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CALCULATION OF GAS LIFT LIFTS AT THE ALTYGUYI FIELD

Abstract: *The article presents calculations for a periodic gas lift, in relation to the operating conditions of the Altyguyi field, where it is recommended to equip wells with a single-row replacement chamber with a packer and a check valve installed in the lower part of the tubing. The method of designing gas lift lifts is presented.*

This technique includes the arrangement of starting and working valves in accordance with standard ones, taking into account the properties of reservoir fluids and projected well flow rates.

Based on the results of the calculations carried out, the justification for the dual completion (DC) in the wells of the Altyguyi field was carried out.

Key words: *Filter opening, oil density, liquid extraction, gravity, liquid lifting height, specific flow rate, gas lift valve, reservoir fluid.*

Language: *English*

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Introduction

The calculation of continuous gas lift lifts is reduced to determining the length, diameter of lifting pipes and specific gas consumption.

The choice of the diameter of the lift pipes of the gas lift well is carried out in accordance with the volume of the filtered liquid in the area of the optimal operating mode of the lift. Practice shows that, depending on the flow rate of wells, the optimal sizes of lifts correspond to the data given in Table 1.

Table 1. Optimal sizes of lifts

Well flow rate, t/day	20-40	40-60	60-200	200-300
Lift diameter, mm	40,3	50,3	62	76

In field conditions, from the point of view of technological and mechanical characteristics, pipes of the "M" brand with a bore diameter of 62 mm have an unlimited scope of application. It is recommended to use a universal lift scheme that provides both periodic and continuous lifting of liquid (Fig. 1.).

The above scheme is used in wells with a gas inlet depth of up to 3000 m. In wells with a depth of up to 4000 m or more, the lift layout shown in Figure 2 is used.

For maximum fluid extraction, it is necessary to create minimum pressures at the bottom.

Therefore, the depth of the descent of the lifting pipes should be maximum, i.e.

$$L = H - (20\!:\!30)\,m$$

where H is the distance to the upper filter holes, m.

For an annular system (the working agent - gas is injected into the annular space), the required specific gas consumption during continuous lifting is determined from the expression:

$$R = \frac{0{,}388\left[Lpg - (P_1 - P_2)\right]}{d^{0,5}(P_1 - P_2)Lg\dfrac{P_1}{P_2}}, m^3/t$$

where: P_1 is the working pressure, Pa (the working pressure is 8.5; 10.0; and 12 MPa);

P_2 is the wellhead pressure (the minimum allowable under operating conditions), we take it to be equal to $P_2 = 1.2 \times 10^6$; 1.5×10^6 Mpa;

ρ -the density of oil is assumed to be equal to 861 kg/m³;

g-acceleration of gravity (9.81 m/sec²);

d - diameter of lifting pipes, m;

L is the lifting height of the liquid, m.

The specific flow rate of the injected gas, taking into account the solubility of the gas, is determined from the expression:

$$R_{inj.} = R_{req} - \left[G_0 - \alpha\left(\frac{P_1 + P_2}{2}\right)\right]\left(1 - \frac{n_w}{100}\right), m^3/t$$

where: G_0 is the gas factor (for oil), m³/t;

α is the solubility coefficient of gas in oil, α = 0.4031 m³/t. atm.

n_w is the water content of products, %.

The optimal specific flow rate of the injected gas calculated at an input depth of 2700, 3000m and 3500m (P_{work}= 8.5; 15.0 MPa) is, respectively, 200, 300 and 500 m³/t and at a gas input depth of 3000 - 3500m (P_{work} = 10; 15 MPa) is, respectively, 150 ÷ 400 m³/t.
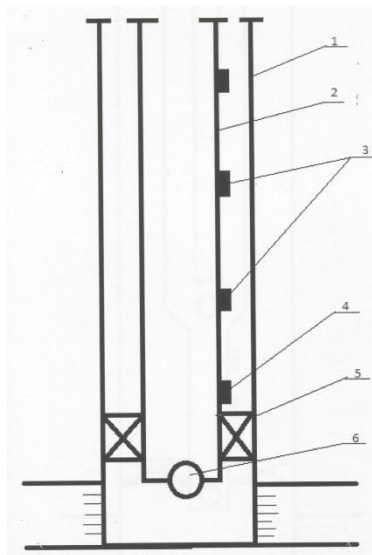

Fig. 1. Diagram of a universal gas lift
1- operational column; 2- elevator pipes; 3- starting valves; 4- working valve; 5- packer; 6- check valve.
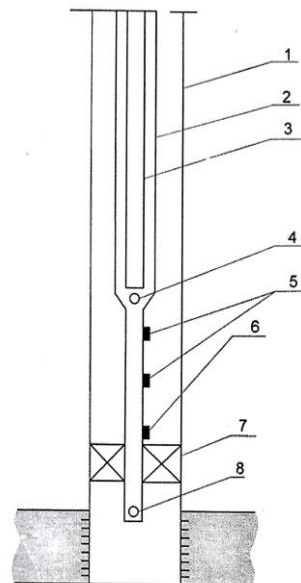
Fig. 2. Diagram of a stepped gas lift
1- operational column; 2- intermediate column; 3- upper stage of the elevator; 4, 8 – check valves; 5- starting valves; 6- working valve; 7- packer.

Calculation of the installation of a periodic gas lift with a replacement chamber

For periodic gas lift, in relation to the operating conditions of the Altyguyi deposit, it is recommended to equip wells with a single-row replacement chamber with a packer and a check valve installed in the lower part of the tubing (Fig. 3). In this case, the annular space between the tubing and the casing acts as a replacement chamber [1, 2, 3, 4].
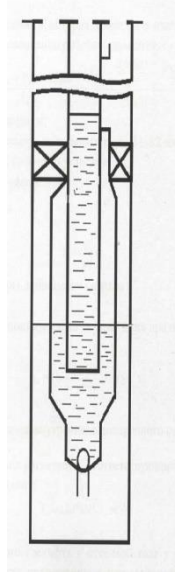
Fig. 3. Diagram of a lift for periodic lifting of a liquid with a replacement chamber

Reducing the pressure of the injected gas for purging the liquid is provided by installing starting valves on the tubing string, and the lower (working) valve acts as a shut-off device that reduces the specific gas consumption [5, 6, 7, 9].

The working pressure of the injected gas is determined from the expression:

$$P_{work} = \frac{h\gamma_{oil}}{10} - P_{pip} + P_{w.h} , kgf/sm^2$$

The height of the column of liquid that can be forced into the lifting pipes with full use of the working pressure will be:

$$h = \frac{(P_{work} - P_{pip} - P_{w.h})10}{\gamma_{oil}} = \frac{(P_{work} - \frac{0,0064L}{d^{0,5}} - P_{w.h})10}{\gamma_{oil}} , m$$

where: L is the length of the lift, m;

d is the inner diameter of the lifting pipes, d = 62 mm (2.5")

P_{work}, $P_{w.h.}$ - working and wellhead pressure, at;

γ_{oil} - the specific gravity of oil.

Camera Length:

$$\ell_c = \frac{d^2}{d_{1c}^2} h$$

where dc is the diameter of the camera, we take it equal to 4".

The volume of liquid raised in one cycle at the optimal flow rate of the injected gas:

$$q_{cyc.} = \left(h \frac{0,5\sqrt[3]{L^2}}{d^{0,5}\gamma} \right) f \gamma, t$$

where d = 0.003 m is the area of the inner cross-section of 2.5" pipes.

The gas consumption during the injection period corresponding to the minimum specific consumption will be:

$$V_0 = 1,1d^2\sqrt[3]{L^2} , m^3/h$$

For a periodic gas lift with a gas cut-off at the chamber, the amount of gas required for one cycle, reduced to normal conditions, is determined from the expression:

$$V_c = f(L + h - \ell_c)\frac{P_{work}}{P_o} , m^3$$

Duration of the gas injection period:

$$T_1 = \frac{60V_c}{P_o} , m^3$$

Duration of the full cycle:

$$T = \frac{q_{cyc.}1440V}{Q} , min$$

where: Q is the flow rate of the liquid, t/day

Duration of the liquid accumulation period:

$$T_2 = T - T_1 , min.$$

Number of cycles per day:

$$n = \frac{1440}{T}$$

Specific gas consumption per 1 ton of liquid:

$$R_0 = \frac{V_c}{q_{cyc.}}, m^3/t$$

The calculated values of the parameters of the periodic gas lift for wells with a lifting height from depths of 2500, 3000, 3500 m are given in Table 2.

The design of gas lift lifts, including the arrangement of starting and working valves, should be carried out in accordance with standard methods [8, 12, 13, 14], taking into account the properties of reservoir fluids and projected well flow rates.

Bellows valves of the G-38 and G-38R, G-25 and G-25R types, installed in the pockets of downhole chambers KT 73-25 and KT 73-38, K60-25 and K60-38, are recommended as gas lift valves. The minimum required number of valves per well is 5÷6 [10, 11, 15].

Table 2. Calculated parameters of the periodic gas lift

L, m	d, mm	Ppip, MPa	P_work, MPa	P_{w.h}, MPa	h, m	l_c, m	q_{cyc}, t	V_0, m³/h	Vc, m³	T_1, min	T, min	n_{cyc}, cycle	Q, t/day	R_o, m³/t	V, m/day
2500	62	1,01	8,4	1,5	695	271,7	1,62	1266	884	41,89	116,6	12,35	20	546	10920
3000	62	1,21	10,0	1,5	898	350,7	2,12	1430	1064	44,65	152,6	9,4	20	501	10022
3000	62	1,42	12	1,5	1115	435,7	2,66	1584	1504	57,0	191,5	7,52	20	565	11314

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TAX PLANNING IN THE IMPLEMENTATION OF FOREIGN ECONOMIC ACTIVITY OF JOINT STOCK COMPANIES OF THE REPUBLIC OF UZBEKISTAN

Abstract: *The paper discusses the theory and causes of changes in the tax planning system in the implementation of foreign economic activity of companies of the Republic of Uzbekistan, their factors, analyzed the basic modern concepts of institutional transformation in accordance with which the directions in which the state can actively influence the process of optimizing tax planning have been identified. Considerable attention is paid to the effectiveness of state regulation of foreign economic activity of companies in order to: avoidance of double taxation, as well as differences in the tax regimes of countries allow the company to reduce tax payments, including through targeted structuring of the business.*

Key words: *foreign economic activity, international business schemes, a multinational corporation, international taxation and international tax planning, an effective mechanism for international tax planning, international tax competition, international tax arbitration.*

Language: *English*

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Introduction

In modern conditions, there is a rapid growth of electronic commerce both at the global and As noted in the Strategy of Actions for the Further Development of the Republic of Uzbekistan for 2017-2021, the priorities of the country's development are liberalization and simplification of export activities, diversification of the structure and geography of exports, expansion and mobilization of the export potential of economic sectors and territories. An important role in the implementation of these tasks is assigned to the issues of international taxation and international tax planning, the analysis of the effectiveness and rethinking of the activities of which is dictated by the time itself [1].

In a short period of time, consistent work has been carried out in the country to integrate into the international economic community and create favorable conditions for the implementation of foreign economic activities by business entities. At the same time, the current system of customs and tariff regulation does not stimulate the development of

market principles of competition. In particular, the provision of excessively broad privileges in the payment of customs duties on imported goods does not contribute to effective tariff regulation, while individual preferences create unequal competitive conditions for the development of entrepreneurial activity [2].

In the modern world in the context of financial globalization, when business is becoming more and more international, the company's management should take into account the possibility of saving financial costs in connection with the peculiarities of the tax policy of individual countries and their cooperation in the tax area. The fact is that some provisions of agreements concluded between countries on the avoidance of double taxation, as well as differences in the tax regimes of countries, allow the company to reduce tax payments, including through targeted business structuring. In this regard, the tax attractiveness of a jurisdiction when building an international business scheme is considered as one

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of the factors when deciding on the choice of location for companies of a transnational group.

Thus, tax planning in the implementation of foreign economic activity (FEA) is due to the possibilities of tax savings, which for an entrepreneur seems to be the same need to reduce the costs of manufacturing their products as, for example, cost savings as a result of using cheap labor resources. There are times when a transnational corporation (TNC) completely rebuilds its international organizational structure based on tax considerations. So a modern TNK can have a headquarters in London, production facilities in Singapore, a subsidiary company for owning the company's patents in Cyprus, a financial center in the Netherlands, a holding company in Luxembourg, etc. Or, in the simplest case, a business can simply move business operations to a neighboring country where the tax rate is lower.

If a company manages to develop an effective mechanism for international tax planning (MNP), then this contributes to the growth of its post-tax revenues, allowing then to use the funds saved on tax payments in the investment process, ensuring the development and growth of the company, increasing its competitiveness, which leads to economic benefits and increase in national wealth. Therefore, the relevance of the topic of this scientific research is determined by the increased role of the factor of minimizing the taxation of the company in the implementation of foreign economic activity at the present stage of development of international economic relations.

However, some methods of tax minimization in the implementation of foreign economic activity, and with them the use of the possibilities of a number of low-tax jurisdictions (tax havens) cause a lot of dissatisfaction and the use of appropriate punitive measures by national tax administrations and international organizations. This, in particular, is due to the fact that these methods of obtaining tax savings lead to financial losses for the budgets of the countries on whose territory companies' revenues are generated. As a result, there has recently been a tendency for a negative attitude towards international tax planning in the domestic point of view. This, according to the author, is due to a lack of understanding of its essence and the lack of comprehensive studies of modern legal capabilities of the MNE toolkit, as well as simply mixing this concept with other forms of minimizing tax payments associated with the illegal behavior of the taxpayer.

A weighty argument in favor of the relevance of the topic of this scientific article is the active involvement of domestic companies in the processes of international tax planning in the context of significantly changed and continuing to change the national institutional framework of these processes. So, since 2019, the tax legislation in the Republic of Uzbekistan has changed in terms of the regulation of transfer pricing, it is planned to introduce provisions limiting operations using companies from tax havens - provisions on controlled foreign companies. In addition, it should be noted the growing involvement of the Republic of Uzbekistan in the international exchange of tax information, as well as the active implementation of international standards of tax transparency under the auspices of the OECD in more than 50 countries of the world. Such changes will undoubtedly affect the degree of disclosure of tax information and its availability to fiscal authorities to monitor the activities of taxpayers to reduce tax payments, which is one of the fundamental measures of state policy in the tax area.

Thus, the determination of the modern limits of the legal reduction of the tax burden by the companies of the Republic of Uzbekistan using MNE tools, as well as ways to increase the effectiveness of domestic legislation to counter abuse in this area requires in-depth scientific analysis.

LITERATURE REVIEW

Tax planning in the "Big Economic Encyclopedia" and "Big Legal Dictionary" is understood as a choice between various options for carrying out the activities of a legal entity and placing its assets, aimed at achieving the lowest possible level of tax liabilities arising from this [3].

According to S. M. Dzhaarbekov, tax planning involves the taxpayer taking certain organizational measures in order to minimize tax payments [4] .. This position is shared by E. Yu. Zhidkova, who considers the goal of tax planning to minimize tax payments in a legal way based on the use of tax benefits and preferences, the correct choice of tax regimes and objects of taxation, the literacy of the formation and use of accounting policy elements [5].

E. B. Shuvalova and E.A. Grachev also define tax planning as a way to minimize the tax burden, including the development of complex and completely legitimate systems that can significantly reduce the tax burden on an economic entity without violating the norms of current legislation and international law [6].

I. V. Sergeev, A. F. Galkin and O. M. Vorontsova distinguish between tax planning at the macro and micro levels and defines it as an integral part of the tax process, which is the activity of public authorities, local governments and taxpayers by definition for a given time period. the period of the economically justified amount of tax revenues to the relevant budget, as well as the amount of taxes payable by a specific economic entity [7].

V.V. Semenikhin and Yu.V. Emelyanova argue that tax planning is a set of lawful targeted actions of a taxpayer associated with the use of certain techniques and methods, as well as all legally granted benefits and exemptions in order to reduce tax liabilities and increase cash flows [8].

V.A. Babanin and N.V. Voronin define tax planning as a process of developing a system of tax plans and regulatory indicators to ensure the correct and timely calculation and payment of taxes and improve the efficiency of activities in terms of tax payments [9].

E.S. Vylkova proposes to distinguish between tax planning in a broader and a narrower sense. So at the level of an economic entity, tax planning is an integral part of managing its financial and economic activities within the framework of a unified strategy for its economic development, which is a process of systematic use of optimal legal tax methods and methods to establish the desired future financial state of an object in conditions of limited resources and the possibility of them alternative use. In the narrow sense, tax planning is planning at the minimum level for a particular economic entity, the amount of individual taxes [10].

Analysis of the literature on the problems of theory and practice of tax planning shows that, despite the large number of publications in this area, the authors' attempts to determine the essence of the company's tax planning do not always provide a clear distinction between the concepts of tax planning, tax optimization and tax minimization. So, S. Malakeeva identifies the concepts of tax planning, tax optimization and tax minimization, defining them as actions of a taxpayer to reduce tax payments [11].

For T.A. Guseva, the concepts of tax planning and tax optimization are identical, opposing the concept of tax evasion [12].

IV Petrov believes that in the implementation of tax planning, the achievement of the main commercial and investment results should occur at a reasonable or permissible (optimal) level of the amount of taxes paid [13].

T.A. Kozenkova defines tax planning as an integral part of the general planning system at the micro level, a type of management activity, a way to optimize the actions of an economic entity through the regulation of its taxation. Tax planning contributes to the achievement of the general goals of the organization's management: to survive - in a critical situation; to increase efficiency, increase the amount of own financial resources and gain an advantage over competitors - in a normal environment [14].

ANALYSIS AND RESULTS

Before the development of international economic integration and the globalization of economic processes, economic life was concentrated mainly within the borders of the state, occasionally going beyond its limits, and then only in some simple forms of foreign trade exchange and financial cooperation. Thus, most of the income of legal entities was formed from sources that were located on the territory of one separate country, while foreign economic transactions between different states

usually did not have a stable and sustainable nature. In this regard, the question of the need for the same taxpayers to pay similar taxes from the same objects (income) in different states did not acquire significance, which would stimulate the search for a solution to this problem within the framework of both individual states and through international cooperation. But the subsequent internationalization and globalization of the system of world economic relations and the exercise by individual states of their rights to receive part of the income from the international economic activity of national residents led to the emergence of international taxation.

The development of international economic activity of necessity leads to the emergence of international tax relations, the participants of which are states, international organizations, individuals and legal entities of various states. In order for the interaction of national tax systems not to have a conflict in nature, states should not act in isolation, without taking into account the specific features of international economic activity and the status of its subjects. After all, each of the countries in whose territory any commercial activity leading to the generation of income is carried out, as well as any property is located, has the right to expect to pay the corresponding tax on income or property. Due to the nationality of legal entities, there are also corresponding tax liabilities. So there is a conflict between the two tax jurisdictions for the right to tax such income, and the taxpayer may bear an increased tax burden.

The consequence of the application of national tax legislation in the field of taxation of foreign economic transactions of legal entities (and individuals) is international double taxation, when, for example, a domestic company that receives income in a foreign state is obliged to pay tax on this income in two or more countries. In this case, international taxation is understood as the tax consequences of foreign economic activities of individuals and legal entities arising from the provisions of national tax laws governing foreign economic transactions. In a broader sense, the following aspects also apply to international taxation [15]:

- features of the national tax policy in the modern globalizing system of world economic relations;
- international legal regulation in the tax area;
- national conditions of taxation in the modern world as a result of international tax competition;
- international tax coordination - coordination of actions of national tax policies and tax services.

