure 4 shows the change in the truss fall rate in the middle span of the building [9-10].

After the destruction of floor structures, the truss freely falls with constant acceleration (in Figure 4 it is the blue curve, indicated by the Roman numeral II) until the safety tightening is turned on in this section in Figure 4 is marked by a curve A.

Further, the safety tightening gets into gear with initial speed which the truss developed during free fall before the onset of this stage (in the figure this stage is designated by Roman I), this section can be called the section of elastic resistance to movement. The speed during the elastic work of an tightening depends on the rigidity of the tightening ($c(x)$), and how far the tightening will stretch to the loss of its rigidity (Δh_{el}).

From the analysis of Figure 4 it follows that the speed of the falling trusses decreases as the safety tightening starts to impede the free fall.

In figure 5 shows the change in kinetic energy since the moment when the reservation system was turned on, it can be seen that the speed on the stretch of elastic movement decreases, which means that the kinetic energy decreases and its absorption occurs.

When the spring quite exhausted completely the rigidity, the entire load from the falling truss is transferred to the bolt in the rack of the reservation system and when the load exceeds the strength of the bolt's shear strength, the truss free fall again and the speed increases, and the acceleration reaches $9,81 \text{ m/s}^2$. The cycles are repeated until the truss does not fall on the floor structure, or it stops at some distance from the floor.

In this case, with the destruction of the truss in the middle span of the building with the given parameters, the truss fell down to a distance of 5.4 m and stopped ($v_{\text{terminal}} = 0$, $a = 0$, $E = 0$). The average fall rate is equal to $3,6 \text{ m/c}^2$, the average acceleration value is $3,35 \text{ m/c}^2$, the average value of the kinetic energy is 17917 Joule. The calculation was performed in the Mathcad system.

5. Conclusions

1. In each case, when the reservation system is turned on during the fall of the truss, there is a decrease in such movement parameters as speed, acceleration due to the elastic work of the safety tightening and shearing bolt in the strut, compared to the free fall of the truss.

2. When the reservation system is put into operation, the kinetic energy decreases (it is "absorbed" by braking the falling truss), which leads to a decrease in the dynamic effect on the environment from the fall of the truss.

3. The main advantage of this reservation system in the northern areas is that when selecting such characteristics as: the length of the safety tightening, the rigidity of the safety tightening, the diameter and number of bolts in the strut, you can achieve that the speed of the falling truss is not just reduced to the moment of contact with the floor structure, but can turn to zero, that is, the truss will stop at some distance from the floor. This will give the opportunity and time to at least evacuate people, and this is the main idea of the reservation system.

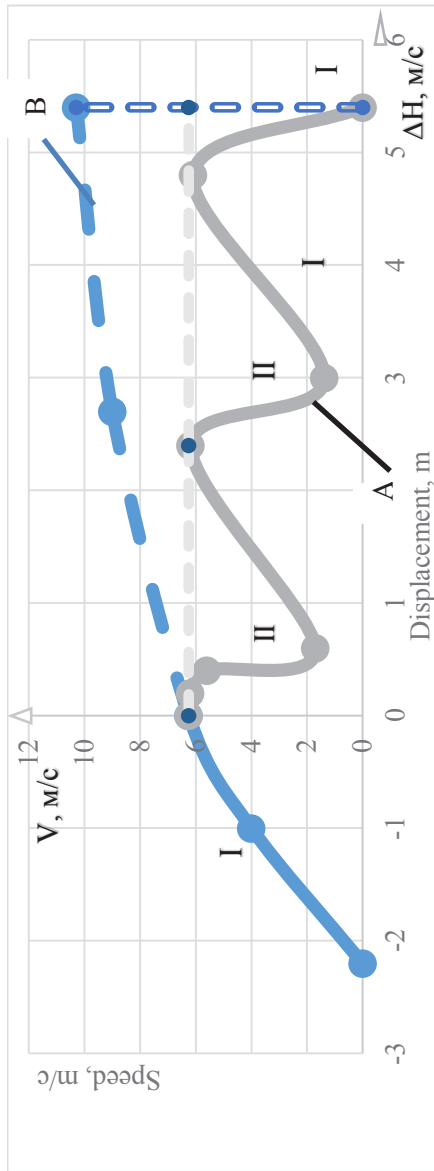


Figure 4. Graph of the final speed when using the reservation system (line A), speed changes with the free fall of the truss (curve B).