Speaking about international taxation, it should be noted that there is competition between national fiscal jurisdictions for the right to attract foreign economic agents into their economy to tax them using favorable tax rates and taxation regimes - international tax competition. It is quite obvious that this competition acts as an incentive for business entities,

allowing the transfer of income and factors of production from one tax jurisdiction to another. In particular, financial transfers made within an associated group of companies located in different tax jurisdictions can only take place for tax reasons.

A direct consequence and product of international tax competition is international tax arbitration - financial transactions based on the difference in tax rates in certain jurisdictions, due to which the effective tax rate can be reduced, and the post-tax revenues of international business entities will be maximized. Differences in the principles of taxation (the principle of residence and the principle of source of income) can also serve as a basis for international tax arbitration. For this reason, international tax arbitration as an element of tax optimization is very often used by subjects of foreign economic activity. The most direct participation in the scheme of operations of international tax arbitration is taken by the associated structures of the transnational group located on the territory of low-tax jurisdictions.

The mechanisms of international arbitration transactions, in turn, are built on many operations of international tax planning. It is obvious that the subjects of foreign economic activity are interested in optimizing their tax payments arising in different jurisdictions of doing business. It is for them that international tax planning is extremely important and relevant, representing a view of the problems of international taxation from the standpoint of taxpayers seeking to reduce tax payments based on legal means.

Nevertheless, I would like to emphasize the need to balance the interests of each of the parties to international taxation: national tax administrations and taxpayers - as well as to prevent any abuse.

If we turn to the successful practice of tax planning in a company, which consists in an effective way to increase financial resources with a sustainable long-term reduction of the company's tax burden, then it is carried out within the framework of the corporate financial management system to find the optimal amount of tax payments - tax optimization.

Tax optimization is the determination of the best way to manage tax payments, which consists in minimizing them in order to increase the company's financial resources. At the same time, it is part of a larger and main task of financial management - financial optimization - choosing the best way to manage the company's financial resources and attracting external sources of financing. Optimization of the company's tax policy allows avoiding overpayment of taxes, which is especially important in conditions of a high level of taxation, when insufficient consideration of the tax factor can even lead to bankruptcy of the company [16].

At the same time, minimizing tax payments and increasing the company's financial resources do not always have a direct relationship. Thus, the minimization of tax payments can be carried out by a complete reduction in economic activity: income is not generated - there is no object of taxation on income. There are situations when a reduction in some taxes leads to an increase in others. Or an enterprise with too low tax payments may raise suspicion and additional checks by the regulatory authorities, which, in turn, may entail additional costs. Or, the minimization of taxation can be achieved through the misbehavior of the taxpayer when paying taxes: attempts to evade taxation, violating the current legal norms, which is fraught with additional financial burden for the company in the form of sanctions from the fiscal authorities. Such minimization of tax payments will not meet the goals of optimization of taxation, that is, minimization and optimization of taxation are not identical concepts, they should not be confused. But at the same time, tax optimization presupposes (includes) the minimization of tax payments using the rights provided by law.

In order to tax optimization aimed at increasing the financial resources of the company with a relative decrease in tax payments, the taxpayer carries out activities for the systematic use of the opportunities provided by tax legislation, called tax planning. This is a legal way to reduce tax liabilities. When planning the tax consequences of economic activity, it is important to know not only how much, where, when and how to pay taxes, but also what are the ways to avoid overpaying taxes (maximizing income) and to act on the basis of legal methods. Tax planning can be successfully applied by both individuals and companies. Based on such areas of application, it is advisable to subdivide it into individual tax planning (typical for individuals) and corporate tax planning, which is used by legal entities. And since in the modern conditions of doing business, many types of activities are associated with foreign economic operations, therefore, tax planning becomes international.

Thus, based on the territoriality criterion, it is advisable to distinguish between national and international tax planning. For national tax planning, implementation boundaries are set within the individual tax jurisdiction. For international - the subject of tax planning is cross-border transactions, covering two or more states. In this regard, resident taxpayers must understand how to pay taxes in accordance with the current legislation, while not experiencing an additional tax burden not only within the boundaries of their jurisdiction, but also in all countries of their business activity.

Considering the process of international tax planning (MNP), it should be noted that some of its aspects have been studied in great detail by such authors as S.A. Baev, A.R. Gorbunov, V.A. Kashin, A.N. Kozyrny, A.V. Perov, A.I. Pogorletsky, S.F. Sutyrin, B.A. Kheifetz et al. However, a uniform approach to MNEs and the economic processes associated with them has not developed. So, V.A.

Kashin interprets MNEs as a choice between various options and methods of carrying out activities and allocating assets, aimed at achieving the lowest possible level of tax liabilities arising from this [17].

An excellent formulation is found in A.R. Gorbunova: MNP - creation of tax planning schemes and tools in order to reduce tax losses in international investment and financial transactions [18].

One of the famous Russian researchers of tax planning issues E.S. Vylkov, it is proposed to consider MNEs as an integral part of corporate tax planning, which is a process of systematic use of the optimal legal tax methods and methods to establish the desired future financial and economic state of the organization when conducting various international transactions in conditions of limited resources [19].

All these definitions are correct and correct, but, in our opinion, they are not exhaustive, corresponding to the definition of tax planning. Therefore, we propose our own definition: international tax planning is the process of using instruments for reducing the tax burden of individuals and legal entities allowed by national legislation and norms of international law in carrying out various international transactions to establish the desired future financial and economic condition, which consists in increasing total income due to tax savings. in all jurisdictions of economic activity.

In practice, MNE involves the complex use of these methods, which have an obvious connection with minimizing company taxes. These methods of international minimization of the tax burden are determined by the capabilities of the MNE toolkit.

Tax planning tools are understood as legal institutions, mechanisms and regimes, the application of which allows the taxpayer to legally claim to reduce tax liabilities and mobilize released financial resources. In general, the tool, according to the "Dictionary of the Russian language" S.I. Ozhegova is a means used to achieve something. Among the international planning tools used to reduce the tax payments of a company, which are also designated as MNE directions, include:

- creation of a special intra-firm structure of a transnational group, including an intermediate holding company;

- the use of the norms of national legislation that establish tax benefits or provide for a preferential tax regime;

- use of the relevant provisions of international agreements on the avoidance of double taxation;

- the establishment of a certain form of contractual relations between affiliated persons - transfer pricing and intra-company lending.

DISCUSSION AND CONCLUSION

So, international corporate tax planning, expressed in reducing the company's global tax burden, is carried out in the following main ways:

1. Minimization of tax risks when choosing the methods of presence and economic activity of the company in certain foreign countries (the company has the opportunity to choose whether to work abroad through a subsidiary company, a branch, forming a permanent establishment, or not to be present in this country for tax purposes at all). The procedure for the establishment of a permanent establishment of a foreign company for tax purposes is determined by the national legislation of the countries, as well as international agreements on the avoidance of double taxation;

2. Choosing the most optimal type of business activities (holding company, financial company, etc.), based on the tax benefits and advantages of a particular jurisdiction;

3. Effective use of the provisions of international treaties for the avoidance of double taxation for the purpose of deducting interest expenses on loans granted from taxable profit;

4. Effective use of provisions of agreements on avoidance of double taxation for the purpose of reduction of taxes paid at the source of payment of dividends, interest or royalties;

5. Taking advantage of transfer pricing. A number of MNE practitioners advise to use to the full what is provided by the jurisdiction, despite the existence of special legislation on the regulation of transfer pricing, but, in our opinion, this method will not apply to the MNE toolkit, since it leads to abuse and manipulation of transfer prices and as a consequence, distortion of the tax base in order to minimize tax payments, which is tax evasion.

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TRANSVERSE VIBRATIONS OF A THREE-LAYER ELASTIC PLATE

Abstract: *In the work, the heads of the displacements of the selected middle surface of the three-layer elastic plate are included as sought functions. Accordingly, a system of fifth-order differential equations has been developed that can be used to solve practical problems with respect to the functions sought by performing several mathematical operations.*
Key words: *Plates, solutions, equations, oscillations, layer, algorithm.*
Language: *English*
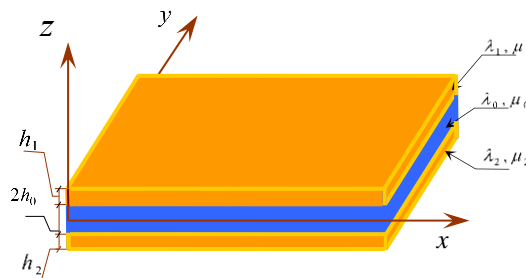
Introduction

Currently, several studies are being conducted simultaneously on multi-layer, especially three-layer plates. This is due to the fact that the three-layer plates maintain a high level of strength during various vibrations and easily solve economic problems. Such a collection of scientific papers can include many articles, including [1, 2].

Picture 1.

Multilayer plates, especially three-layer plates, are widely used in various fields of technology and construction. In most cases, the dynamic calculation of the plates is based on the classical theory based on Kirchhoff's hypotheses [3]. In some cases, the dynamic calculations are based on equations of the type S.P.Timoshenko, which take into account the transverse shear deformation and rotational inertia [4].

Over the next few decades, plate theories based on G.I Petrashen's exact solution method were developed. In particular, this method was developed by Professor IG Filippov [6] and his students in the theory of vibration of three-layer plates with an asymmetrical structure.

In this paper, the vibration equations of a three-layer elastic plate are given by the Petrashen-Filippov method mentioned above, but for a case where the problem is considered to be a flat problem. In addition to the vibration equations, an algorithm has been developed that allows determining the state of stress-strain in any section of the plate with a single value in coordinates and watts.

Problem statement. We look at a three-layer plate in the Cartesian coordinate system. The platelayers are made of different materials and the contact between them is considered a virgin. Assume that the plate is in a state of flat deformation at right angles Oxz (Figure 1). In this case, we direct the axis Ox along the line of contact of the layers of the cross section, and the axis Oz - perpendicular to it. We number the plate layers with "1", "2" and "3" as in Figure 1. Let the thicknesses of the layers be h_0, h_1 and h_2, respectively, for the plate layer materials, the Lame coefficients $(\lambda_0, \mu_0), (\lambda_1, \mu_1)$ and (λ_2, μ_2), and the densities ρ_0, ρ_1 and ρ_2.

In the Cartesian coordinate system, we obtain the relations between the stresses and deformations at the points of the layers and the equations of motion for the points of the layers in the Cartesian coordinate system, i.e.

$$\sigma_{ii}^{(m)} = \lambda_m \left(\varepsilon^{(m)} \right) + 2\mu_m \left(\varepsilon_{ii}^{(m)} \right),$$
$$\sigma_{ij}^{(m)} = \mu_m \left(\varepsilon_{ij}^{(m)} \right), \quad (1)$$

$$\sigma_{ij,j}^m + \rho_m \cdot F_i^m = \rho_m \cdot \frac{\partial^2 U_{mi}}{\partial t^2} \quad (2)$$

where $m = 0,1,2$ is the layer number index;

Given that the potentials of the transverse and longitudinal waves [6] ψ_m and φ_m are the displacement vectors $\vec{U}^m = \vec{U}^m(U_m, W_m)$ of the points of the layers in the case of plane deformation, we introduce [7]:

$$\vec{U}^m = grad\, \varphi_m + rot\, \vec{\psi}_m \quad (3)$$

Here $\vec{i}$, $\vec{j}$, $\vec{k}$ are the unit axes of the coordinate axes. Putting these (3) expressions into (2) motion equations

$$\Delta\varphi_m = \frac{1}{a_m^2} \frac{\partial^2 \varphi_m}{\partial t^2}; \qquad \Delta\psi_m = \frac{1}{b_m^2} \frac{\partial^2 \psi_m}{\partial t^2}, \quad (4)$$

we come to the wave equations.
Where

$$\Delta = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial z^2}$$

is the two-dimensional Laplace differential operator.

We assume that for $t < 0$ times the plate was at rest, and at $t = 0$ the dynamic loads began to act on its boundary surfaces. In this case, the boundary conditions are as follows:

When $z = \pm h_m$

$$\sigma_{xz}^m = f_x^m(x,t); \quad \sigma_{zz}^m = f_z^m(x,t);$$
$$\sigma_{yz}^m = 0, \quad (m = 0,1,2). \quad (5)$$

In addition, the following kinematic conditions are appropriate on the test surface:

$$U_0(x,z,t)\big|_{z=h_0} = U_1(x,z,t)\big|_{z=h_0};$$
$$W_0(x,z,t)\big|_{z=h_0} = W_1(x,z,t)\big|_{z=h_0}. \quad (6)$$

the initial conditions are assumed to be zero, i.e., when $t = 0$

When $t = 0$

$$\varphi_m = \psi_m = 0; \qquad \frac{\partial \varphi_m}{\partial t} = \frac{\partial \psi_m}{\partial t} = 0 \quad (7)$$

Thus, the solution of the problem of longitudinal oscillations of a three-layer plate leads to the integration of the system of equations (4) in the boundary conditions (5), (6) and in the initial conditions (7). To solve the problem, ψ_m and φ_m potential functions [5]

$$\varphi_m = \int_0^\infty \left. \begin{matrix} \sin kx \\ -\cos kx \end{matrix} \right\} dk \int_{(l)} \tilde{\varphi}_m e^{pt} dp;$$

$$\psi_m = \int_0^\infty \left. \begin{matrix} \cos kx \\ \sin kx \end{matrix} \right\} dk \int_{(l)} \tilde{\psi}_m e^{pt} dp, \quad (m = 0,1,2). \quad (8)$$

and put them in (4)

$$\frac{d^2 \tilde{\varphi}_m}{dz^2} - \alpha_m^2 \tilde{\varphi}_m = 0;$$

$$\frac{d^2 \tilde{\psi}_m}{dz^2} - \alpha_m^2 \tilde{\psi}_m = 0 \quad (m = 0,1,2) \quad (9)$$

we get the equations. Here

$$\alpha_m^2 = k^2 + \frac{1}{a_m^2} p^2;$$

$$\beta_m^2 = k^2 + \frac{1}{b_m^2} p^2 \quad (10)$$

Under the influence of the above (5) - symmetrical loads, the plate oscillates longitudinally, and the solutions of equations (9) consist of

$$\tilde{\varphi}_m(z,k,p) = A_m^{(1)} ch\alpha_m z,$$
$$\tilde{\psi}_m(z,k,p) = B_m^{(1)} sh\beta_m z. \quad (m=0,1,2) \quad (11)$$

We also describe the displacements of the points of the layers in (8) and have

$$\tilde{U}_m = kA_m^{(1)} ch(\alpha_m z) - \beta_m B_m^{(1)} ch(\beta_m z);$$
$$\tilde{W}_m = \alpha_m A_m^{(1)} sh(\alpha_m z) - kB_m^{(1)} sh(\beta_m z). \quad (m=0,1,2)(12)$$

for the replaced $\tilde{U}_m$, $\tilde{W}_m$. We line the right-hand sides of these expressions (12) in degrees $(\alpha_m z)$ and $(\beta_m z)$

$$\tilde{W}_m = \sum_{n=0}^{\infty} \left[\alpha_m^{2n+2} A_m^{(1)} - k\beta_m^{2n+1} B_m^{(1)}\right]\frac{z^{2n+1}}{(2n+1)!};$$

$$\tilde{U}_m = \sum_{n=0}^{\infty} \left[k\alpha_m^{2n} A_m^{(1)} - \beta_m^{2n+1} B_m^{(1)}\right]\frac{z^{2n}}{(2n)!} \quad (13)$$

As the search functions in the oscillation equations of the three-layer plate, we choose the main parts of the displacements and displacements, i.e.,

$$\tilde{U}_0^{(0)} = kA_0^{(1)} - \beta_0 B_0^{(1)}, \quad \tilde{W}_0^{(0)} = \left[\alpha_0^2 A_0^{(1)} - k\beta_0 B_0^{(1)}\right]\xi.$$

From here

$$A_0^{(1)} = \frac{\frac{1}{\xi}\tilde{W}_0^{(0)} - k\tilde{U}_0^{(0)}}{\alpha_0^2 - k^2};$$

$$\beta_0 B_0^{(1)} = \frac{\frac{k}{\xi}\tilde{W}_0^{(0)} - \alpha_0^2 \tilde{U}_0^{(0)}}{\alpha_0^2 - k^2}; \quad (14)$$

We obtain a system of equations by substituting the above expressions (12) for the alternating $\tilde{U}_m$ and $\tilde{W}_m$ transitions into the contact conditions (6). Solving this system of equations, we express the variables $A_1^{(1)}$ and $B_1^{(1)}$ by $A_0^{(1)}$ and $B_0^{(1)}$. Then we add (13) to the resulting expressions

$$A_1^{(1)} = \frac{1}{(\alpha_0^2 - k^2)\Delta_1^0}\left[\frac{1}{\xi}\left(\Delta_{11}^0 + \frac{k}{\beta_0}\Delta_{12}^0\right)\tilde{W}_0^{(0)} - \left(k\Delta_{11}^0 + \frac{\alpha_0^2}{\beta_0}\Delta_{12}^0\right)\tilde{U}_0^{(0)}\right];$$

$$B_1^{(1)} = \frac{1}{(\alpha_0^2 - k^2)\Delta_1^0}\left[\frac{1}{\xi}\left(\Delta_{21}^0 + \frac{k}{\beta_0}\Delta_{22}^0\right)\tilde{W}_0^{(0)} - \left(k\Delta_{21}^0 + \frac{\alpha_0^2}{\beta_0}\Delta_{22}^0\right)\tilde{U}_0^{(0)}\right]. \quad (15)$$

To find non-zero voltages $\sigma_{xz}^{(m)}$, $\sigma_{zz}^{(m)}$ at any point of the plate layers, we describe them in the same way as (8). Then by substituting (8) for (1) on the other side and equating it with the expression described as (8) we get the following from the contact condition (5)

$$\tilde{M}_1\left(2k\alpha_1 A_1^{(1)}(k,p)sh(\alpha_1 z) - (\beta_1^2 + k^2)B_1^{(1)}(k,p)sh(\beta_1 z)\right) = \tilde{f}_x^{(1)}(k,p);$$
$$\left[\tilde{L}_1(\alpha_1^2 - k^2) + 2\tilde{M}_1 k^2\right]A_1^{(1)}(k,p)ch(\alpha_1 z) - 2\tilde{M}_1 k\beta_1 B_1^{(1)}(k,p)ch(\beta_1 z) = \tilde{f}_z^{(1)}(k,p). \quad (16)$$

By substituting the values of $A_1^{(1)}$ and $B_1^{(1)}$, defined by formulas (15), into the last (16) relationship, and by extending the hyperbolic functions in the resulting equations into power series along the thickness coordinate levels, we obtain the general equations of longitudinal oscillations of a three-layer plate. Since the order of these equations by derivatives is infinite, we assume that the conditions of the intersection of infinite-degree rows are satisfied in the work, and we limit ourselves to the first terms in the distributions. Then we have the following system of equations that can be used to solve practical problems.

$$-\left\{\left[A_{11}\frac{(h_0+h_1)h_0^4}{12} + A_{12}\frac{(h_0+h_1)^3 h_0^2}{36}\right]\frac{\partial^4}{\partial t^4} - \left[A_{13}\frac{(h_0+h_1)h_0^4}{12} + A_{14}\frac{(h_0+h_1)^3 h_0^2}{36}\right]\frac{\partial^4}{\partial x^2 \partial t^2} +\right.$$

$$\left. + \left[A_{15}\frac{(h_0+h_1)h_0^4}{12} + A_{16}\frac{(h_0+h_1)^3 h_0^2}{36}\right]\frac{\partial^4}{\partial x^4} + \left[A_{17}\frac{(h_0+h_1)h_0^2}{6} + A_{18}\frac{(h_0+h_1)^3}{6}\right]\frac{\partial^2}{\partial t^2} -\right.$$

$$-\left[A_{19}\frac{(h_0+h_1)h_0^2}{6}+A_{110}\frac{(h_0+h_1)^3}{6}\right]\times\frac{\partial^2}{\partial x^2}+A_{111}(h_0+h_1)\right\}\frac{1}{\xi}\frac{\partial}{\partial x}W_0^{(0)}-$$

$$=\left\{\left[B_{11}\frac{(h_0+h_1)h_0^2}{6}+B_{12}\frac{(h_0+h_1)^3}{6}\right]\frac{\partial^4}{\partial t^4}-\left[B_{13}\frac{(h_0+h_1)h_0^2}{6}+B_{14}\frac{(h_0+h_1)^3}{6}\right]\frac{\partial^4}{\partial x^2\partial t^2}+\right.$$

$$+\left[B_{15}\frac{(h_0+h_1)h_0^2}{6}-B_{16}\frac{z^3}{6}\right]\frac{\partial^4}{\partial x^4}+B_{17}(h_0+h_1)\frac{\partial^2}{\partial t^2}-B_{18}(h_0+h_1)\frac{\partial^2}{\partial x^2}\right\}U_0^{(0)}=$$

$$=\left\{S_1\frac{h_0^4}{12}\frac{\partial^4}{\partial t^4}-S_2\frac{h_0^4}{12}\frac{\partial^4}{\partial x^2\partial t^2}+\frac{h_0^4}{12}\frac{\partial^4}{\partial x^4}+S_3\frac{h_0^2}{6}\frac{\partial^2}{\partial t^2}-S_4\frac{h_0^2}{6}\frac{\partial^2}{\partial x^2}+1\right\}f_x^{(1)}(k,p); \quad (17)$$

$$\left\{\left[A_{21}\frac{h_0^4}{12}+A_{22}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial t^4}-\left[A_{23}\frac{h_0^4}{12}-A_{24}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial x^2\partial t^2}+\right.$$

$$+\left[A_{25}\frac{h_0^4}{12}+A_{26}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial x^4}+\left[A_{27}\frac{h_0^2}{6}+A_{28}\frac{(h_0+h_1)^2}{2}\right]\frac{\partial^2}{\partial t^2}-$$

$$-\left[A_{29}\frac{h_0^2}{6}+A_{210}\frac{(h_0+h_1)^2}{2}\right]\frac{\partial^2}{\partial x^2}+A_{211}\right\}\frac{1}{\xi}W_0^{(0)}+\left\{\left[B_{21}\frac{h_0^4}{12}+B_{22}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial t^4}-\right.$$

$$-\left[B_{23}\frac{h_0^4}{12}+B_{24}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial x^2\partial t^2}+\left[B_{25}\frac{h_0^4}{12}+B_{26}\frac{h_0^2(h_0+h_1)^2}{12}\right]\frac{\partial^4}{\partial x^4}+$$

$$+\left[B_{27}\frac{h_0^2}{6}+B_{28}\frac{(h_0+h_1)^2}{2}\right]\frac{\partial^2}{\partial t^2}-\left[B_{29}\frac{h_0^2}{6}+B_{210}\frac{(h_0+h_1)^2}{2}\right]\frac{\partial^2}{\partial x^2}-B_{211}\right\}\frac{\partial}{\partial x}U_0^{(0)}=$$

$$=\left\{S_1\frac{h_0^4}{12}\frac{\partial^4}{\partial t^4}-S_2\frac{h_0^4}{12}\frac{\partial^4}{\partial x^2\partial t^2}+\frac{h_0^4}{12}\frac{\partial^4}{\partial x^4}+S_3\frac{h_0^2}{6}\frac{\partial^2}{\partial t^2}-S_4\frac{h_0^2}{6}\frac{\partial^2}{\partial x^2}+1\right\}f_z^{(1)}(k,p).$$

Here, the coefficients A_{ij}, B_{ij}, S_{ij} $(i,j=1,2)$ are variables that depend on the elastic properties of the layers. By solving this system of equations, it is possible to find the functions sought and to find the displacements and stresses that occur in the layers of a three-layer plate.

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THE DEVELOPMENT OF COTTON BOLLWORM (HELICOVERPA ARMIGERA HBN.) IN TOMATOES GROWN IN GREENHOUSE CONDITIONS AND THE CRITERION OF ECONOMIC THRESHOLD

Abstract: *The article presents the results of experiments on the development of bollworm (Helicoverpa armigera Hbn.) in tomatoes grown in greenhouse conditions and the criterion of economic risk. In this case: the 1st-year-old worms first feed on the leaves at the point of growth, then the 2-3-year-old worms damage the pods and flowers, and the older worms damage the fruit and make it unfit for consumption, and the hatched worm develops in greenhouse conditions for 25-30 days. 20-25 pods, flowers and fruits were destroyed. Egg-laying of mature breeds continued for 15-20 days in tomato. At air temperature of 27 °C and humidity of 60-65%, it was observed that the average number of eggs laid by butterflies is 300-400. It has been confirmed in the conducted experiments that the criterion of economic threshold of cotton bollworm in greenhouse conditions during the fruit ripening period was 0.06 per plant i.e. 6 per 100 plants. So in greenhouse conditions the economy threshold of cotton bollworm is 6 units per 100 plants, which means that it is expedient to carry out protection measures against the pest from this period.*

Key words: *Greenhouse, plant, tomato, harvest, flowering, fruiting, pest, cotton bollworm, egg, worm, butterfly, mature breed, food.*

Language: *English*

Introduction

Tomato crop is grown as a food product in more than 100 countries of the world and satisfies the food demand of the world population to a certain extent. The tomato plant is of great importance in human life and occupies an important place in the diet. In order to continuously provide the population with these products throughout the year, it is important to find ways and means of effective protection of their crops from diseases and pests. Tomatoes are grown in the farms of all regions and districts of our Republic and in private plots of the population. Various diseases and pests occur in large numbers in this crop and cause great damage.

Today, several types of pests damage the tomato crop in greenhouse conditions, reducing the yield and spoiling its quality. Such pests include tomato rust mite (*Aculops lycopersici* Massee), spider mite (*Tetranychus urticae* Koch.), greenhouse whitefly (*Trialeurodes vaporariorum* West.), greenhouse thrips (*Heliothrips haemorrhoidalis* Bouché) and plant aphids (Aphididae), autumn nightworm (*Agrotis segetum* Den. et Schiff.), cotton bollworm (*Helicoverpa armigera* Hbn.), caradrina (*Spodoptera exigua* Nb.), pore-forming flies (Agromyzidae), nematodes (Meloidogyne) and other pests belonging to various systematic families, resulting in a plant yield of 40–50 %, and in some greenhouses, even 50-60% is lost.

The cotton bollworm *Helicoverpa armigera* butterfly is 12-18 mm, the forewings are yellowish-gray in color, sometimes reddish-brown or pink, or bluish in color, and the wings have a dark color pattern, slightly inward from the tip of the forewings. and there are two spots in the middle of the inconspicuous belt and wings [1;4].

Many literatures provide complete information on the distribution, feeding and migration of this pest,

natural entomophages, and development period[1;2;]. In the northern regions of Central Asia, depending on the weather conditions, the cotton tunlan gives 3-4 generations in a year, counting with the first generation, which is very small in number.

As overwintering fungi go dormant, about 85% of this pest emerges from winter. Cotton bollworms overwinter in the soil near those plants at a depth of 10-15 cm. The first adult butterflies appear in late April - early May. Butterflies collect their eggs and lay them on plant leaves, at growth points [5].

Each butterfly lays 250-500 eggs in its lifetime, and some up to 1000 eggs. According to the results of observations of the Central Asian plant protection station, the first flight period of cotton night butterflies begins when the average daily air temperature is higher than +15°C; wintering mushrooms develop well when the temperature is not lower than -15°C.

Newly hatched worms are shiny with a light green color, and later the body begins to darken. At first, the younger ones feed on the young leaves and twigs of the plant, while the older ones feed on tomato fruits. Depending on the type of plant the worm is eating, the color of the worm's body changes from gray-green blue to yellow-white [6].

In agricultural crops, the economic threshold of cotton tundra - the criterion of economic harmful amount (threshold) was determined in cotton and other crops under field conditions. Studies have also been conducted on the development, damage and control of nightshade pests in vegetable crops. In areas where the cotton bollworm is not controlled, it can multiply and destroy 70-80% of vegetable crops and 35-40% of cotton crops.

Experimental results: Experiments were carried out to determine the size of the growing cotton bollwormin different periods under greenhouse conditions. At the time of damage to tomatoes, bollworms were collected from tomato fields, fed and observed in laboratory conditions (Fig. 1). In this case, the length of the 1st young worm is 3-4 mm, the 2nd year - 7-8 mm, the 3rd year - 11-14 mm, the 4th year - 20-22 mm, the 5th year - 26-29 mm, and the 6th year bollworm was observed to be 33-35 mm (Table 1). According to the results of observation, it was observed that in the fields planted with vegetable crops (tomatoes), the bollworms of the last age of the cotton bollworm fell into the soil and turned into cones at a depth of 5-12 cm between the soil.

Figure 1. Experiments conducted in laboratory conditions

In rare cases, it can become a tuber outside the nest, that is, in leaf axils or inside fruits. The color of cotton bollworm varies from pale pinkish yellow to reddish brown. The height of the bulb is 17-21 mm.

On the last growth of the tenth segment of the abdomen there are two parallel spines. A newly formed bulb has four dark black dots around the eye, which is not fully colored.

Table 1. Size of cotton bollworm by different ages
(Cotton bollworm laboratory experiment.)

The age of larvas	Observed time second generation	Length of larvas, mm	Weight of larvas, g
I	19.07	3-4	0,01
II	23.07	7-8	0,13
III	29.07	11-14	0,19
IV	06.08	20-22	0,24
V	13.08	26-29	0,33
VI	20.08	33-35	0,39
Pupaes	27.08	16-18	0,5

Butterflies lay one, sometimes two, eggs on the stems at the point of growth of tomatoes. The 1st-year-old worms that hatched from the eggs first feed on the leaves at the point of growth, then the 2-3-year-old worms damage the pods and flowers, and the older worms damage the fruit and make it unfit for consumption. It was observed that the worm hatched from the egg develops in greenhouse conditions for 25-30 days and destroys 20-25 pods, flowers and fruits. It was found that this pest is particularly damaging to tomatoes planted in autumn and winter in the greenhouse (Fig. 2).

Figure 2. The damage of cotton bollworm in tomatoes of different ages

Experiments on the damage of cotton bollworm were conducted in the greenhouse of "Shamurod oglu" LLC in Kibrai district of Tashkent region. From the results of the scientific research, it became known that in the tomatoes planted for the autumn-winter period in the greenhouse conditions, the appearance of mature varieties of cotton bollworm was observed from the second and third ten days of August.

On the 3rd ten days of August and the first ten days of September, it was observed that mature breeds (samka) began to lay eggs on the growth points of the tomato plant. Emergence of worms from laid eggs occurred from September 10 to September 20. Usually, the coolness of autumn and high humidity have a negative effect on the development of this pest. According to the results of our researches, it was confirmed that the cotton bollworm develops in greenhouse conditions without going into diapause. In our experimental plots, the pest, which turned into a pupaes by the beginning of December, was killed by various entomopathogenic fungi due to high humidity. 3 of the female butterflies, which were flown from the pupaes collected from the nature and fertilized, were released in the pieces separated during the tomato picking season. In the rest of the pieces, the pollen of the next generation of cotton bollworm was studied.

Control was carried out every 3 days until the mature breeds died after laying eggs. From the observations, it was known that the egg-laying of mature breeds continued for 15-20 days in tomatoes. At an air temperature of 27 °C and humidity of 60-65%, the average number of eggs laid by butterflies was 300-400 (Fig-3).

■ **1st generation temperature - 27°C, humidity - 60%**

■ **2nd generation temperature - 25°C, humidity - 80%**
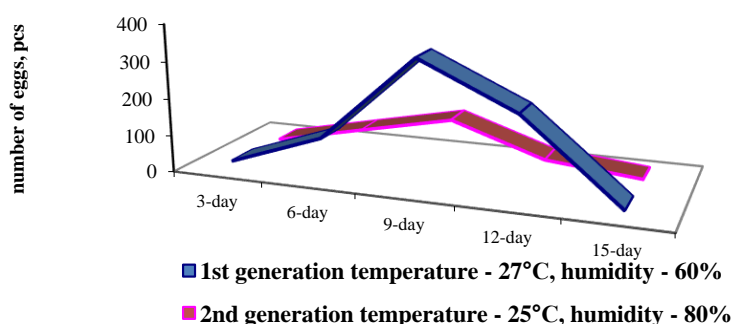
Figure 3. In the greenhouse, the flowering of the cotton tunlami mature breed

After the worms were fully fed and developed into pupae, they were picked and released into the second part of the isolated greenhouse in the same order as above. In the greenhouse during this period, the air temperature was low (22 °C), humidity was high (75-80%), which was unfavorable for butterflies to lay eggs. The average clutch of each female butterfly was 190 eggs, more than half of which, 55% or 104, did not hatch. Based on the above, the lack of additional food for feeding butterflies in greenhouses, as well as low air temperature and high humidity, is evidence that the biological parameters of cotton night butterflies have been negatively affected.

We conducted field experiments to study the

damage caused by cotton bollworm in tomatoes on Videtta F1 hybrid. In this case, the artificially infested plants were covered with gauze in boxes (to prevent them from being infected by other insects).

During the flowering and fruiting periods of the plant, the first young worms of the nightworm were placed in 3 repetitions, and the plant in the control variant was left pest-free. It was observed that the laid young worms start to damage the leaves and growth points and stems of tomatoes. Damaged pods and flowers began to dry up, and fruits were observed to

rot under the influence of fungi and bacteria. The results of the experiment are presented in Table 2.

As can be seen from this table, tomato yield is reduced by 73.3% compared to the control in the variant infested with pest worms during the flowering period. The total yield showed a decrease of 2.15 kg of yield from each plant. During the fruiting period, in the variant affected by cotton borer, 53.3% less fruits were observed compared to the control, and 1.4 kg of yield was observed per plant.

Table 2. Damage caused by cotton bollworm to tomato productivity
(Greenhouse of "Shamurod oglu" LLC)

№	Tomato variety	The period of growth affected by the pest	Backaches	Yield from 1 plant, kg	Yield loss relative to control	
					kg	%
1.	Videtta F1	bloom	1	0,8	2,2	73,3
			2	0,9	2,1	70,0
			3	0,8	2,2	73,3
	Average		-	0,83	2,15	72,2
2.	Videtta F1	fruit bearing	1	1,5	1,5	50,0
			2	1,4	1,6	53,3
			3	1,3	1,7	56,6
	Average			1,4	1,6	53,3
	Control		-	3,0	-	-
	EKF$_{05}$			1,2		

The degree to which cotton bollworms damage a plant depends on its quantity. Therefore, it is important to determine the economic threshold level criterion (ETHLC) of cotton bollworm in different plants. Economic threshold has been extensively studied by various scientists in various agricultural crops such as cotton and tomatoes, which are major pests [7].

However, the number of economically dangerous thresholds of cotton in greenhouse conditions has not been studied. Therefore, in our research, we aimed to determine the economic

threshold of cotton bollworm under greenhouse conditions. The results of the experiment are presented in (Table 3). As can be seen from this table, the number of fruits decreased by 14.1 units, the weight of the fruits also decreased, and the yield was 1350.2 grams less from one bush of tomatoes. The damage level of the fruit crop compared to the control crop was 60.8%. In the second version of the experiment, when 2 cotton bollworms were found on 1 plant, the fruit yield was reduced by 1787.2 grams per plant compared to the control, and it was determined that the level of damage was 79.7%.

Table 3. The economic risk limit criterion of the cotton bollworm in the tomato plant in the greenhouse n=5, M±m
("Son of Shamurod" greenhouse of MJCh, variety Charlotte F1)

1 in the plant worms number, pcs	1 plant- taken fromaverage yield, g	in 1 plant fruits number, pcs	Harvest decrease, g	3 separation coefficient, %	Economy threshold
Control (pest free)	2210,2±0,86	22,8±0,8	-	-	
1	859,26±0,71	8,7±0,42	1350,2±1,15	60,856±0,886	
P<	0,01	0,05	-	-	0,06
2	422,4±0,57	3,85±0,37	1787,2±0,86	79,702±0,918	
P<	0,05	0,05	-	-	
3	346,2±1,15	4,06±0,59	1864,2±1,06	84,08±0,64	
P<	0,05	0,05	-	-	

In the third version of the experiment, 1864.2 grams less yield was obtained compared to the control when 3 cotton bollworms were found in one tomato plant. In this case, the damage rate of the crop was 84.08% (Table 3).

Conclusion: As it can be seen from the conducted experiments, the criterion of the economic risk level of the cotton plant in the greenhouse conditions during fruit ripening was 0.06 per plant, i.e. 6 per 100 plants. So, the IHMM of cotton bollworm in greenhouse conditions is 6 units per 100 plants, which means that it is justified to carry out protection measures against the pest from this period.

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FUNGI –PATHOGENS OF COTTON SCOOPS AND DETECTION OF TOXICITY OF A NUMBER OF ENTOMOPATHOGENIC MICROMYCETES

Abstract: *The materials discuss the issue of the presence of fungi-micromycetes causing diseases of caterpillars of one of the most dangerous pests of cotton – cotton scoops. In 2020-2021, 20 species of micromycetes were identified and isolated into pure culture. 50 wax moth caterpillars were artificially infected with these cultures. As a result, only 2-4% of the dead caterpillars were noted. These strains of fungi are pathogens and have entomopathogenic properties, but have no practical interest.*

Key words: *Cotton scoop, caterpillar, wax moth, entomopathogenic micromycetes, pure culture, strain, systematic taxa, culture fluid, filtrate, toxicity.*

Language: *Russian*

ГРИБЫ –ВОЗБУДИТЕЛИ ЗАБОЛЕВАНИЙ ХЛОПКОВОЙ СОВКИ И ВЫЯВЛЕНИЕ ТОКСИЧНОСТИ РЯДА ЭНТОМОПАТОГЕННЫХ МИКРОМИЦЕТОВ

Аннотация: *В материалах обсуждается вопрос наличия грибов-микромицетов вызывающих заболевания гусениц одного из опаснейших вредителей хлопчатника – хлопковой совки. В 2020-2021 г.г. были выявлены и выделены в чистую культуру 20 видов микромицетов. Данными культурами искусственно заражались 50 гусениц восковой моли. В результате было отмечено лишь 2-4% умерших гусениц. Данные штаммы грибов являются возбудителями болезней и обладают этномопатогенными свойствами, но не имеют практического интереса.*

Ключевые слова: *Хлопковая совка, гусеница, восковая моль, энтомопатогенные микромицеты, чистая культура, штамм, систематические таксоны, культуральная жидкость, фильтрат, токсичность.*

Введение

Микромицеты – чрезвычайно обширная и разнообразная группа организмов, которая играет важную роль в природных биоценозах, оказывают существенное влияние на происходящие в природе процессы. Основная группа грибов относятся к сапротрофным организмам осуществляющих процессы деструкции органического материала, другая группа грибов вызывает заболевания растений и животных.

Хлопководство традиционно является одной из ведущих отраслей сельского хозяйства Узбекистана. Известно, что потери урожая от вредителей, могут составлять до 30%, так З.К.Адылов (1991) приводит данные, что в течение вегетационного периода хлопчатнику наносят вред более 217 видов насекомых и клещей.