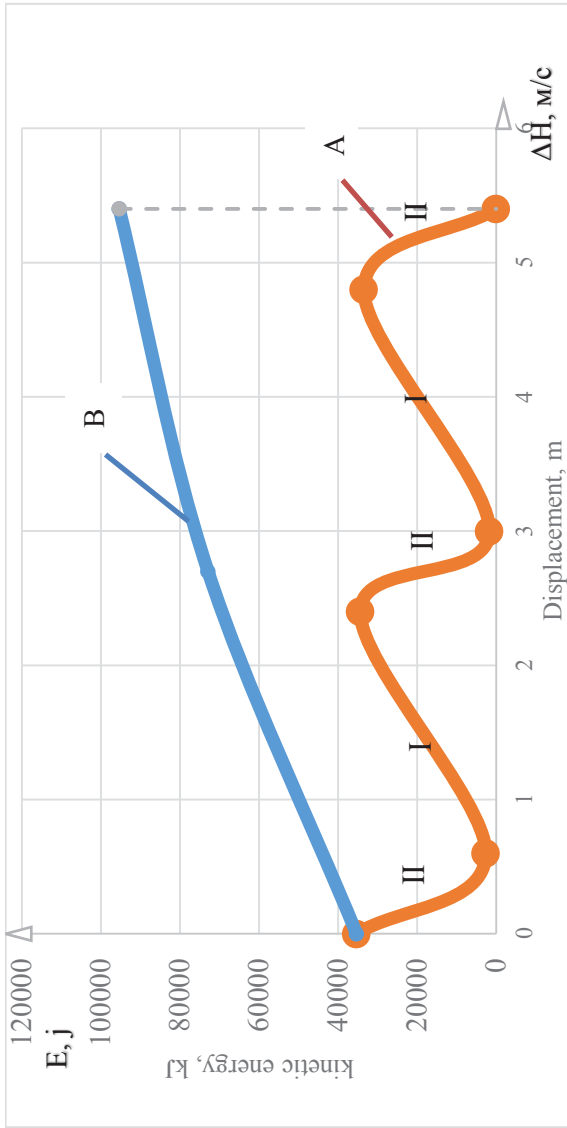


Figure 5. Graph of kinetic energy changes when a truss falls when using the reservation system (curve A), energy changes at a truss free fall (curve B)

References

- [1] Aleksashkin, E. N., Veselov, V. V., Egorov, V. V. *Wooden beam: pat. RU 168412 Russian Federation, IPC B04C 3/12 / declarer and patent owner Emperor Alexander I St. Petersburg State Transport University. - № 2016134585; Appl. 23.08.2016; Publ. 02.02.2017. Bul. № 4.*
- [2] Aleksashkin, E. N., Veselov, V. V., Egorov, V. V. *Wooden beam: pat. RU 2633721 Russian Federation, IPC E04C 3/18, E04B 1/26 /; declarer and patent owner Emperor Alexander I St. Petersburg State Transport University. - № 2016134693; Appl. 24.08.2016; Publ. 17.10.2017. Bul. № 29.*
- [3] Veselov, V. V. *Wooden beam: патент RU 171490, Russian Federation, IPC 3/12 /.; declarer and patent owner Emperor Alexander I St. Petersburg State Transport University. - № 2017106069; Appl. 22.02.2017; Publ. 02.06.2017. Bul. № 16.*
- [4] Komokhov, P.G., Maslennikova, L.L., Makhmud, A. *Control of strength of ceramic materials by forming the contact zone between clay matrix and leaning agent// Stroitel'nye Materialy/ 12, (2003), pp. 44-46.*
- [5] Maslennikova, L.L., Abu-Khasan, M.S., Babak, N.A. *The use of oil-contaminated crushed stone screenings in construction ceramics// Procedia Engineering 189 (2017), pp. 59-64. DOI: <https://doi.org/10.1016/j.proeng.2017.05.010>.*
- [6] Abu-Khasan M., Solovyova V., Solovyov D. *High-strength Concrete with new organic mineral complex admixture// MATEC Web of Conferences Proceeding 193, 03019 (2018). DOI: <https://doi.org/10.1051/mateconf/201819303019>.*
- [7] Abu-Khasan, M., Egorov, V., Rozantseva, N., Kuprava, L. *Load Carrying Wood and Metal Structures of Trusses of Covering of Long Spanned Rail Depot. 2018. IOP Conference Series: Materials Science and Engineering 463(4), 042075*
- [8] Rusanova, E., Abu-Khasan, M., Sakharova, A. *The Control Waste of Com-munal Services. IOP Conference Series: Earth and Environmental Science. 2019. <http://orcid.org/0000-0002-6782-2514>*
- [9] Baidarashvili M and Sakharova A and Petriaev A 2017 *The Modern Structure for Storm Sewage Purification of Roads (Procedia Engineering) chapter 189 pp 576-581*
- [10] Sakharova A and Svatovskaya L and Baidarashvili and M Petriaev A 2016 *Sustainable Development in Transport Construction through the use of the Geocoprotective Technolo-gies (Procedia Engineering) chapter 143 pp 1401-1408*

УДК 546.06

关于铝酸盐溶液分解的结晶机理
**ON THE CRYSTALLIZATION MECHANISM
IN DECOMPOSITION OF ALUMINATE SOLUTIONS**

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抽象。 本文分析了溶液中大量结晶过程的各种模型。 已经确定, 在国内和国外文献中, 实际上没有关于在铝酸盐溶液的工业结晶条件下结晶固相的特定表面的变化规律的研究数据。 然而, 所得固相的比表面可以表征许多因素的作用。 特定表面的测量使得可以简化结晶过程的动力学研究并获得用于自动过程控制系统的附加信息参数, 其具有对所得产品的质量控制。

关键词: 结晶, 溶液, 模型, 核, 比表面。

Abstract. *The paper analyzes various models of the process of mass crystallization from solutions. It was determined that in the domestic and foreign literature there is practically no data on the study of the laws of change in the specific surface of a crystallizing solid phase under conditions of industrial crystallization of aluminate solutions. Nevertheless, the specific surface of the resulting solid phase can characterize the action of a number of factors. The measurement of the specific surface makes it possible to simplify the study of the kinetics of the crystallization process and to obtain an additional informative parameter for automated process control systems with quality control of the resulting product.*

Keywords: *crystallization, solution, model, nucleus, specific surface.*

Decomposition of aluminate solutions occurs under conditions of mass crystallization, which has its own characteristics in contrast to the growth mechanism of single crystals. Under conditions of mass crystallization, particle growth occurs in a wide range of supersaturations with vigorous stirring, with the formation of complex particles, which are aggregations of small crystals with a significant surface area.

Under these conditions, it is believed [1] that neither the mechanism of two-dimensional nucleation nor diffusion are decisive throughout the process. The dislocation mechanism is also unlikely, since the size of the crystals of the precipitate is relatively small, and the supersaturation is significant. It follows from this that the mechanism

of mass crystallization is more complicated, especially considering the presence of internal feedback [2] existing between the initial supersaturation, the rate of formation and growth of crystals, and the surface of the solid phase. It is assumed that the patterns inherent in heterophase reactions are more appropriate. To describe the process of mass crystallization, chemical kinetics equations were proposed [3], where the concentration of reacting substances was replaced by absolute saturations:

$$\frac{d\sigma}{dt} = \frac{k*s}{v} * (C - C_p)^n \quad (1)$$

where V – solution volume;

n - process order;

σ – crystallization surface.