В условиях Узбекистана одним из основных вредителей хлопчатника и овощных культур является хлопковая совка. Биология совки в настоящее время изучена хорошо (Яхонтов, 1953, Кимсанбаев и др., 2007, Ходжаев, Холмурадов,

2008, и др.), однако возбудители болезней совки ранее не изучались.

В настоящее время в защите растений значительная роль принадлежит биологическому методу борьбы, который является мощным фактором в повышении урожайности и качества продукции, уменьшении объемов применения пестицидов и предотвращении загрязнения окружающей среды ядохимикатами. Сущность биологического метода состоит в целенаправленном использовании сложившихся в природе антагонистических взаимоотношений между вредителями сельскохозяйственных посевов, их паразитами и хищниками, а также энтомопатогенами – возбудителями бактериальных, грибных и вирусных болезней вредителей.

Энтомопатогенные грибы являются самостоятельной экологической группой микромицетов, жизнедеятельность которых связана с насекомыми и которые влияют на регулирование численности насекомых в природных агро- и биоценозах.

Энтомопатогенные грибы привлекают внимание специалистов в силу их возможного использования в качестве средства подавления популяции вредителя. Они влияют на природные биоценозы и популяции вредителей, способны снижать их численность, в связи с чем перспективны в биологической борьбе с вредителями. В практике сельского хозяйства применяется около 40 препаратов, основанных на использовании энтомопатогенных свойств микроорганизмов (Холмурадов и др., 2011). На возможность применения энтомопатогенных грибов обращали внимание многие исследователи (Полтев и др, 1965, Евлахова, 1971, Коваль, 1984, и др.).

ЦЕЛЬ ИССЛЕДОВАНИЯ.

Целью данной работы являлось выявление состава местных энтомопатогенных грибов, поражающих коробчатого червя (хлопковой совки), выявление их патогенности и их токсическое действие на вредителя.

МАТЕРИАЛ И МЕТОДЫ РАБОТЫ.

Материалом для исследования служили погибшие и живые личинки вредителя разных возрастов и взрослые особи с признаками поражения. Сбор насекомых осуществлялся на хлопчатнике и томатах в весенний и летний сезоны маршрутными обследованиями по Ташкентской области.

Исходя из биологии развития вредителя – окукливание гусениц в поверхностных слоях почвы, пробы почвы брали из верхних слоев (до 10 см) методом раскопок. Почву просеивали и выбирали попадающих насекомых (Поляков и др.,1984). Собранный материал подвергался камеральной обработке - после поверхностного фламбирования их раскладывали в стерильные чашки Петри во влажную камеру. Выделение грибов с субстрата и в чистую культуру проводили общепринятыми в микологии методами (Дудка и др., 1982).

Идентификацию проводили по определителю Э.З.Коваль (1974), также в работе использовались определители А.А.Ячевского (1917), М.А.Литвинова (1967) и сводка «Флора грибов Узбекистана» (Сагдуллаева и др.,1989, 1990).

В работе использовались голодный агар, среда Чапека, сусло-агар (Дудка и др., 1982). Для выявления токсичности применяли экстракты и культуральные жидкости грибов, приготовленные по методу Н.А.Спесивцевой (1964). Токсическое действие выявленных микромицетов устанавливалась путем погружения личинок восковой моли, которая вырабатывается в биолабораториях для получения энтомофага бракона – паразита хлопковой совки в экстракты и культуральные жидкости грибов на 30 сек. и проводили наблюдение за развитием насекомого.

РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ

В результате проведенного исследования было выявлено 20 штаммов грибов, относящихся к 12 родам гифальных грибов, подотдела Deuteromycotina. Анализ систематического состава микромицетов показал преобладание видов светлоокрашенных гифомицетов, по сравнению с темноокрашенными и туберкуляриевыми. Наибольшее количество отмечено у родов *Aspergillus* Mich.- 5 видов, *Penicilium* Lk., (3), *Fusarium* Lk. и *Alternaria* Nees ex Fr. (2), остальные роды включали по 1 виду (табл.1).

Таблица 1. Распределение микромицетов, выделенных с гусениц хлопковой совки по систематическим таксонам.

	Семейство	Род	Вид
1	Moniliaceae	*Aspergillus* Mich.	A. *A. Flavus* Lk. ex Fr.
2			A. *niger* v.Tiegh.
3			A. *terreus* Thom.
4			A. *ochraceus* Wilhelm

5			*A. fumigatus* Fr.
6		*Cephalosporium* Cda.	*C. acremonium* Cda.
7		*Geotrichum* Lk. ex Pers.	*G. candidum* Lk. ex Pers.
8		*Penicillium* Lk.	*P. chrysogenum* Thom.
9			*P. frequentans* Westl.
10			*P. spinilosum* Thom.
11		*Scopulariopsis* Bain.	*S. brevicaulis* (Sacc.)Bain.
12		*Spicaria* Harting em. Harz	*S. heliothis* V.Charles
13		*Trichotecium* Lk. ex Fr.	*T. roseum* Lk. ex. Fr.
14	Dematiaceae	*Alternaria* Nees ex Wallr.	*A. alternata* (Fr.) Keiss.
15			*A. tenuissima* (Fr.) Wiltsh.
16		*Cladosporium* Lk. ex Fr.	*C. herbarum* Pers ex. Lk.
17		*Stachybotrys* Cda.	*S. lobulata* Berk.
18		*Stemphylium* Wallr.	*S. botryosum* Wallr.
19	Tuberculariaceae	*Fusarium* Lk. ex Fr.	*F. avenaceum* (Fr.) Sacc.
20			*F. lateritium* Nees.
Итого: 3		12	20

Одной из задач нашего исследования было определение патогенности выявленных штаммов грибов. Степень патогенности выявленных микромицетов устанавливалась путем искусственного заражения гусениц старших возрастов восковой моли, которая вырабатывается в биолабораториях для получения энтомофага бракона – паразита хлопковой совки. Сухой споровый порошок наносился на поверхность гусениц, которые в течение 20 дней содержались для выявления возможности поражения. Гусеницы в контроле не обрабатывались. Опыт проводился на 50 гусеницах. Высчитывался средний процент поражения. Результаты опыта представлены в табл.2.

Из представленных данных следует, что процент поражения гусениц восковой моли в опыте при искусственном заражении колеблется в пределах от 2 до 25%. В случае поражения, на 10-12 день отдельные особи становились малоподвижными, вялыми, слабо реагирующими на раздражение, на поверхности гусениц наблюдались различные пятна.

Необходимо отметить, что картина гибели гусениц в течение 20 дней отмечалась лишь в случае с *Aspergillus fumigatus* (4%), *Aspergillus flavus*, *Trichotecium roseum*, *Spicaria heliothis* и *Fusarium lateritium* вызвали гибель 2%. Погибшие гусеницы становились твердыми, хрупкими, иногда наблюдалось образование спороношения на поверхности насекомого.

Табл. 2. Поражение гусениц восковой моли выявленными штаммами микромицетов.

Вид микромицета	Количество выявленных штаммов	Количество личинок	Поражение гусениц, %	
			Поражение	Гибель
B. Aspergillus flavus	1	50	21	2
Aspergillus niger	1	50	18	-
Aspergillus terreus	1	50	-	-
Aspergillus ochraceus	1	50	3	-
Aspergillus fumigatus	1	50	25	4
Cephalosporium acremonium	1	50	16	-
Geotrichum candidum	1	50	-	-
Penicillium chrysogenum	1	50	6	-
Penicillium frequentans	1	50	4	-
Penicillium spinilosum	1	50	1	-
Scopulariopsis brevicaulis	1	50	16	-
Spicaria heliothis	1	50	16	2
Trichotecium roseum	1	50	18	2
Alternaria alternate	1	50	5	-
Alternaria tenuissima	1	50	3	-
Cladosporium herbarum	1	50	5	-

Stachybotrys lobulata	1	50	-	-
Stemphylium botryosum	1	50	2	-
Fusarium avenaceum	1	50	13	-
Fusarium lateritium	1	50	12	2

Кроме прямого влияния на насекомых одной из задач нашего исследования было определение патогенности выявленных штаммов грибов и токсическое действие выявленной микобиоты. В отечественной и зарубежной литературе накоплено достаточно данных о токсических свойствах отдельных видов микромицетов (Спесивцева, 1984, Аблаева, 1990).

В связи с вышесказанным нами было проведено изучение ряда выявленых грибов на способность продуцировать токсические метаболиты, отрицательно воздействующие на насекомых. В опыте были задействованы *Aspergillus flavus*, *A. fumigates*, *Trichotecium roseum*, и *Fusarium lateritium* которые в предыдущих опытах вызывали гибель личинок.

При определении токсичности использовали экстракты и культуральные жидкости грибов. При получении экстрактов культуры выращивали в течении 10 дней. Для получения культуральных жидкостей и для выявления сроков накопления компонента, обусловливающего большую токсичность, грибы выращивались в течении 10 и 30 дн.

В результате эксперимента установлено, что фильтраты культуральных жидкостей обладают большей токсичностью чем экстракты грибов. При этом больший процент гибели личинок вызывали 30-дневные фильтраты культуральных жидкостей, по сравнению с 10-дневными (табл. 2).

Так 10-дневные культуральные жидкости обладали более чем в 2 раза низкой активностью по сравнению с 30-дневными культурами, так *Aspergillus flavus* вызывал гибель 16.2%, *A. fumigates*- 15,2, *Fusarium lateritium* - 10,9, *Trichotecium roseum* – 8,0 % личинок ранних возрастов восковой моли, тогда как данные по поражению восковой моли 30-дневными культуральными жидкостями составляют 43,1; 42,4; 37,6; 36,4 % соответственно. Для личинок старших возрастов данный показатель был ниже, но наблюдалось та же закономерность (табл.3).

Табл.3. Действие фильтратов культуральных жидкостей на личинок восковой моли

Культуральные жидкости гоибов	Число личинок на листе	Гибель личиок, в %			
		10-дневные культуральные жидкости		30-дневные культуральные жидкости	
		Личинки I-II возрастов	Личинки III-IV возрастов	Личинки I-II возрастов	Личинки III-IV возрастов
A. flavus	50	16,2	19,2	43,1	34,2
A.fumigates	50	15,2	19,9	42,4	34,5
F. lateritium	50	10,9	19,0	39,6	31,2
Tr. roseum	50	8,0	6,2	36,4	23,5

Экстракты, как уже отмечалось, обладали меньшей токсичностью, чем фильтраты, так *Aspergillus flavus* вызывал гибель 16.1%, *A. fumigates*- 14,2, *F. lateritium* - 15,0, *Tr. roseum* – 9,8 % личинок ранних возрастов восковой моли, а для личинок старших возрастов процент поражения несколько ниже (табл.4).

Табл.4. Действие экстрактов грибов на личинок восковой моли

Культуральные жидкости гоибов	Число личинок на листе	Гибель личинок, в %	
		10-дневные культуральные жидкости	
		Личинки I-II возрастов	Личинки III-IV возрастов
A. flavus	50	18,1	14,5
A.fumigates	50	14,2	10,3
F. lateritium	50	15,0	8,4
Tr. roseum	50	9,8	6,3

На основании полученных данных, можно говорить о энтомопатогенных свойствах микромицетов *A. flavus*, *A. fumigates*, *F. lateritium*, *Tr. roseum* и воздействии их культуральной

жидкости и экстрактов на живых опытных личинок насекомых. Дальнейшая работа с данными культурами может предполагать

возможность применения их в борьбе с вредными насекомыми.

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DIGITAL OIL AND GAS UNIVERSITY - OPPORTUNITIES AND PERSPECTIVES

Abstract: Today in Uzbekistan, the development of the oil and gas industry is inseparably linked with the introduction of digital technologies and innovations at all its stages. In the long term, the fuel industry will focus on the creation of high-tech petrochemical clusters, which will allow mastering the production of processing products of traditional and alternative hydrocarbons with high quality characteristics. To implement these large-scale tasks, first of all, two important conditions are necessary: the availability of appropriate infrastructure and qualified personnel. In this regard, the article proposes the creation of a digital oil and gas university, which will be aimed at meeting the requirements of companies for the quality of education and ensuring the full life cycle of training new personnel for the oil and gas sector.

Key words: Digital oil and gas university; qualified personnel; fuel and energy industry; international educational space; digital technologies; digital resources; digital platform; individual educational trajectories; process simulators.

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Introduction

Due to the changing nature of the energy industry and the challenges it faces, one of which is the complication of the current industry complexes for hydrocarbon production, there is a need for equipment modernization and technical re-equipment, as well as the inevitable transition of production to digital technologies and automatic control methods. According to the results of research conducted by IHS Markit, 86% of company leaders say that the introduction of such digital innovations as smart fields, digital twins of oil refineries is transforming their business to a greater extent than any other trends (Figure 1) [7, 13]. That is why digitalization, being a priority for the development of the oil and gas industry, is a key element in increasing the competitiveness of enterprises.

Clarivate Analytics indexed

28% Urbanization

39% Resource constraints and climate change

58% Shift in global economic performance

69% Demographic shift

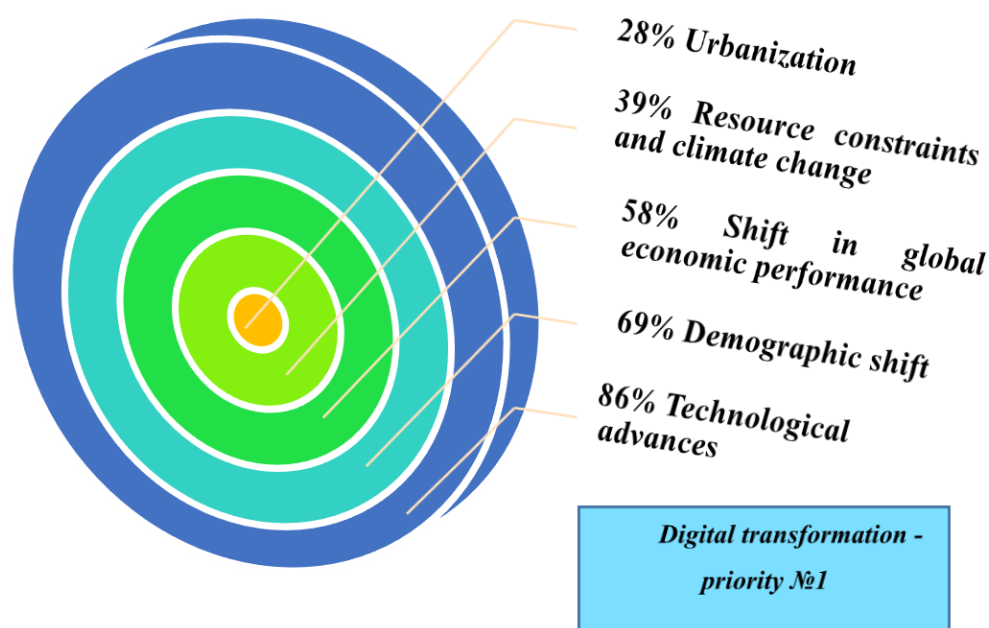86% Technological advances

Digital transformation - priority №1

Figure 1. Trends that transform business in the next 5 years [7, 14]

On January 25, 2020, the President of the Republic of Uzbekistan Shavkat Mirziyoyev spoke about the most important priorities for the development of digital technologies in the country in his address to the Oliy Majlis: "For the further development of science in our country, teaching our young people deep knowledge, high spirituality and culture, accelerating our work on formation of a competitive economy, we will continue to raise the level of science, education and the digital economy in 2020" [10].

However, the introduction of digital technologies contributes to the displacement of traditional approaches in all spheres of human life. Under the influence of external unforeseen factors, such as the outbreak of the COVID-19 pandemic, these processes are significantly accelerated, and have already pushed the public consciousness to global changes in the formation of new principles for the functioning of production, construction, transport, and financial relations. But first of all, the cardinal restructuring affected the sphere of education.

Consequently, the oil and gas industry is already facing the problem of retraining workers who are losing their jobs due to automatization, the emergence of new digital specialties and the required competencies. In order to be able to provide advanced training of new personnel by the oil and gas educational services market, it is proposed to create an educational platform where flexible continuous digital training in oil and gas competencies and specialties will be introduced.

Literature review

In an article entitled «Digital Modernization of Education: Pros and Cons», the author talks about the need for modernization of the country, taking into account the technological revolution taking place in the world, "the speed of technological change is accelerating rapidly, going up sharply. Whoever uses this technology wave will go far ahead. Those who cannot do this, this wave will simply overwhelm, drown" (Antonova, Khorina, Gavryushina, 2022) [2, 32]

To solve the problem of a shortage of qualified specialists in the field of the digital economy, it is necessary to increase the number of graduates of educational institutions of higher and secondary vocational education in areas of training related to information and telecommunication technologies, to increase the proportion of the population with digital skills and information technologies. All this requires the modernization, digitalization of the educational system, the transition to an electronic form of education. The role of the teacher is changing in the era of the digital economy, new forms of interaction between the teacher and the student, the so-called network interaction, are emerging. Recently, in the conditions of the digital economy, the leading role in the pedagogical process belongs to electronic educational technologies. One of the most demanded pedagogical trends is the formation of massive open online courses for systems of level and additional education (massive open online courses-MOOC) (Ramazanova, 2020) [12, 108]

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The widespread introduction of modern digital means of communication into the educational environment raises many questions and causes a large number of problems that cannot be solved within the framework of the traditional educational paradigm. Among these problems are the obvious mental changes of the new, so-called digital-born generation, which is capable of consuming huge amounts of information and finding ready-made solutions in it, skipping the traditional stages of logical conclusions based on fundamental analysis (Anakhov, 2020). [9, 82]

Research Methodology

The proposed project of the digital oil and gas University is a self–customizable service aimed at building options for individual educational trajectories in accordance with the requests from the oil and gas company. Since the necessary condition for the functioning of this platform will be the provision of accessible education to every oilman anywhere and at any time, the operator of the digital oil and gas university will become one of the most popular new specialties.

It is obvious that a digital university should not be considered exclusively as a double of a "physical" university, since digital technologies make it possible to create new conditions, change the order of organization of processes, both training and management.

A digital oil and gas university will be a combination of four interdependent elements: the format of training; digital resources; digital platform; digital environment (Figure 2) [1, 23].
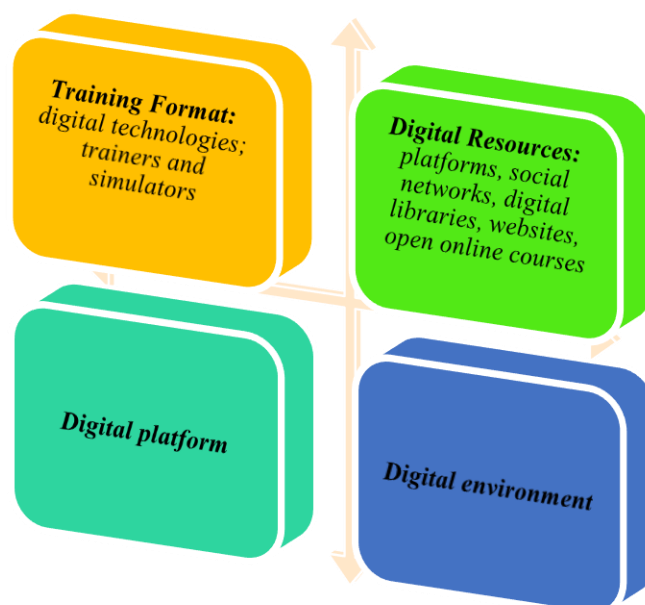

Figure 2. Elements of a digital oil and gas University [1, 23]

The *digital format* of training implies not only the use of digital technologies for remote learning, but also the use of various digital training simulators and simulators of technological processes for employees of the enterprise in the learning process.