It was found that at high supersaturations $n = 1$, which suggests that the crystallization rate in this case, despite intensive mixing, is determined by diffusion.

It should be noted that equation (1) is valid only for the portion of the kinetic curve $C = f(t)$ after reaching the maximum growth rate. Up to this point, this equation is not applicable, since with a decrease in supersaturation at the initial moment, the crystallization rate increases, which contradicts the equation. The increase in speed in this case is due to an increase in the surface. In the initial period of crystallization, an increase in surface plays a significant role. The dependence of the linear crystal growth rate on the surface growth rate was studied by Roginsky and Todes [4]. The authors note that of the various properties of a solid, dispersion is most directly related to the kinetics of formation. The total number of crystals and their size distribution is primarily determined by the ratio between bulk and flat nucleation both in the case of simple crystallization and in the case of chemical crystallization. In this work, the laws of the primary distribution of particles over radii and areas during free growth are investigated. Cases of crystallization with a constant linear velocity, and in the case of a change in the linear velocity, which increases with the size of the crystals are considered separately. The laws of the primary dispersion distribution of the simplest case of crystallization at a decreasing concentration, which affects both nucleation and crystal growth, are also analyzed. The obtained characteristic "kinetic" distribution curves allowed the authors to argue that the primary distribution over lengths, surfaces, and volumes always differs significantly from the Gaussian distribution and approaches the latter as a result of secondary processes of collective crystallization and adhesion.

In the works of Gerasimov [5] it is proposed to evaluate the crystallization rate by direct methods through the linear growth rate of crystal faces:

$$L = \frac{dl}{dt} \quad (2)$$

or by incrementing the number of nuclei formed per unit volume:

$$N = \frac{dn}{dt} \quad (3)$$

as well as an increase in the mass of crystals at the beginning and at the end of the experiment. Direct methods for measuring these values are very tedious and time-consuming, and it is believed [6] that they only allow for high-quality calculations in individual particular cases.

For the general case, it is proposed [7] to determine the attachment rate and particle loss of the growing surface:

$$\frac{-d\sigma}{dt} = kS\sigma - \frac{k'\sigma'}{\sigma} \quad (4)$$

K and K' - corresponding rate constants;
S – surface

In the simplest case, the reverse reaction can be neglected, since the supersaturation is large:

$$\frac{-d\sigma}{dt} = k, S - \left(\frac{c}{c_p}\right)^n \quad (5)$$

Assuming S = const, the solution to the equation has the form:

$$\ln \frac{c}{c_p} = k, \Delta t \quad (6)$$

$$\text{or } \Delta t = \frac{1}{k} \lg \frac{c_n}{c_p} - \frac{1}{k} \lg \frac{c}{c_p} \quad (7)$$

where Δt – crystallization time

In engineering chemical calculations, it is proposed to proceed from a first-order equation and use the system of equations to describe mass crystallization:

$$\begin{cases} \frac{d\sigma}{dt} = kFS \\ \frac{dS}{dt} = A - kFS \end{cases} \quad (8)$$

where G is a mass of crystals per unit amount of suspension;

S – supersaturation;

A – the speed of creating supersaturation in solution, that will be determined from the equation of material balance:

$$A = \frac{dG}{dt} = \frac{c_0 B_w \left(1 - \frac{c_0}{c_g}\right) - \left(1 - \frac{c_0}{c_g} - B_w t\right)}{1 - \frac{c_0}{c_g}} * \frac{dc_0}{dt} \quad (9)$$

When solving the system of equations jointly, an expression describing the change in the amount of excess substance in the system under the condition that the surface area of the crystals F, the crystallization rate constant K, and the supersaturation creation rate A is:

$$G - G_n = At + \left(2n - \frac{A}{KF}\right) * \left(1 - e^{-kFt}\right) \quad (10)$$

If, simultaneously with the occurrence of supersaturation, growth and formation of new nuclei occurs, then the dependence of supersaturation on time will be expressed:

$$\frac{dS}{dt} = A - kFS - k_m S^m \quad (11)$$

where $k_{FS} = 3\alpha\rho_\tau \leq$ - the rate of release of a substance from a unit mass due to growth: $K_m S^m = \alpha\rho_\tau J r^3$ - substance release rate due to the formation of new nuclei.