Digital technologies are a variety of tools for mastering educational material, for self-study and study with the help of a mentor, for feedback, for monitoring progress. For example, using an online test constructor will allow you to remotely check the knowledge of students. An interactive worksheet is a convenient digital tool that is most often used when a student works independently or when doing practical work. Multimedia presentation is also a popular and actively developing technology in the practice of distance learning, which combines many tools for working with information. Undoubtedly, the use of this technology in the educational process increases motivation to learn, because a new form of information presentation is used, thereby it contributes to better assimilation and better memorization of educational material. [2, 20]

The development of oil fields requires constant monitoring and analysis of a variety of production conditions. The software complexes or training simulators contained in this digital educational resource make it possible to evaluate the efficiency of deep-pumping equipment, take into account the influence of factors complicating production, analyze the state of the reservoir and work out possible emergency situations at the production facilities of oil-producing enterprises. In this regard, they can be used both for training and advanced training of specialists of oil and gas companies, and for the preparation of expert opinions on various production issues [6, 8].

The simulator, in turn, simulates the technological process and provides information about its condition, so that the specialist will be able to gain practical skills in managing the technological installation: when starting; when stopping; when working in normal mode; when working in emergency and emergency situations. Thus, the simulator will allow you to test the knowledge and conduct the certification of technological personnel.

The second element of a digital university is *digital resources*. They embody the tools through which the idea of digital transition is realized. For example, these include digital platforms, social networks, electronic libraries, websites, mass open online courses, various interactive simulators, virtual exhibition stands, databases.

The third element is a *digital platform*, which simultaneously acts as an algorithm for the relationship of participants, and a platform for content placement, and a combination of digital tools, such as an integrated information and analytical system, and an environment with software. Digital Oil and Gas University is a platform that operates on the principle of "one window", that is, the student has access to all the information of interest on his profile, which allows reducing the irrational use of his personal time by a person.

The fourth element is the *digital environment* — a space, a place where interaction takes place.

Analysis and Results

The mechanism of operation of the proposed digital oil and gas university is shown in Figure 3.
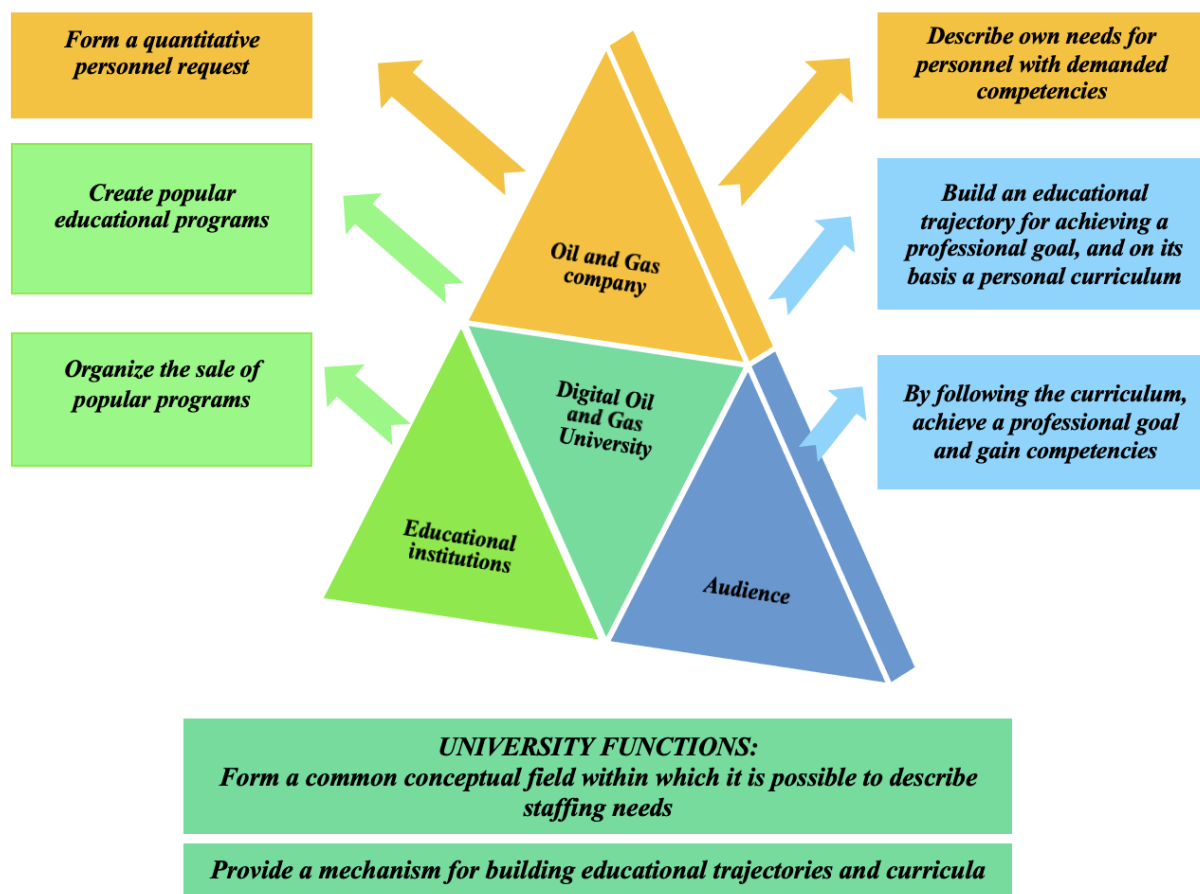

Figure 3. The mechanism of operation of the digital Oil and gas University [9, 81]

First of all, oil and gas companies should formulate requirements for new specialists with digital oil and gas knowledge, and online training, in turn, will allow you to study at any time, easily embedding this process into your work/personal life. Thus, with the gradual acquisition of new competencies and skills, with breaks and monitoring between training, the acquired knowledge will be stored in memory for many years.

State funding of the project

Digital technologies will expand opportunities for the export of educational services. Already, information and communication technology platforms provide an opportunity to meet global development trends and integrate into the international educational space.

However, in the process of implementing this project, financing problems may arise in supporting

the infrastructure of a digital university. The issue of financing is a necessary condition for the formation of digital education, which is expensive, carries not only advantages, but also significant risks, for example, dependence on the project goals of external investors who can both directly participate in the university's digital projects and provide grant support.

In accordance with the Decree of the President of the Republic of Uzbekistan dated January 28, 2022 No. PD-60 "On the Development Strategy of New Uzbekistan for 2022 — 2026", as well as in order to implement priority tasks to raise the sphere of information and communication technologies to a new level, it was instructed to introduce, from October 1, 2022, the procedure for allocating grants in order to support startup projects in the field of information and communication technologies aimed at providing educational IT services, developing software products and exporting them to in the amount of up to 1 billion sums through a competition held by the Ministry of Innovative Development at the expense of the Fund for Support of Young Entrepreneurs under the Ministry of Investment and Foreign Trade. Thanks to this Presidential Decree, it will be possible to receive state support for the implementation of the project to create a digital oil and gas university. [3]

Conclusion

Thus, the digital oil and gas University is the very project aimed at changing the traditional teaching methodology, the purpose of which is to help oil and gas companies significantly save time and costs for retraining; educational institutions – to meet the requirements of modern reality, increasing the efficiency of digital oil and gas education, and attracting highly motivated students; and new students coming for retraining - to show how much their acquired skills will be in demand in digital oil and gas production.

Continuous training of employees at the digital oil and gas University has a number of advantages.

Firstly, the digital oil and gas university will "connect" enterprises and universities so that training does not take place exclusively in the theoretical aspect. To date, there is inconsistency in the requests of specialists at enterprises and in the skills and knowledge possessed by graduates who have received a traditional education. In addition, universities have lost communication with real business. According to the authors, the practice focused on the needs of today's realities and business needs is important.

Secondly, this solution will allow students of a digital university to have access to all of the above elements of a digital university, being in real time, without interrupting their main activities.

Thirdly, the creation of a modern university will lead to an increase in its competitiveness, able to demonstrate digital adaptability in the education market, create additional values and attract more students. Undoubtedly, the expected result of the digitalization strategy of the university as a positioner of authoritative ratings is expected to increase the competitiveness and the level of the image of the university, the interest of teachers and students in the field of research competencies.

Thus, the use of digital solutions is extremely important for our country, since the lack of active dissemination of modern digitalization systems greatly reduces the efficiency of enterprises. Investments made in digitalization today are shaping the energy industry of the future. This will provide a unique chance to jump several steps in development at once and install the latest solutions that have just been applied in leading industrial countries.

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DISPERSION OF THE SPEED OF SOUND IN WATER-ORGANIC SOLUTIONS

Abstract: Concentration and temperature studies of spontaneous Mandelstam-Brillouin scattering of light in aqueous solutions of g-picoline showed the manifestation of negative dispersion of hypersound velocity at concentrations C J 0.2 mole fractions of g-picoline. The temperature and concentration dependence of the negative dispersion is associated with the process of solution structurization, which reaches its optimum value at a concentration of C = 0.06 mole fractions of g-picoline.
Key words: dispersion, relaxation of bulk viscosity, hypersound, relaxation time, water-organic solution.
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Introduction

The work is devoted to the description of an experiment on measuring the temperature dependences of the hypersound velocity at different frequencies in water-organic solutions with singular points. Interest in the study of such solutions is due to the following. As is known (see, for example, monograph [1]), there is a class of water-organic solutions in which an anomalously high scattering peak unrelated to molecular scattering is observed in a certain fairly narrow range of concentrations. The physical nature of this peak is currently being actively discussed (see, for example, [2] and references cited in this work). It is believed that the main reason for the appearance of this peak is the appearance of a supramolecular structure in a certain range of temperatures and concentrations. It is necessary to mention the previous works [3 - 6], in which it has been shown that stable liquid molecular complexes with sizes of 100 - 200 nm spontaneously arise in

aqueous solutions of polar organics, the density of which differs from the density of the surrounding liquid. It has been shown in [7 - 12] that anomalous light scattering is associated with the formation of a nanodroplet phase in water-organic mixtures.

In this work, a mixture of "water - g-picoline" is studied. Interest in this particular mixture is due to the fact that in this solution in a certain concentration range there is an abnormally high light scattering peak at a content of g-picoline » 0.06 mole fractions (ppm), see Fig. III.14 in the monograph [1] and comments on this figure. At the same time, in accordance with the literature data (see, for example, [11]), g-picoline has infinite solubility in water, i.e. the mixture "g-picoline - water" does not separate at any concentration in the entire temperature range at which the liquid mixture exists. The refractive index of g-picoline at a wavelength of l = 589.3 nm is 1.5, so it should be expected that in the concentration range for which an anomalous light scattering peak is recorded, a nanodroplet phase enriched in g-picoline can be observed, and the phase contrast, in this case, will be high enough to study these nanodroplets with a phase microscope, see [7 - 10]; we are currently experimenting with. In addition, in [12 - 15] it was shown that the Landau-Placek relation $\left(\dfrac{I_\omega}{I_{\omega-\delta\omega} + I_{\omega+\delta\omega}} \right)$, where I_w - unbiased component intensity, $I_{w \pm dw}$ - the intensity of the displaced components increases with decreasing solution concentration over a wide temperature range. In [16], it was suggested that the increase in $\left(\dfrac{I_\omega}{I_{\omega-\delta\omega} + I_{\omega+\delta\omega}} \right)$ is due to an increase in the isothermal compressibility b_T with an increase in the water content. This, in turn, may be due to the appearance of stable supramolecular structures (nuclei of the nanodroplet phase) with a decrease in the concentration of g-picoline; this phase, in accordance with the model presented in [7 - 10], causes anomalous scattering in an aqueous solution of g-

picoline at its concentration of 0.06 ppm. in solution; henceforth, we will call this concentration the critical concentration. This paper presents the results of a study of the frequency dispersion of hypersound velocity in aqueous solutions of g-picoline in a wide range of temperatures and concentrations; special attention is paid to the concentration region near the critical one.

Experiment.

The experimental setup is described in detail in [17]. The spectra of polarized light scattering were studied by using a two-pass Fabry-Perot interferometer. The light scattering angle was ~90° and 135°. The error in setting the angle did not exceed 0.2°. The dispersion region of the interferometer was 60.625см⁻¹ and 60.417см⁻¹с. The interference contrast of the pattern reached 4Ч10⁵, the sharpness of the interference maxima was 35. The radiation source was a He-Ne laser with a wavelength of 632.8 nm and a power of 115 mW. The shift of the Mandelstam - Brillouin components Dw was measured with an error not exceeding 0.5%. The hypersound velocity v was calculated using the formula:

$$ v = \frac{\Delta\omega \cdot c}{\omega_0\, 2n \sin\dfrac{\theta}{2}}, \qquad (1) $$

where c– is the speed of light, w_0 – is the frequency of the exciting light, n – is the refractive index, q – is the scattering angle.

Experimental results and discussion.

On Fig. 1 (a) – (f) panels show the temperature dependences of the hypersound velocity v for frequencies of 6.2 GHz and 4.5 GHz for pure g-picoline (panel (a)) and for concentrations of g-picoline C = 0.4 ppm .(panel (b)); C = 0.2 ppm (panel (c)); C = 0.1 ppm (panel (d)); C = 0.06 ppm (panel (e)) and C = 0.05 ppm. (panel (f)). Figure 2 shows the dependence of the area difference DS under the curves for frequencies of 6.2 GHz and 4.5 GHz on the concentration C of the solution.
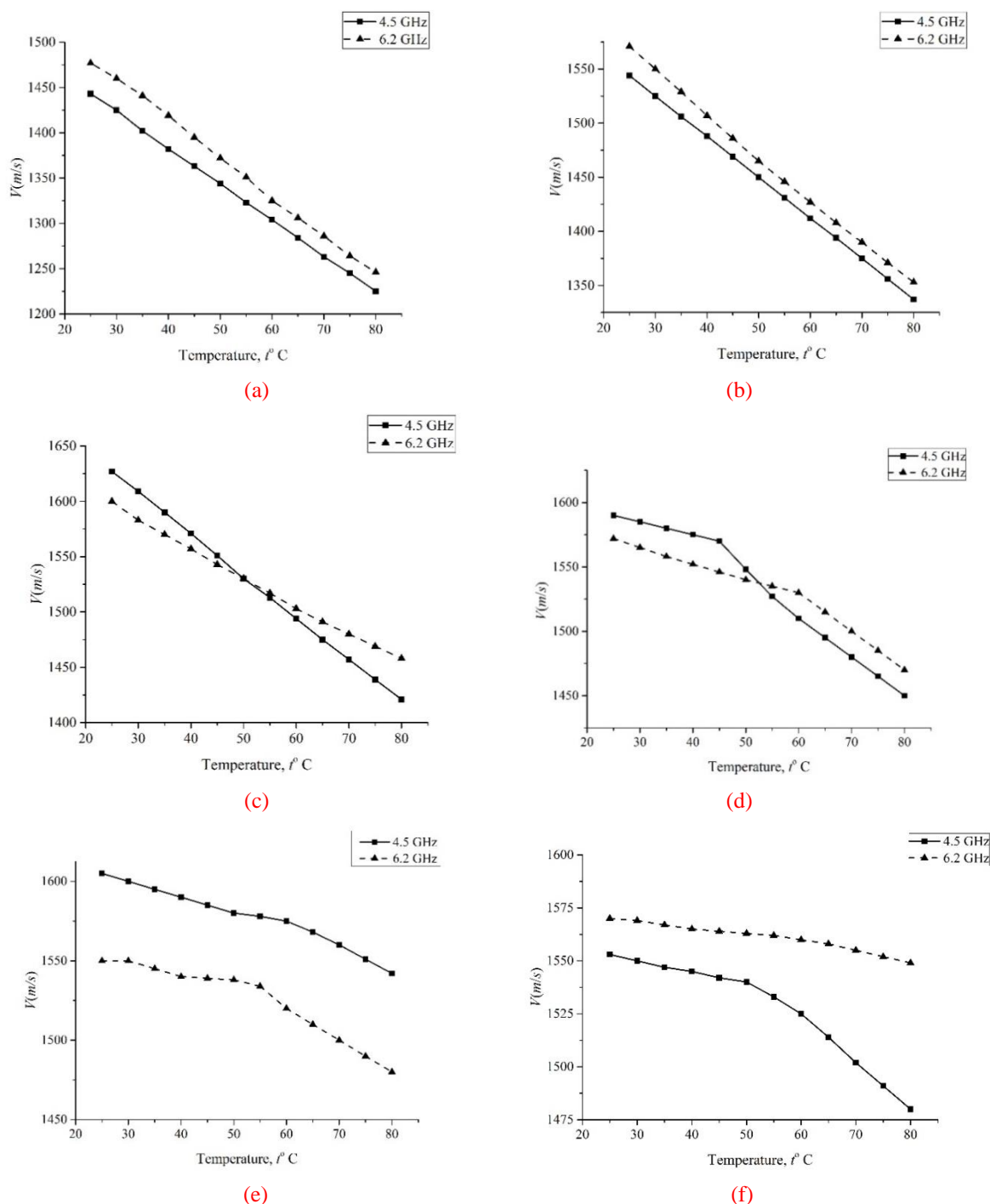
(a)

(b)

(c)

(d)

(e)

(f)

Fig. 1. Dependences of the velocity V of hypersound at frequencies 4.5 and 6.2. GHz on temperature for pure g-picoline (a), mixture "g picoline - water" at a concentration of g-picoline 0.4 mole fractions (b), mixture "g-picoline - water" at a concentration of g- picoline 0.2 mole fractions (c), mixtures "g-picoline - water" at a concentration of g-picoline 0.1 mole fractions (d), mixtures "g- picoline - water" at a concentration of g-picoline 0.06 mole fractions (e), mixtures "g-picoline - water" at a concentration of g- picoline 0.05 mole fraction (f).

As can be seen from the figure (panels (a) and (b)), the nature of the temperature dependence at the indicated frequencies for pure g-picoline and 0.4 ppm is approximately the same for both frequencies. Differences appear when the concentration of g-picoline is C = 0.2 ppm. and 0.1 ppm (panels (c) and (d)). It can be seen that at $t > 50°$ C, there is a positive and at $t < 50°$ C, a negative hypersonic speed dispersion in the frequency interval between 6.2 and 4.5 GHz.

Figure 2 shows the dependence of the area difference $DS = S_{6.2} - S_{4.5}$, where $S_{6.2}$ and $S_{4.5}$ are the areas under the graphs in Fig. 1 for frequencies of 6.2 and 4.5 GHz, respectively, depending on the concentration of g-picoline. Since DS is the temperature-averaged difference in hypersonic speeds at the specified frequencies, this value can be conditionally considered as a quantitative characteristic of the hypersound velocity dispersion.
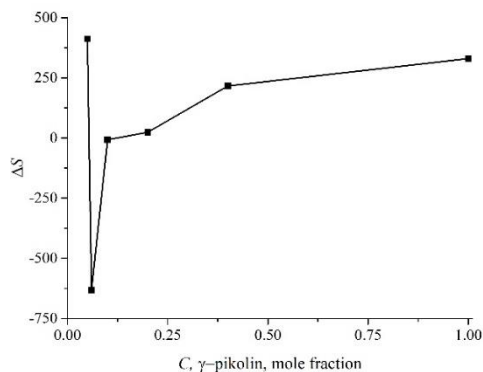

Fig. 2. Concentration dependence of *DS*

In this case, the concentration dependence of DS anticorrelates with the concentration dependence of the scattering coefficient (see [1]): a sharp negative minimum of DS at $C = 0.06$ ppm. coincides with the position of the scattering peak at the same concentration. Thus, it has been found that the appearance of a nanodroplet phase (peak of anomalous scattering) leads to a change in the sign of the dependence dV/dw, where V - is the hypersound velocity.