When calculating industrial periodic crystallization with constant supersaturation, it follows from equation 1-43 that in order to maintain constant supersaturation, it is necessary to increase the rate of its creation as the total surface of crystals F increases, and at the beginning of the process it should be very small, although in practice this rule not respected. For the case of creating a supersaturation by cooling, the author calculated the modes with an increase in the cooling rate from 0, 16 C / hour to 13, 4 C / hour, the results of which are experimentally verified.

Crystallization of aluminum hydroxide during the decomposition of aluminate solutions, both by mixing with grain and carbonization, the limiting stage is the process of crystallization of aluminum hydroxide. According to Mazel [8], part of the hydroxide formed as a result of hydrolysis of aluminate is deposited on grain grains (heterogeneous nucleation), and most is released in the form of tiny particles, crystallization centers.

Gerrmann and Stipetich proved that reverse grains cannot serve as crystallization centers. They only split off amorphous, weakly crystalline particles, which serve as centers of crystallization. An empirical equation is proposed to describe the decomposition process at a constant temperature and the use of a grain of medium activity.

$$\frac{C_x}{\tau} = k(\delta - C_x) \quad (12)$$

where δ - difference between equilibrium and initial concentration. Al_2O_3 ;
 C_x - the amount of hydroxide released from the solution, in terms of Al_2O_3 ;
 K - autocatalytic decomposition rate constant.

According to S.I. Kuznetsov and V.N. Derevyankin [9] it is difficult to assume that the grain hydroxide contains amorphous hydroxide, the formation of which is impossible due to greater solubility.

Wrigge and Ginsberg [10] studied the decomposition of aluminate solutions at high grain ratios, when simple growth of the grain crystals predominates, and the formation of new ones is insignificant. The authors do not explain the mechanism of the formation of new centers.

Marich mistakenly came to the conclusion that the source of new nuclei can only be grain particles, nothing more. Test, performed by Kuznetsov S.I. and Derevyankin V.N. showed that coarse-grain is able to induce nuclei.

Mazel's work states that the growth of hydroxide crystals occurs both due to the simple growth of individual crystals and by the coalescence of particles upon their contact. However, Arakelyan and Chistyakov [11] explain the growth and aggregation of aggregates not by the fusion of small particles, but due to the formation of dislocations, which serve to nucleate new crystals.

By crystal-optical studies, the authors confirmed that the resulting carbonization aluminum hydroxide consists of spherulites, along with which there are idiomorphic crystals of rectangular and wedge-shaped.

As a result of electron microscopic studies of Kuznetsov-Derevyankin, a detailed picture of the crystallization of hydroxide obtained under various decomposition conditions was obtained. Crystals with critical sizes (0.1 - 0.2 μm) are pseudo-hexagonal tablets. As the plates grow, they become opaque; lamellar processes on the (001) planes appear on them. This is due to the presence of dislocations, mainly of a screw type. As a result, single crystals grow antiskeletal lamellar dendrites. Subsequent dendrite deformation due to trapping of impurities and collision leads to the loss of either a single-crystal structure and transformation into polycrystals, the so-called pseudospherulites. The probability of spontaneous nucleation is extremely small. New crystallization centers are created mainly by fragments of lamellar dendrites and pseudospherulites during collisions during pulp mixing, as well as during the destruction of hydrargillite crystals under the influence of internal stresses.