Conclusions

In aqueous solutions of g-picoline, the situation occurs when the bulk viscosity relaxes at a relatively low frequency compared to other aqueous solutions. This led to the fact that at frequencies $f>4$GHz, hypersonic speed dispersion appeared, which was not associated with the processes of relaxation of bulk viscosity. The temperature, concentration, and frequency dependences of the hypersound velocity consistently reflect the following: a) Positive sound velocity dispersion for pure g- picoline and for a solution with a concentration of C=0.4 ppm. g-p. b) Positive dispersion for C=0.2 and 0.1 ppm. g-p. for temperature t>50^{0}C, negative dispersion for temperatures t<50^{0}C, c) For a concentration of 0.06 ppm g-p. only negative variance is observed. Such a transformation of the sign of the dispersion can be associated with the process of solution structurization, which begins at a concentration of 0.2 ppm. g-p. and reaches its maximum value at C=0.06 ppm. g-p. In parallel with structurization, the thermodynamic state of the solution approaches (ECP) or (LCP) [16].

With a decrease in the concentration of g-picoline, the solution is closer to the periphery of the closed separation curve, and therefore the influence of the Upper critical point and the Lower critical point becomes weaker. With a decrease in the concentration of g-picoline in water, the process of structurization intensifies and its influence increases to a maximum associated with the optimal number of g-picoline molecules.

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NANOCOMPOSITE MATERIALS BASED ON THERMOPLASTICS AND LAYERED ORGANOSILICATES FOR MEDICAL DEVICES

Abstract: Composite materials based on linear low-density polyethylene (LDPE) containing up to 3 wt. % of aluminosilicates that have high performance properties and a pronounced bactericidal effect, and composites based on fire-resistant aliphatic polyamides, diffusion-modified with nanosized copper particles, characterized by high resistance to thermal oxidative aging, have been developed. The developed composite materials based on polyolefins and polyamides can be used in the production of medical product's elements, such as disposable removable nozzles for hydro vacuum aspiration of palatine tonsils and multiple-action injectors for injection of the special preparations (antidotes, drugs, stimulants, etc.) under extreme conditions (in the zone of military training exercises and maneuvers, fighting and special operations, disaster relief, etc.), which used in specialized units and structural subdivision of the Ministry of Health and the Ministry of Defense of the Republic of Belarus.

Key words: nanocomposite materials, polyolefins, polyamides, organosilicates, clay, diffusion treatment, exfoliation, intercalation, medical devices.

Language: English

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Scopus ASCC: 2507.

Introduction

Polymer composite materials are the main type of raw material used in the industrial production of special-purpose products used in medical practice, providing for special units of the ministries of defense, emergencies and other departments, at food and processing industries [1, 2]. In particular, in the medical practice of domestic medical institutions, endoprostheses made from polymer materials and composites based on its are widely used for the treatment of otorhinolaryngological diseases, disorders of the musculoskeletal system, as well as special tools and containers for delivering drugs to the affected areas (nozzles for hydro vacuum aspiration of palatine tonsil lacunae) and collection of biological products from patients in order to monitor the general physical condition and treat diseases (containers for collecting plasma, blood and other biological substances).

To ensure the effectiveness of the actions of military and specialized units of the Ministry of Defense, the Ministry of Emergency Situations, etc., special devices (injectors) are used to injection special preparations (antidotes) that reduce the effect of damaging factors on the body of soldier. To reduce the chance of unfavorable environments entering the body in the extreme situations, it is necessary to ensure a pronounced bactericidal activity of the structural elements of injectors made from polymer composites.

Currently, the domestic industrial production of composite materials with a pronounced bactericidal effect does not function due to not have enough of systematic research in the field of functional nanocomposites based on thermoplastic matrices [2–5]. At the same time, a lot of studies carried out by domestic and foreign specialists unequivocally indicate the prospects for using the phenomenon of the nanostate of condensed matter in the processes of controlling the kinetics of adverse biochemical processes that cause damage to organic substances and the development of diseases of various types.

At present, polymeric nanocomposite materials based on an organosilicate modifier and a thermoplastic matrix (polymersilicate nanocomposites) are one of the most promising materials with an optimal combination of high performance, environmental safety, and relatively low-cost characteristics when they are processed into products on an industrial scale [6].

An important step before using the clay filler is its modification, in which the covalent bond between the clay layers is destroyed due to the introduction of surfactants or hydrophobic functional fragments, which leads to an increase in the degree of clay dispersion and expansion of the interplanar space (base distance), that is, to intercalation of the polymer chain.

At the same time, numerous studies are being carried out to develop polymer nanocomposites containing in their composition dispersed particles of layered silicates that could exfoliate (separate) into single layers of nanometer thickness in a thermoplastic matrix. As a thermoplastic matrix, polyolefins, which are characterized by increased parameters of technological and service characteristics, and high chemical resistance, are most widely used.

The development of new nanocomposite materials based on polyolefins will significantly expand the areas of their practical application as structural materials with increased parameters of stress-strain, barrier characteristics and resistance to combustion. The structure of such nanocomposites is a system consisting of many thin silicate plates with a thickness of about 1 nm and a transverse size from 30 nm to several microns, located in a polyolefin matrix. Dispersed particles of the modifier can form individual crystallites from several (about tens) parallel plates or be randomly distributed over the volume of the material. In the first case, nanocomposites are called intercalated; in the second, they are called exfoliated. However, due to the limited compatibility of non-polar polymers (in particular, polyolefins) with aluminosilicates and the poor delamination of the particles of the layered filler into single nanolayers in the polymer matrix, it has not yet been possible to achieve the same significant effects of changing the entire complex of mechanical and functional properties, as in the case of use in as polymer matrices of polar polymers (polyamides, polyesters, etc.). Therefore, an urgent task of modern polymer nanomaterials science is a systematic search for highly efficient ways to increase polymer intercalation and exfoliation of layered silicate particles in nonpolar polymer matrices and to study the effect of the layered silicate organomodifier composition on the properties of the target nanocomposite [6].

The purpose of this work was development of functional nanocomposite materials based on polyolefins and polyamides with high barrier, performance properties and increased resistance to thermal-oxidative aging for the production of medical products.

Research methods

As polymer matrices for composite materials, thermoplastic polymers of the class of polyolefins (linear low-density polyethylene F-0320 produced by the Shurtan Gas Chemical Complex, Uzbekistan) and polyamides (PA6 FR, PA6-GF20 FR produced by the Branch "Khimvolokno Plant" JSC "Grodno Azot", Belarus).

To modify thermoplastic materials, we used dispersed particles of modified montmorillonite brand "Cloisite 20A" manufactured by Southern Clay Production Inc., USA and organically modified natural sodium bentonite clay (Na+-montmorillonite)

with quaternary alkylammonium chloride produced by Scientific and Production Closed Joint-Stock Company "Sinta", Belarus. Low molecular weight maleinized polyethylene (PEMA) with a residual content of maleic anhydride of 0.5 wt. % was used as a compatibilizer.

Mixing of components of composites based on polyolefins was carried out in a mixing chamber (volume 30 cm^3) of a Brabender plasticorder (Plasticorder Brabender OHG Duisburg, Germany) at a temperature of 180±2°C. The speed of rotation of the plasticorder cams was 50 rpm.

To modify polyamide matrices, we used dispersed particles of metals (copper) obtained by thermolysis of metal-containing compounds (formate salts) in a melt medium. The evaluation of the effectiveness of the action of nanosized metal-containing particles was determined on model composites based on aliphatic polyamides containing nanosized copper particles in an amount of 0.075–0.6 wt. %. A nanosized metal-containing modifier was obtained by heat treatment of granular or powdered semi-finished products, diffusion-modified in aqueous solutions of a metal-containing precursor (copper formate) for 1–10 hours.

Molding of standard samples was carried out on a laboratory injection molding machine (Zamak Merkator, Poland) under the following technological conditions: injection pressure – 60 MPa for polyolefins and 90 MPa for polyamides, melt temperature – 180±0.5°C for polyolefins and 260±0.5°C for polyamides.

X-ray diffraction analysis of samples of the studied materials was carried out on a Rigaku D/max 2400 X-ray unit (CuK$_\alpha$-radiation (λ = 1.54056 Å), current voltage 40 kV, current strength 200 mA). The counter rotation rate was 2 deg/min. The shooting range was 2–30 deg on the 2θ scale.

Comparative evaluation of the effectiveness of the action of nanosized metal-containing modifiers in composite materials based on aliphatic polyamides was carried out according to the stress-strain properties of standard samples subjected to thermal-oxidative aging at a temperature of 150±5°C in air for up to 200 hours. As a criterion, the parameter of tensile strength σt (MPa) was chosen.

Tests of samples from polymers and polymer composites for the stress-strain properties were carried out on an INSTRON 3365 tensile testing machine in the uniaxial tension mode with a set strain rate at a sample strain rate of 50 mm/min.

Results and discussion

In order to improve the performance properties of polyolefins and add the barrier (bactericidal) characteristics to its, compositions based on linear low-density high-pressure polyethylene PE (F-0320) with the introduction of silicate-containing particles and a compatibilizer - low molecular weight maleinized polyethylene (PEMA) with a residual content of maleic anhydride 0,5 wt.% – PEMA (MA-0.5%):

1) PE/MMT – polyethylene (97 wt.%) + montmorillonite (original clay) (3 wt.%);

2) PE/PEMA/Cloisite 20A – polyethylene (85 wt.%) + PEMA (12 wt.%) + organoclay Cloisite 10A (3 wt.%);

3) PE/PEMA/OMMT (Belarus) – polyethylene (85 wt.%) + PEMA (12 wt.%) + organoclay OC (Belarus) (3 wt.%).

Confirmation of the introduction of modifier molecules into the interlayer gallery of the layered aluminosilicate is the experimental data obtained by X-ray diffractometry, presented in Fig. 1 and Fig. 2.

The obtained results of X-ray patterns, reflecting the interlayer distances of the studied types of montmorillonite (Fig. 1) and the developed composites based on polyolefins (Fig. 2), corresponding to a certain diffraction reflection, indicate that the intercalation of modifier molecules into the interlayer gallery of the layered aluminosilicate leads to an increase in the width of the interplanar distance.

Table 1 presents the parameters of the stress-strain characteristics of linear low-density polyethylene and composites based on it.
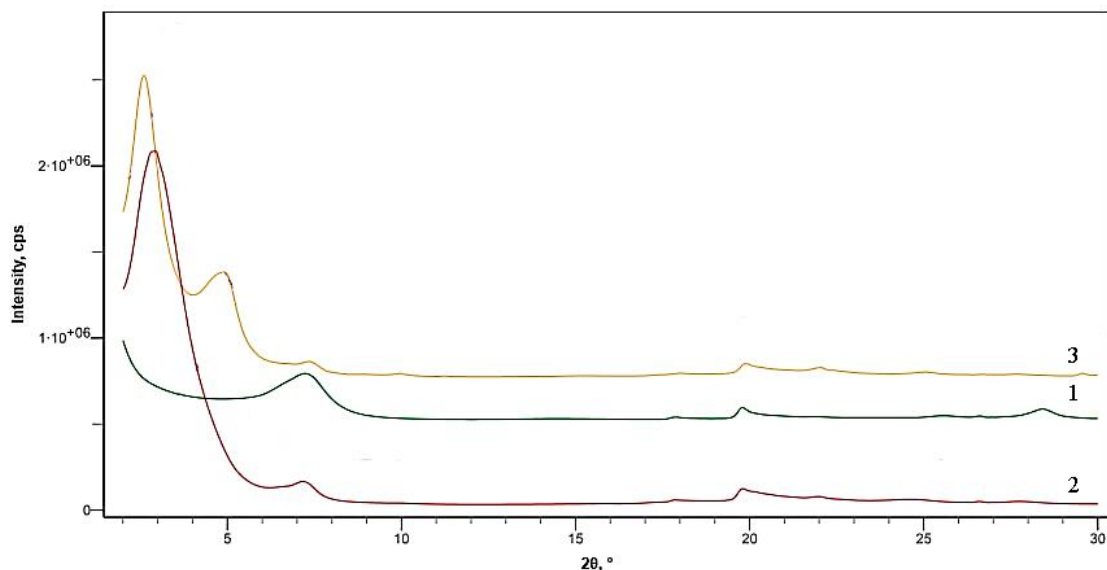
**Fig. 1. X-ray scattering patterns of various types of montmorillonite:
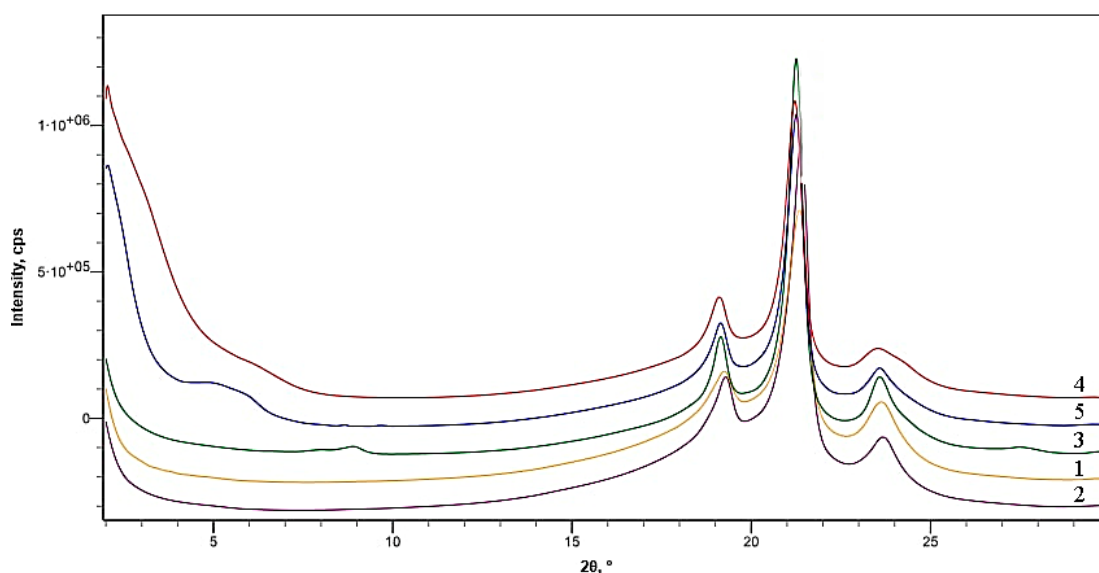montmorillonite (1), Cloisite 20A (2), OMMT(Belarus) (3)**

**Fig. 2. X-ray scattering patterns of composite materials based on polyolefins:
PE (F-0320) (1), PEMA (MA-0,5%) (2), PE/MMT (3), PE/PEMA/Cloisite 20A (4),
PE/PEMA/OMMT(Belarus) (5)**

Table 1. Parameters of the mechanical characteristics of the developed compositions of composites based on polyolefins

Material	Modulus of elasticity, MPa	Strain-to-failure, %	Yield point, MPa
PE (F-0320)	129,9±3,3	655±0,5	20,3±0,5
PEMA (MA-0,5%)	155,9±14,2	421,0±95,2	32,11±1,3
PE/MMT	198,6±6	91,7±5,5	32,48±1,9
PE/PEMA/Cloisite20A	193,4±22,0	163,2±12,2	26,21±0,5
PE/PEMA/OMMT (Belarus)	181,6±16,4	116,0±4,7	24,22±0,5

A technically significant effect of increasing the resistance to thermal oxidative aging was achieved for samples made from composite materials based on polyamide PA6 modified with flame retardants (PA6 FR) and a combination of flame retardants and 20 wt. % glass fiber (PA6-GF20 FR). The

introduction of nanosized copper particles into polymer matrices in the amount of 0.085–0.6 wt. % by diffusion treatment in an aqueous solution of copper formate significantly increases not only the initial parameters of the stress-strain characteristics, but also their values after 100 hours and 200 hours of thermal oxidation at a temperature of 150±5°C (Fig. 3 and Fig. 4).
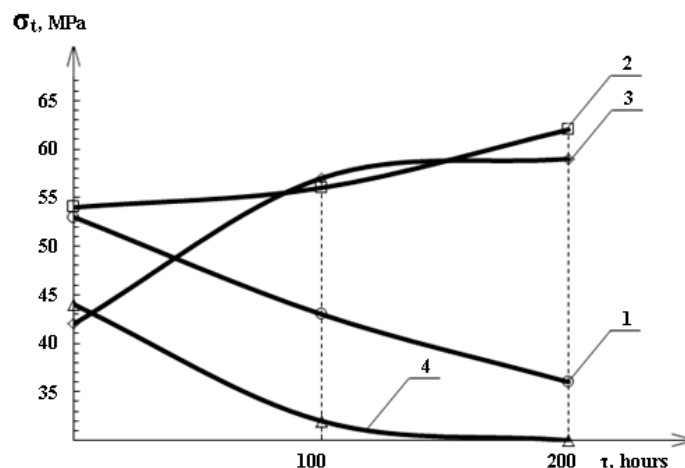

Fig. 3. Effect of copper nanosized particles on the resistance of nanocomposites to thermal oxidative destruction:
PA6 FR (1), PA6 FR + copper formate after treatment for 1 h (2),
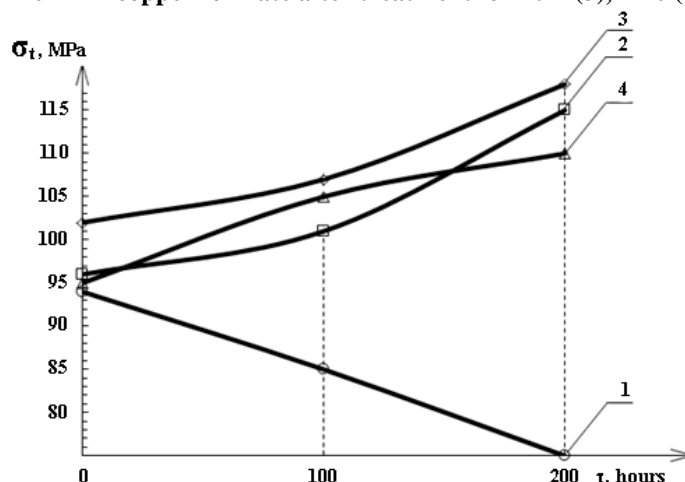**PA6 FR + copper formate after treatment for 10 h (3), PA6 (4)**

Fig. 4. Effect of copper nanosized particles on the resistance of nanocomposites to thermal oxidative destruction:
PA6-GF20 FR (1), PA6-GF20 FR + copper formate after treatment for 1 h (2),
PA6-GF20 FR + copper formate after treatment for 5 h (3),
PA6-GF20 FR + copper formate after treatment for 10 h (3) (4)

The developed composite materials based on polyolefins and polyamides containing dispersed particles of silicates and copper are recommended to be used for the production of elements of medical and special purpose products.

One of the most effective directions for the practical implementation of the invention is the use of the developed nanocomposite materials that have a pronounced bactericidal effect in the original design of the domestic injector for the introduction of special preparations into the affected areas of military personnel in extreme situations. The appearance of the developed design of the injector is shown in Fig. 5.
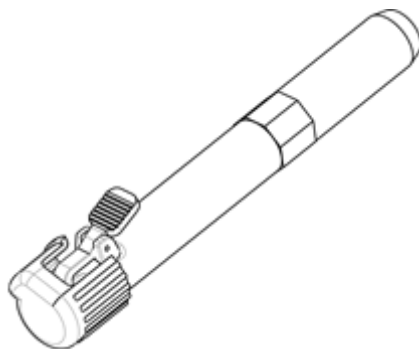
Fig. 5. The developed design of the special-purpose injector

As already noted, the developed design of domestic injector is made from nanocomposite materials based on polymer matrices with a pronounced bactericidal effect. It allows the injector to be used in the field conditions without special sterilization treatment while minimizing the chance of introducing pathogenic substances into the affected area.