Liner [12], considering the crystallization of aluminum hydroxide, proposes to consider the process in two stages: nucleation with a speed V_1 equal to

$$V_1 = \frac{k \cdot C_1 - C}{c} A_{\eta} \quad (13)$$

and nuclei growth at a rate of V_2 :

$$V_2 = \frac{D}{x} S (C_1 - C) \quad (14)$$

where η - solution viscosity.

The limiting stage is the first. According to these equations, with an increase in viscosity, the rate of nucleation accelerates, but their growth rate decreases. Thus, according to Liner, the speed of the process as a whole is determined by diffusion.

Lyapunov and Kholmogortseva [13] using the proposed method for calculating the average particle growth rate, have established that in the initial period of decomposition, temperature has a significant effect. This indicates the non-diffusive nature of the growth of hydrargillite particles, and, as Kuznetsov and Derevyankin suggest, is determined in the initial period by the course of crystal-chemical phenomena.

It has been established that mathematical descriptions of the crystallization process are carried out through parameters that are either not yet possible to measure (surface free energy, crystal face area, surface concentration), or through parameters characterizing only the composition of the liquid phase (absolute or relative supersaturation of the solution). It is proved that in the domestic and foreign literature there is practically no data on the study of the laws governing changes in the specific surface of a crystallizing solid phase under conditions of industrial crystallization from solutions.

At the same time, the specific surface of the resulting solid phase can characterize the action of a number of factors: supersaturation, residence time of the substance in the apparatus, the presence of impurities, etc., direct measurement of the specific surface will provide additional information about the heterogeneous system, which is important, in both the study of kinetics crystallization processes, and in process control, taking into account the quality of the resulting product.

Based on the foregoing, it seemed appropriate to obtain information on the nature of the variability of the total and specific surface during the industrial process of carbonization of aluminate solutions, the sensitivity of this parameter to disturbing influences, the relationship with other parameters of the process, as well as the possibility of measuring it with a speed sufficient to control the process.

References

1. Mullin J.V. *Crystallization // Metallurgy* – 1968.
2. Roginsky S.Z., Todes O.M. *Proceedings of the Academy of Sciences of the USSR, OKHN*, 3,331 -1940.
3. Gerasimov Y.I. *Physical chemistry course. - Vol. 1, Chemistry. - 1969.*
4. Khamsky E.V. *Crystallization and physicochemical properties of crystalline substances // Science. - 1969*
5. Khamsky E.V. *Crystallization from solutions and properties of crystalline substances // Science. - 1971.*
6. Mazel V.A. *Alumina production // Metallurgizdat. - 1955.*
7. Kuznetsov S.I., Derevyankin V.A. *Physical chemistry of alumina production according to the Bayer method // Metallurgizdat. - 1968, p. 254*
8. Frenkel Ya.I. *METF*, 9, issue 8,952(1939)
9. Arakelyan O.I., Chistyakova A.A. // *Non-ferrous metals*, 6. - 1959, p. 67
10. Limer A.I. *Alumina production // Metallurgizdat. – 196.*
11. Lyapunov A.N., Kholmogortseva E.P. // *Journal of Applied Chemistry*, 9,1306(1957),10,1535(1957)

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创建复制纺织材料功能特性
**CREATION OF DUPLICATE TEXTILE MATERIALS
WITH FUNCTIONAL PROPERTIES**

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抽象。 文章揭示了创建重复材料的相关性。 显示了使用国产丙烯酸共聚物来持久粘合纺织材料和获得具有改善的消费者性能的新的重复材料的可能性。 确定复制材料的透气性。

关键词: 复制材料, 丙烯酸和聚氨酯聚合物, 粘合剂, 纺织材料的透气性。

Abstract. *The article reveals the relevance of creating duplicate materials. The possibility of using domestic acrylic copolymers for durable bonding of textile materials and obtaining new duplicated materials with improved consumer properties is shown. The vapor-permeability properties of duplicated materials are determined.*

Keywords: *duplicated materials, acrylic and urethane polymers, adhesives, vapor permeability of textile materials.*