The developed design of the injector has no domestic analogues and can be a full-fledged alternative to imported developments of a similar purpose. The developed design of the injector is focused on domestic materials and technological equipment available at the disposal of specialized enterprises for the production of polymer products. It allows to reduce the cost of the injector by at least 1.5-2 times compared to imported analogues.

The second direction of the practical implementation of the developed nanocomposite materials based on thermoplastics was their use in the design of functional nozzles for the treatment and prevention of otorhinolaryngological diseases.

A design of a nozzle for the apparatus for hydro vacuum aspiration of the lacunae of the palatine tonsils (Fig. 6) has been developed. This nozzle was designed for localized and dosed delivery of drugs to the affected area and controlled removal of products of inflammatory processes in a non-contact way.

Fig. 6. The developed design of the removable nozzle for the hydro vacuum aspiration of the palatine tonsils lacunae

The use of nozzles for the treatment of otorhinolaryngological diseases can reduce the treatment time by 2-3 times, provide a prolonged protective effect, and prevent possible relapses. The nozzle is made from a special composite material with a bactericidal effect, which allows its repeated use without additional sterilization, provided that the removable disposable applicator is changed.

Conclusion

Thus, functional nanocomposite materials based on the thermoplastics with high performance properties and pronounced bactericidal activity have been developed for use in innovative designs of medical devices. These materials make it possible to inhibit or suppress the development of unfavorable biochemical processes on the medical devices' elements.

The prospect of development is expressed by the possibility of equipping special units of the Ministry of Defense and institutions of the Ministry of Health of the Republic of Belarus with domestic products that are not inferior in terms of functional action at a significantly lower price range.

In addition, the developed nanocomposite materials can be used in the manufacture of multilayer films with a prolonged bactericidal effect for the production of packaging elements for long-term storage of food and special products in warehouse and field conditions.

Acknowledgments

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HEAT FLOW IN A POROUS ORDERED STRUCTURE BASED ON SCHOEN'S I-WP(R) TOPOLOGY

Abstract: The article presents a simulation of the distribution of the thermal field inside a porous material. The pores of the material are evenly distributed in accordance with the triple periodic minimal surface of Schoen's I-WP(R). Such a systematization of pores makes it possible to create materials with predictable thermophysical properties. An important feature of the material is the dependence of the thermal conductivity on the direction. The study considers the distribution of heat flows inside the material in one of the orthogonal directions. This study can be used to further study the thermophysical properties of porous materials with an ordered structure.
Key words: Heat flow, porosity, Schoen's I-WP(R), TPMS, PETG.
Language: Russian
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ТЕПЛОВОЙ ПОТОК В ПОРИСТОЙ УПОРЯДОЧЕННОЙ СТРУКТУРЕ НА ОСНОВЕ ТОПОЛОГИИ SCHOEN'S I-WP(R)

Аннотация: В статье представлено моделирование распределения теплового поля внутри пористого материала. Поры материала распределены равномерно в соответствии с трижды периодической минимальной поверхностью Schoen's I-WP(R). Такая систематизация пор позволяет создавать материалы с прогнозируемыми теплофизическими свойствами. Важной особенностью материала является зависимость теплопроводности от направления. В исследовании рассмотрено распределение тепловых потоков внутри материала в одном из ортогональных направлений. Данное исследование может быть

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использовано для дальнейшего изучения теплофизических свойств пористых материалов с упорядоченной структурой.

Ключевые слова*: Тепловой поток, пористость, Schoen's I-WP(R), TPMS, PETG.*

Введение

УДК 536.1

Изучение пористых материалов открывает все большие возможности развития науки и техники. Пористые материалы в сравнении с сплошными обладают меньшей плотностью, и как следствие, меньшей массой при одинаковом объеме. Внедрение пор по структуре снижает теплопроводность материала, однако пористые материалы могут превосходить сплошные по удельным прочностным характеристикам [1-5]. Более того, пустоты в пористой основе или каркасе могут быть заполнены другим материалом. Полученный таким образом композит может улучшить некоторые свойства в зависимости от прикладных задач [4]. Важно отметить, что пористые материалы, как правило, обладают анизотропией свойств. Это также может быть использовано при решении задач связанных с перераспределением тепловых потоков или деформацией материала в необходимом векторном направлении.

По структуре пористые материалы условно разделены на две большие группы:

1. Материалы со стохастическим распределением пор по объему

2. Материалы с равномерным распределением пор по объему

Пористые материалы с случайным размером и распределением пор по объему наиболее изучены и распространены в строительстве, медицине, машиностроении, легкой промышленности и других производственных технологиях [6].

Изготовление в промышленном масштабе пористых материалов с упорядоченным распределением и размером пор оставалось невозможным до недавнего времени. С появлением различных аддитивных технологий изготовление структурированных пористых материалов стало доступно [7-9]. Прикладное применение таких материалов также находит свое место в космической отрасли, авиационной промышленности, медицине и т.д.

Пористый материал на основе упорядоченной структуры, в сравнении с материалами со случайным распределением пор по объему, обладает рядом преимуществ [1,3,5,10]. Первостепенно стоит отметить возможность прогнозирования свойств, превосходящие удельные прочностные характеристики и т.д. Указанные качества подтверждают высокий потенциал прикладного применения пористых материалов с упорядоченной структурой.

Особое внимание заслуживают пористые материалы на основе трижды упорядоченных минимальных поверхностей (TPMS). Это обусловлено возможностью применения материалов на основе TPMS в медицине, аддитивных технологиях, энергетике и других сферах [3,5,10]. Поверхности TPMS описываются строгими математическими уравнениями. Сейчас уже известно большое количество TPMS, однако исследователи продолжают находить и выводить новые поверхности. Наиболее распространены TPMS описанные в 19-20 веке учеными такими учеными как К.Г.А. Шварц, Э.Р. Неовиус и А. Шён.

Для изучения теплофизических свойств пористых материалов существует множество CAE программных комплексов. Среди которых отдельно стоит отметить Ansys, FlowVision, LVMFlow, Siemens NX[5]. Изучение TPMS с точки зрения тепломассопереноса обладает большим потенциалом. Это связано с тем, что структура TPMS делит пространство на два не пересекаемых объема – лабиринта. Это означает, что подобные структуры могут использоваться в различных теплообменниках. В данной работе для исследования была выбрана поверхность Schoen's I-WP(R), представленная на рисунке 1.
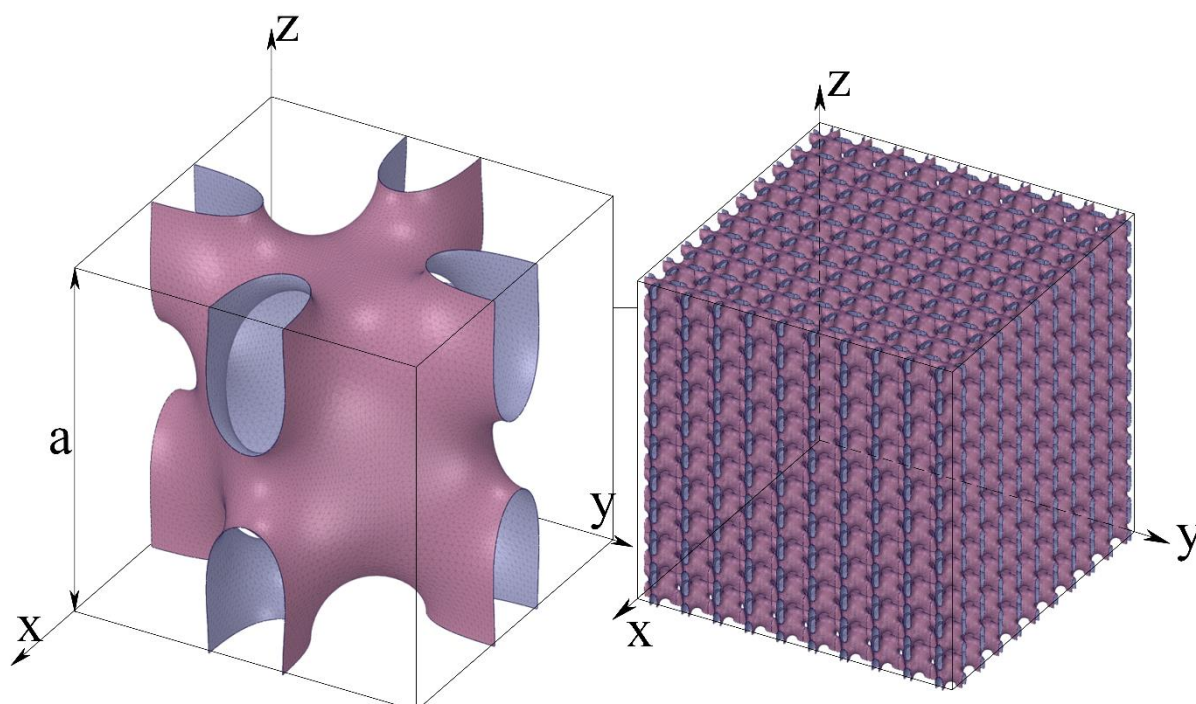
Рисунок 1. Единичная ячейка поверхности Schoen's I-WP(R). Структура Schoen's I-WP(R).

Постановка задачи

Исследуемый пористый материал получен путем придания толщины δ поверхности TPMS. Размеры структуры выбраны в границах $a \in$ [3-10] с шагом в 1 мм (Рис. 1). Толщина δ, придаваемая поверхности, выбрана в δ ∈ [0,05-0,5] с шагом в 0,05 мм. (Рис. 2)

Для изучения теплофизических свойств материалов на основе поверхности Schoen's I-WP(R) необходимо определить влияние геометрических размеров структуры на тепловые потоки.

Для обобщения результатов тепловой поток, проходящий через материал на основе Schoen's I-WP(R), заменен на эквивалентный приведенный тепловой поток через куб с размерами ребра куба

a. Таким образом возможно сравнение удельных тепловых потоков через структуры с различными размерами a и δ.

Для данной задачи используется граничные условия 1 рода (рис. 2). На одной из границ(синяя) задавалась температура 273К, а на другой(красная) 373К. Материал PETG выбран исходя из возможности дальнейшей верификации полученных результатов экспериментальным методом, а также прикладного применения структур. Свойства материала представлены в таблице 1.

Влияние воздуха в текущем исследовании не учитывается, внутри пор условно принят абсолютный вакуум.
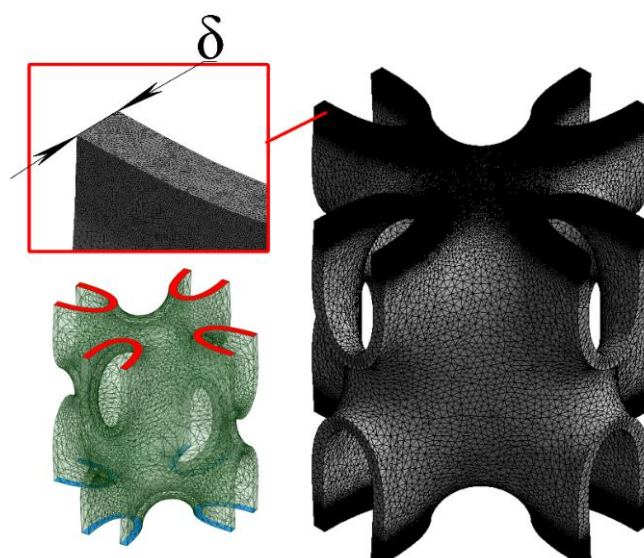
Рисунок 2. Сетка численного моделирования. Области задания граничных условий.

Таблица 1. Свойства материала PETG

Название материала	Свойства		
	Теплопроводность, $\dfrac{Вт}{м \cdot К}$	Теплоемкость, $\dfrac{Дж}{К \cdot кг}$	Плотность, $\dfrac{кг}{м^3}$
PETG	0,2	1050	1300

Для проведения текущего исследования выбрана модель Steady-State Thermal программного комплекса Ansys. Стоит отметить, что вблизи области задания граничных условий расчетная сетка была уменьшена до необходимых значений для повышения точности расчета(Рис.2).

Для изучения пористых материалов в текущем исследовании использовался метод минимального репрезентативного объема (RVE)[9]. В ходе проведения моделирования был выявлен RVE представленный на рисунке 2. Использование такого метода значительно

снизило необходимые компьютерные расчетные мощности, а также время необходимое на проведение исследования.

Результаты

Приведенные тепловые потоки через структуру представлены в таблице 2. Для удобства значения представлены в виде графика на рисунке 3. Полученные удельные тепловые потоки могут быть использованы для дальнейшего исследования теплофизических свойств структуры.

Таблица 2. Приведенный тепловой поток

a, мм	Удельный тепловой поток Вт/м² для δ, мм									
	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
3	254,7	536,1	817,5	1098,9	1380,3	1661,7	1943,1	2224,4	2505,8	2787,2
4	138,3	296,6	454,8	613,1	771,4	929,7	1088,0	1246,3	1404,5	1562,8
5	85,3	186,6	287,9	389,2	490,5	591,8	693,1	794,4	895,7	997,0
6	57,0	127,4	197,7	268,1	338,4	408,8	479,1	549,4	619,8	690,1
7	40,3	91,9	143,6	195,3	247,0	298,7	350,4	402,0	453,7	505,4
8	29,6	69,1	108,7	148,3	187,9	227,4	267,0	306,6	346,1	385,7

9	22,4	53,6	84,9	116,2	147,4	178,7	210,0	241,2	272,5	303,8
10	17,3	42,7	68,0	93,3	118,6	144,0	169,3	194,6	219,9	245,3

Из графика наглядно видно, что с уменьшением размера ячейки и увеличением ее толщины тепловой поток увеличивается нелинейно. Это означает, что и теплопроводность структуры будет увеличиваться нелинейно. Для создания теплоизоляционных материалов необходимо увеличивать размер ячейки. Более

того, увеличение толщины на размерах ячейки более 8 мм не оказывает значительного влияния на теплопроводящие свойства в рамках рассматриваемой в текущем исследовании области. Максимальный приведенный тепловой поток составил 2787,2 Вт/м² в ячейках 3 мм с толщиной 0,5мм.
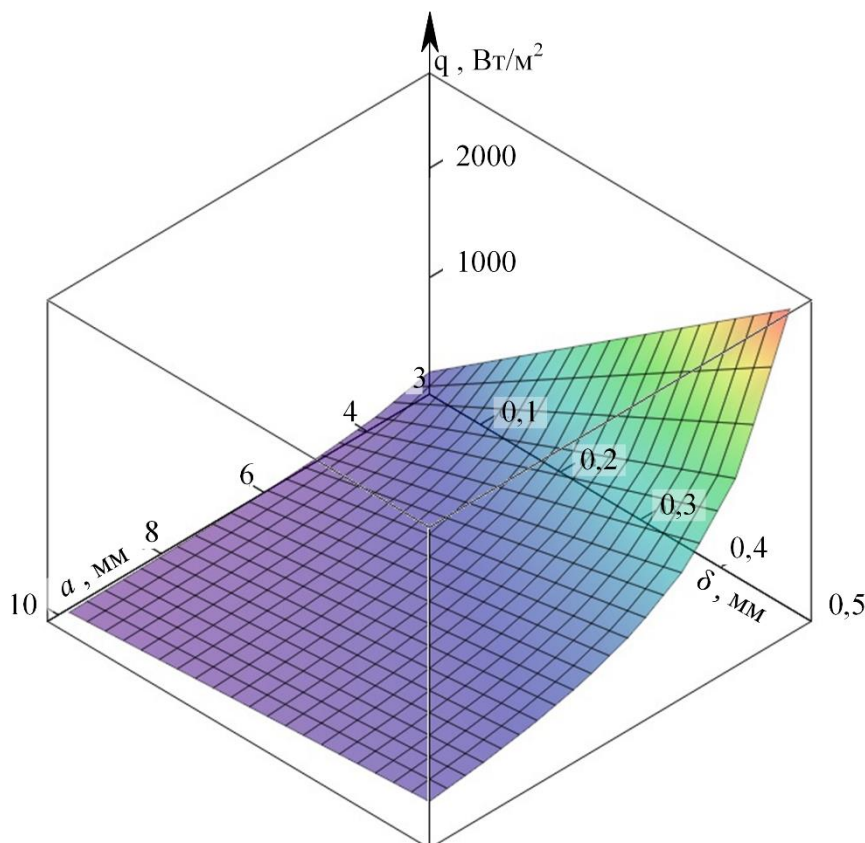
Рисунок 3. График распределения теплового потока параметров.

Также стоит отметить, что в рамках текущего исследования рассматривалось лишь направление Z (Рисунок 1). Теплопроводящие свойства в других направлениях могут существенно

отличаться в силу анизотропии свойств пористых материалов.

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HYDRODYNAMIC OF THE SCHOEN'S I-WP TRIPLY PERIODIC MINIMAL SURFACE

Abstract: *The article presents a numerical experiment to determine the hydrodynamic characteristics of a thriply-periodic minimal surface (TPMS) of Schoen type I-WP. In the geometry of the thriply-periodic minimal surface I-WP, two characteristic parameters are distinguished: the length of the cube edge in which the I-WP cell is inscribed and the thickness of the cell wall. By changing these parameters, it is possible to control such properties of the TPMS structure as porosity, transparency, thermal conductivity, etc. The Ansys software package is used to numerically study the flow of fluid through a channel with an insert made of TPMS. Dependences of porosity on characteristic geometric dimensions are constructed. Contours and fields of velocity distribution in the channel are obtained. Also in the study, pressure drops inside the elementary cell were noted.*

Key words: *Flow, porosity, Schoen's I-WP, TPMS, pressure drop.*
Language: *Russian*
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ГИДРОДИНАМИКА ТРИЖДЫ ПЕРИОДИЧЕСКОЙ МИНИМАЛЬНОЙ ПОВЕРХНОСТИ ШЕНА ТИПА I-WP

Аннотация: *В статье представлен численный эксперимент по определению гидродинамических характеристик трижды периодической минимальной поверхности (ТПМП) Шёна типа I-WP. В геометрии трижды периодической минимальной поверхности I-WP выделено два характерных параметра: длина ребра куба, в которой вписана ячейка I-WP и толщина стенки ячейки. Изменяя данные параметры можно регулировать такие свойства ТПМП структуры, как пористость, просветность, теплопроводность и т.д. При помощи программного пакета Ansys проводится численное исследование течения жидкости через канал*

со вставкой из ТПМП. Построены зависимости пористости от характерных геометрических размеров. Получены контуры и поля распределения скорости в канале. Так же в исследовании отмечены перепады давления внутри элементарной ячейки.

Ключевые слова: *Поток, пористость, Schoen's I-WP(R), ТПМП, падение давления.*

Введение

УДК 532.5

На сегодняшний день существует большое количество различных теплообменных устройств, где в качестве греющей или обогреваемой среды используются различные жидкости. Среди таких теплообменников можно выделить: кожухотрубные, секционные, труба в трубе, пластинчатые, ребристые, микроканальные и т.д.