Duplicated fabrics have gained recognition in various fields of application. It is impossible to create fabrics with such a variety and universality of properties that would be convenient and comfortable during use. So, for example, the properties necessary for modern clothes: sports, recreational, for hunters, fishers, which, with its small mass, keep heat well, remove moisture from the fabric in the form of steam and at the same time does not allow wind and moisture from the outside. And fabrics for curtains such as Blackout should have almost complete light-tightness, soundproofness and crease resistance. The special composition of the duplicated material allows it to absorb odors and not collect dust, due to which Blackout can be used in any room - at-home, in offices, etc. The interior design largely depends on the wall decoration. Many centuries textile wallpaper are one of the most

elite materials for decorating rooms. When choosing them, great attention is paid not only to the color, pattern and compatibility with the overall color of the room, but also to the structure, wear resistance and environmental friendliness of the raw materials used. In addition, with certain technologies of their creation (application for coloring and finishing fabrics mainly polymeric pigmented systems), they can have excellent sound and odor-absorbing properties and retain heat well.

The listed types of textiles can be produced using methods of duplication of fibrous materials of different nature and properties. For this purpose, fabrics of various fibrous composition and texture, knitted fabrics or faux fur, etc. are used.

The aim of this work is to create duplicated textile materials with functional properties using domestic polymer preparations and technologies for producing composites that are close in properties to membrane ones.

At the same time, depending on the methods of obtaining duplicated fabrics, the results either provide a complete connection of the surface between the tissues or acquire the “breathing” effect of membrane tissues. The latter technology is the most complicated, it is used in the manufacture of clothing with selective permeability. These are children's, sports clothing, equipping adherents of active winter vacations, representatives of extreme professions. The introduction of membranes into the composition of protective fabrics allows us to remove water vapor, while preventing moisture and, wind, rain, snow from getting inside.

To duplicate textile materials, polymer preparations are used - glues that meet certain requirements. First of all, they should be characterized by good adhesion to textile materials and form sufficiently flexible films with high cohesion, resistance to moisture, light weather, dry cleaning and aging. Polymer adhesives used for bonding clothing materials should also not contain substances harmful to the human body.

A lot of work on the search and study of adhesives suitable for bonding textile materials was carried out by the authors [1,2]. They showed that bonding materials by continuous adhesive coating leads to increased stiffness of the material, reducing vapor and air permeability of the product, and that it is more appropriate to use glued materials obtained by wet bonding and representing a fibrous layer of natural materials and artificial fibers impregnated with solutions, emulsions, dispersions, latexes of water-soluble or organic binders that adhere the fibers without changing their chemical composition for the manufacture of materials for clothing. Then, the fibrous layer or filaments is heat treated.

The dependence of the above properties on the nature and characteristics of the polymer used to duplicate materials (non-woven fabric with cotton fabric, fleece fabric with polyester fabric, etc.) was established. At the same time, we give the most preference to acrylic copolymers, as the most affordable, environmentally safe and contributing to the production of durable, form-resistant and soft, easily drapable materials.

Studies have shown that the tested preparations of a series of acrylic copolymers with different ratios of such monomers in the polymer as methyl methacrylate, acrylonitrile, styrene, butyl acrylate, acrylamide, etc. give completely different bonding results - from materials with low adhesion to firmly bonded and resistant to wet treatments.

When choosing polymers for bonding non-woven fabric with cotton fabric (for wallpaper), the obtained neck was preliminarily evaluated with a polymer-modified fabric, which showed that the soft neck of the textile material (Figure 1, where 1 - Ruzin-33; 2 - Ruzin-14i; 3 - Binder-83; 4 - Gelizarin ET; 5 - Ruzin-14a; 6 - Larus-33; 7 - PVA), can be obtained using preparations 1 and 2. These preparations are acrylic copolymers; aqueous finely dispersed emulsions during the impregnation process penetrate deeply into the fiber structure, where, after drying and fixing, the film formation process is completed. And the presence in the polymer structure of such monomers as butyl acrylate, esters of acrylic acid, determine the production of soft and elastic textile materials. In addition to domestic polymers, the diagram also contains data when using foreign polymeric preparations - Binder-83 and Gelizarin ET.

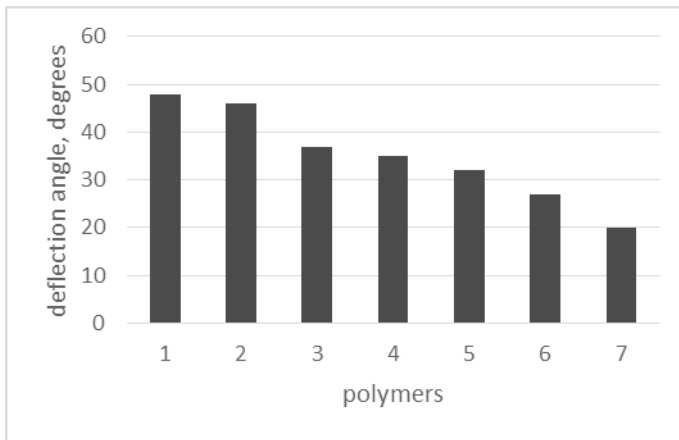


Figure 1. The stiffness indicators of fabrics modified with various polymers: 1 - Ruzin-33; 2 - Ruzin-14i; 3 - Binder-83; 4 - Gelizarin ET; 5 - Ruzin-14a; 6 - Larus-33; 7 - PVA

At the same time, the presence of vinyl acetate fragments in the acrylic polymer, as in Larus-33 and PVA (6 and 7 in the diagram, respectively), significantly increases the stiffness of the fabric. The most effective polymer for the production of decorative textile wallpapers on a non-woven basis is Ruzin-14i, which provides the most durable bonding of natural (cotton, linen, half-linen, etc.) fabrics with non-woven fabric and a soft neck of the resulting duplicated materials.

Duplicate materials intended for use in the clothing of athletes, hunters, fishers, etc. must have a range of other properties: moisture-windproof, vapor-permeable.

In the work, methods for evaluating these indicators were selected and the main technological parameters of duplication (concentration of reagents, temperature and time regulations of bonding technology, the nature of the polymer, mineral fillers, etc.) that provide durable materials with vapor-permeable and waterproof properties are determined

The effect of the mixtures of polymer-adhesive compositions and mineral fillers introduced into the polymer substrate on the vapor permeability coefficient of duplicated materials estimated by the amount of water vapor that passes through a square meter of the sample per day (MVTR indicator) was studied [3]. Table 1 shows the vapor permeability data for materials where graphene oxide is introduced into the polymer. Moreover, his example shows the effect of filler concentrations on the vapor permeability index of a fiber-polymer composite.

Table 1
The vapor permeability of the duplicated material upon the introduction of graphene oxide into the polymer

The amount of graphene oxide (2 g/l) in the polymer,% by weight of the polymer	Vapor permeability rate, MVTR (g/m²)
-	191
10	341
30	1125

Using a different amount of sorbent introduced into the polymer matrix, the vapor permeability index can be changed upwards, which allows predicting the previously required properties of materials. Thus, an increase in the mineral component from 10 to 30% leads to an increase in the MVTR from 191 g / m² to 1125 g / m², which meets the requirements for vapor-permeable fabrics.

References

1. Pritykin, L. M. *Monomeric adhesives* / L. M. Pritykin, D. A. Kardashov, V. L. Vakula. - Moscow: Chemistry, 1988. - 176 p.
2. Kardashov, D. A. *Structural adhesives* / D. A. Kardashov. - Moscow: Chemistry, 1980. - 288 p.
3. <https://sport-marafon.ru/article/odezhda/paropronitsaemost-i-vozdukhopronitsa-emost-v-chyem-raznitsa>. Marmot Pre Cip. Membrane Jacket Review 09.04.2019

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