Важной задачей при проектировании и изготовлении теплообменников является увеличение их мощности. Для этого, как правило, применяют оребрение поверхностей контакта с греющей или обогреваемой средой. Такие ребра могут иметь различную форму (пластина, цилиндр и др.) и размер [1-3]. Наибольший интерес представляют ребра, имеющие форму трижды периодических минимальных поверхностей (ТПМП). Существует ряд исследований, посвященный изучению теплообменных устройств, в которых используются различные ТПМП, такие как: поверхности Шварца, Неовиуса, Шёна и другие [4-6]. Например, в статье [4] сравниваются теплообменники с различной топологией, основанной на ТПМП Шварца типа P и Гироиде. А в работе [5] описывается метод проектирования и создания модели компактного высокоэффективного теплообменника, состоящего из трижды периодических минимальных поверхностей, на языке программирования VDF.

Не смотря на разнообразную и сложную геометрическую форму работа таких устройств основана на классических принципах переноса тепла и массы. Для описания движения несжимаемой жидкости применяется система уравнений Навье-Стокса, включающая уравнение движения и неразрывности. При решении взаимосвязанных задач тепло и массопереноса в систему уравнений добавляется уравнение теплопроводности. Для решения таких задачи применяются различные численные и аналитические методы [7-10]. Среди численных методов отдельно можно выделить методы конечных элементов и объемов, которые применяется во множестве современных программных пакетов (ANSYS, OpenFOAM, Comsol) для моделирования задач гидродинамики, механики, теплообмена и др.

Учитывая вышесказанное можно сделать вывод об актуальности применения и исследования трижды периодических минимальных поверхностей в теплообменных устройствах. В настоящей работе проводится исследование гидродинамики трижды периодической минимальной поверхности Шёна типа I-WP с помощью программного пакета ANSYS.

Постановка задачи

В данном исследовании рассматривается ТПМП Шёна типа I-WP. Элементарная ячейка данной поверхности, а также ТПМП среда, основанная на I-WP структуре, изображены на рисунке 1.
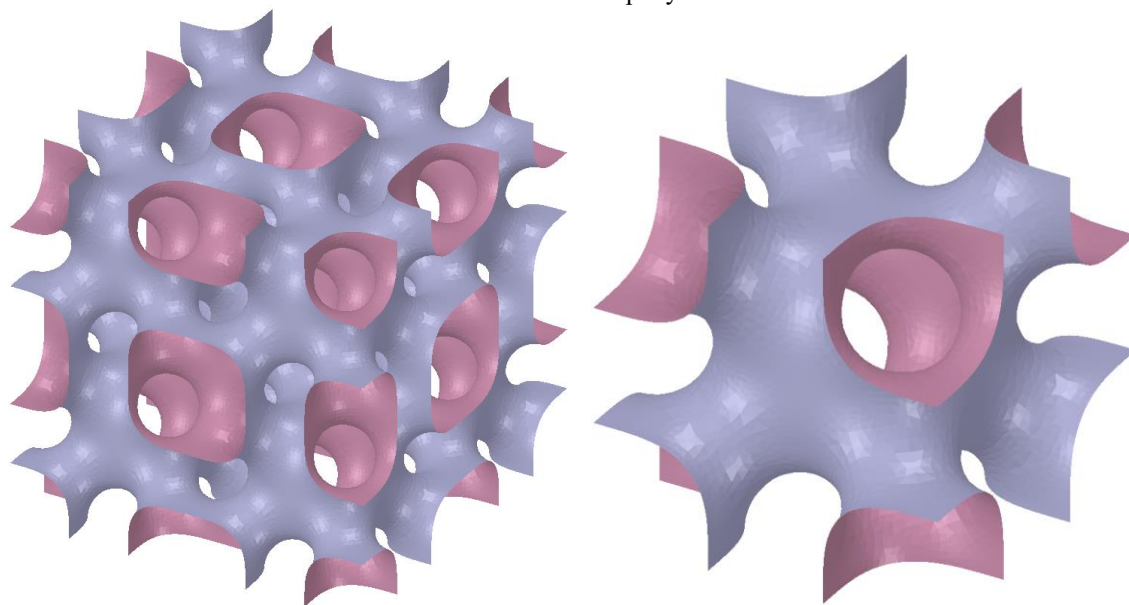

Рисунок 1. ТПМП Шёна типа I-WP.

Исследуемая ячейка поверхности I-WP обладает кубической симметрией. Из этого следует, что данная ячейка идеально вписывается в куб с ребром . Представленная на рис. 1 геометрия является фасетированной поверхностью. Для дальнейшей работы ей необходимо придать толщину . Данная операция выполнялась при помощи функции «Thicken» в редакторе SpaceClaim. На рисунке 2 изображена элементарная ячейка преобразованная в твердотельный объект.

Полученная таким образом геометрия обладает двумя характерными геометрическими размерами: длина ребра куба a, толщина стенки ячейки δ. Регулируя данные размеры можно изменять свойства ТПМП среды, например, такие как: пористость, просветность, плотность, теплопроводность и т.д. В настоящем исследовании наибольший интерес представляет такое свойство среды как пористость ϕ:

$$\phi = \frac{V_\kappa - V_{\text{ТПМП}}}{V_\kappa} \qquad (1)$$

где V_κ – объем куба, в который вписана элементарная ячейка; $V_{\text{ТПМП}}$ – объем ТПМП ячейки.

Построим график зависимости пористости ТПМП среды от толщины стенки ячейки (рис. 3). Из анализа графика видно, что пористость линейно зависит от толщины стенки ячейки при любой длине ребра.

При проектировании теплообменных устройств в первую очередь решаются две задачи: теплообмена и течения жидкости в каналах теплообменника. В рамках данной работы затрагивается исключительно вопрос гидродинамики жидкости в теплообменом устройстве, где применяются трижды периодические минимальные поверхности.
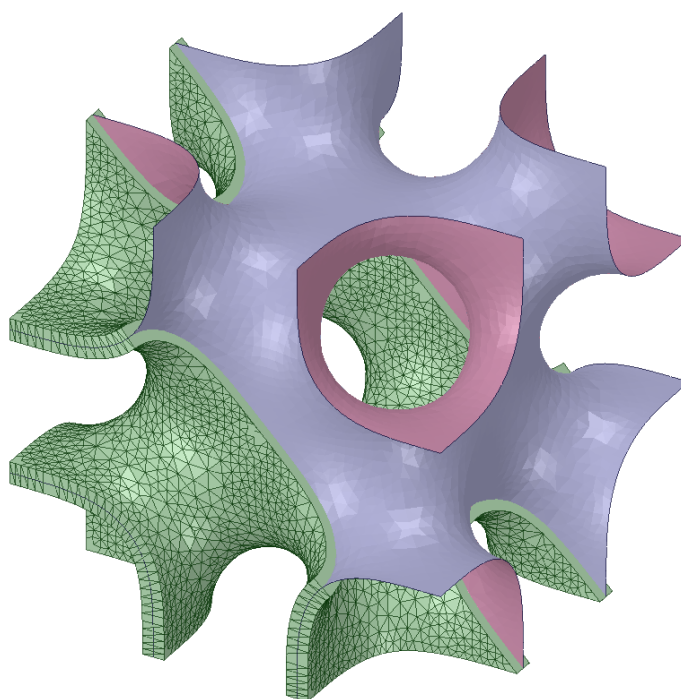
Рисунок 2. Элементарная ячейка поверхности I-WP

Задача течения жидкости в элементарной ячейке решается методом конечных элементов в модуле Fluent программного пакета ANSYS. Для всех задач, связанных только с течением жидкостей (без учёта связанных задач теплообмена, химических реакций и т.д.) в модуле Fluent производится решение уравнений сохранения массы и импульса. Уравнение сохранения массы или уравнение неразрывности можно записать следующим образом:

$$\frac{\partial \rho}{\partial t} + \nabla(\rho \bar{\upsilon}) = S_m, \qquad (2)$$

где ρ – плотность жидкости; t –время; υ – скорость.
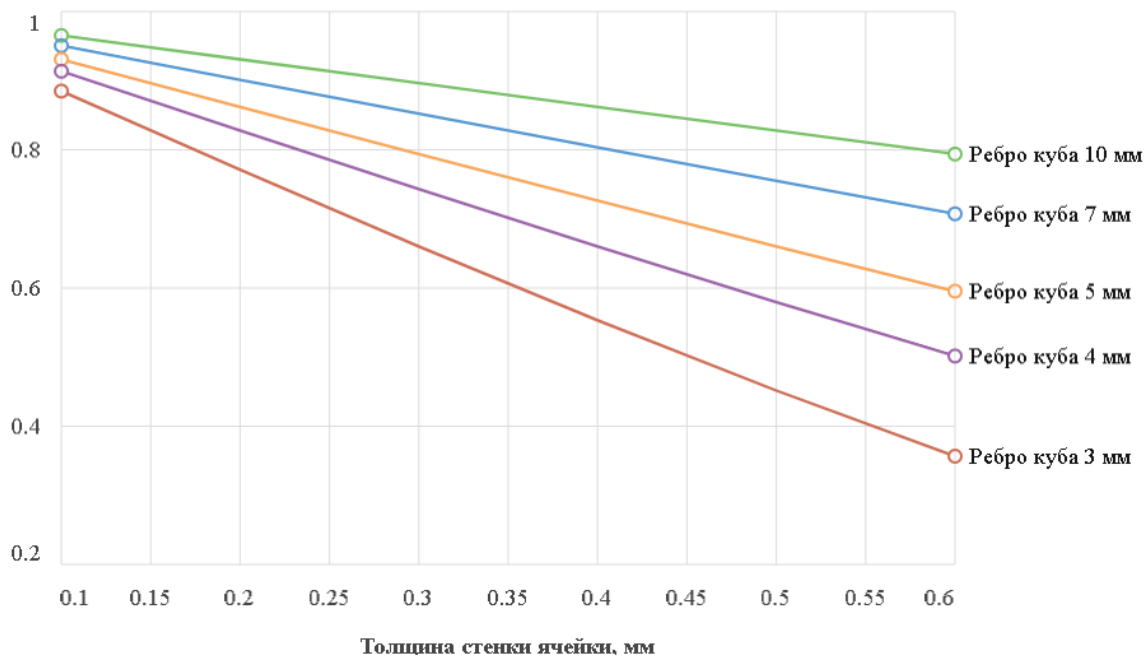
Пористость

Рисунок 3. Пористость I-WP среды

Закон сохранения импульса в инерциальной системе имеет вид:

$$\frac{\partial}{\partial t}(\rho \upsilon) + \nabla(\rho \overline{\upsilon}\overline{\upsilon}) = -\nabla p + \nabla(\overline{\overline{\tau}}) + \rho \overline{g} + \overline{F} \ , \ (3)$$

где p – статическое давление; $\overline{\overline{\tau}}$ – тензора напряжений; ρg – гравитационная объемная сила; $\overline{F}$ – внешняя объемная сила.

Уравнения (2) и (3) решаются в ANSYS Fluent методом конечных элементов. Исходная

геометрия для решения и сетка конечных элементов изображена на рис. 4. Скорость на входе в канал $\upsilon_{\scriptscriptstyle в} = 0.1$ *м/с*. Элементарная ячейка вписана в куб с ребром 20 мм и имеет толщину стенки 1 мм. В качестве жидкости в исследовании используется воды, а материал, из которого изготовлена элементарная ячейка – алюминий. Свойства материалов представлены в таблице 1.
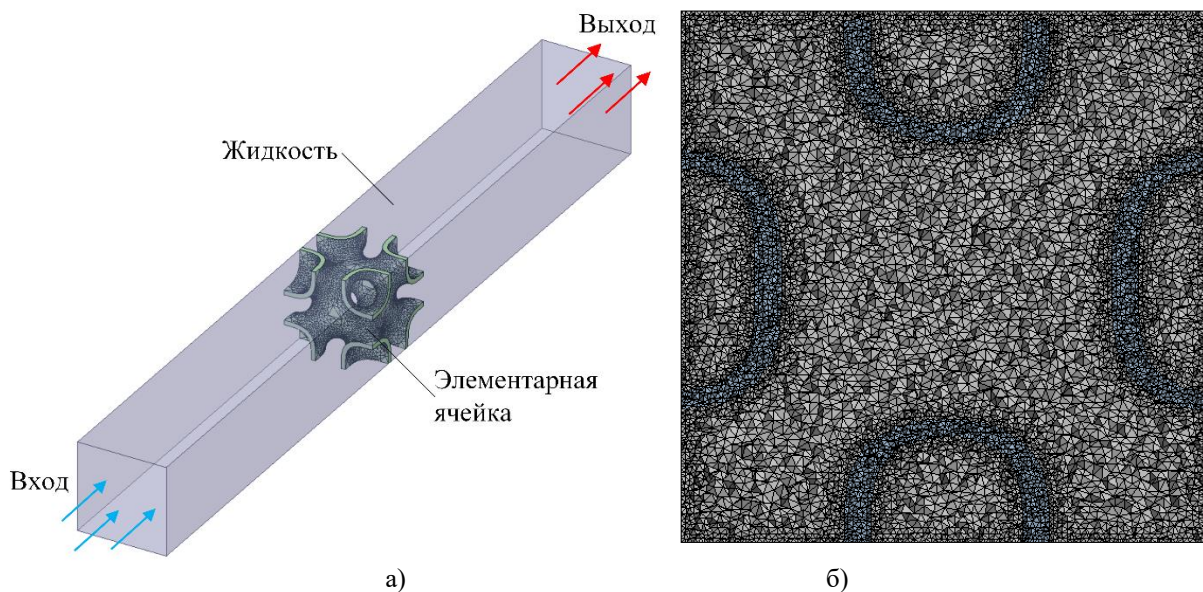
Рисунок 4. Исходная геометрия:
а) расчетная модель; б) сетка в разрезе

Таблица 1. Свойства материалов

Материал	Плотность, *кг/м³*	Вязкость, *кг/(м·с)*
Алюминий	2719	–
Вода	998.2	0.001003

Результаты

Из численного решения задачи гидродинамики в элементарной ячейке поверхности I-WP были получены контуры распределения давления и скорости (рис. 5).

Геометрия элементарной ячейки включает в себя как расширяющиеся так сужающиеся участки, в которых сильно изменяется скорость потока. Это хорошо видно на рис. 6, где отражены линии потока и участки с максимальной и минимальной скоростью движения жидкости. Также на рисунке отмечены застойные зоны, где скорость близка к нулю (такие области выделены красными кругами на рис. 6).

Вдоль некоторых линий потока можно построить график изменения давления (рис. 7). На графике видно, как изменяется давление по длине канала при различных начальных скоростях потока.
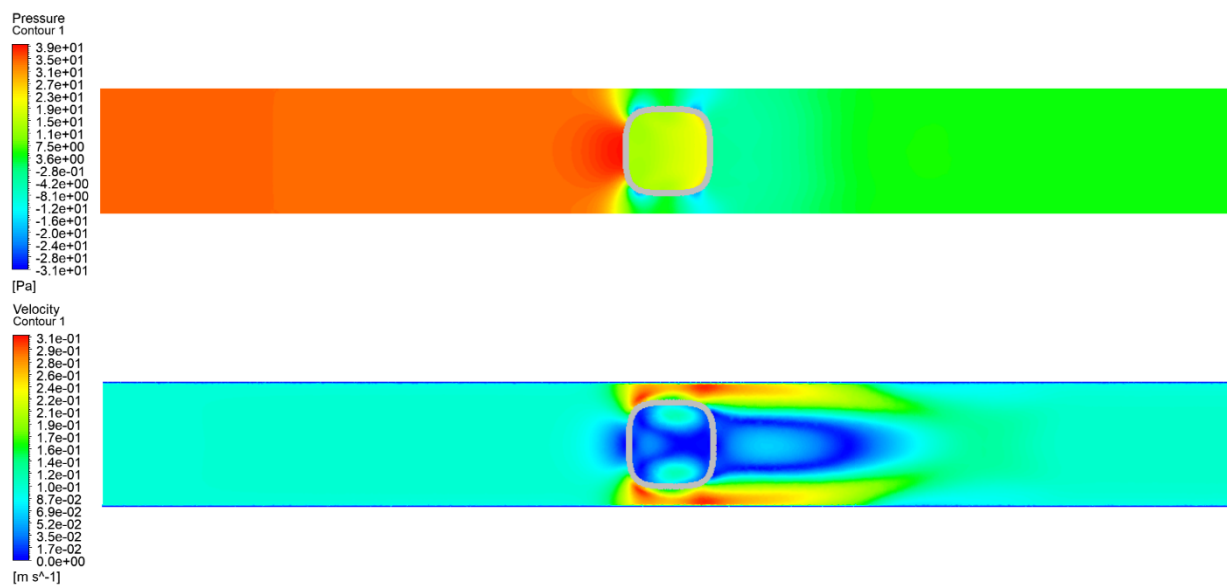
Рисунок 5. Контуры распределения давления и скорости в середине канала при $\upsilon_в = 0.1$
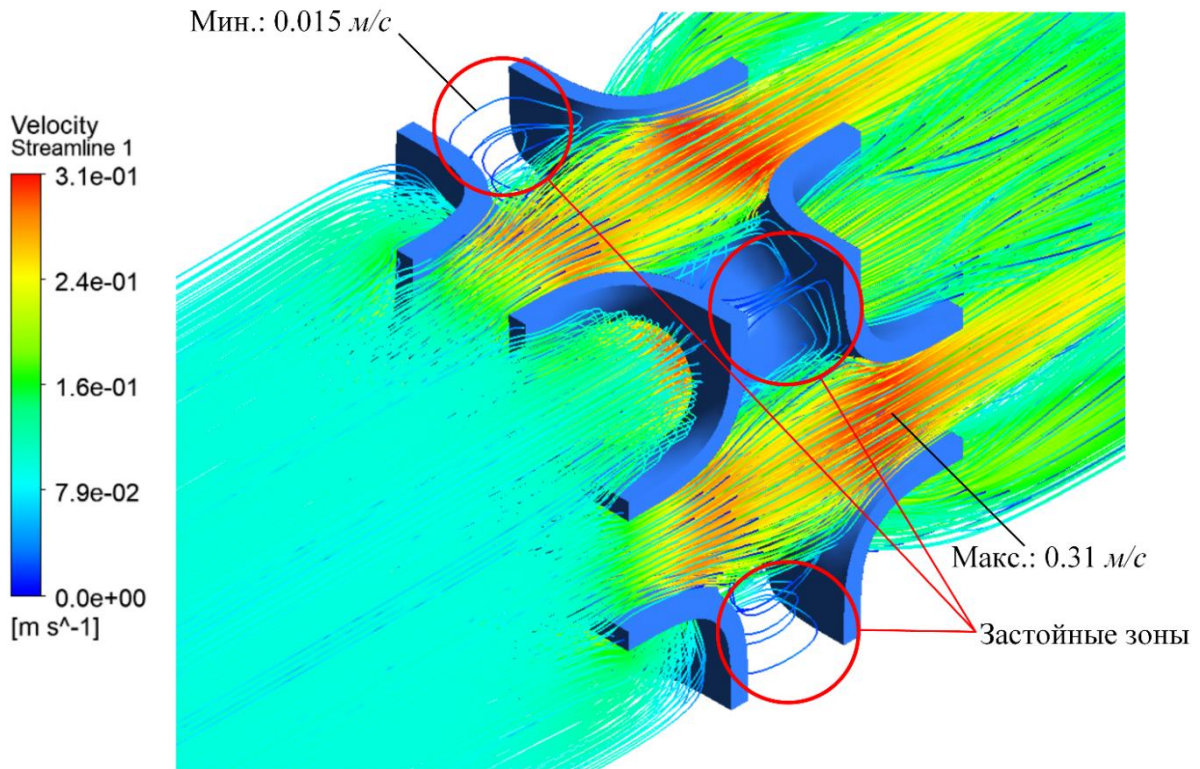
Рисунок 6. Линии потока в элементарной ячейке при $\upsilon_\text{в} = 0.1$
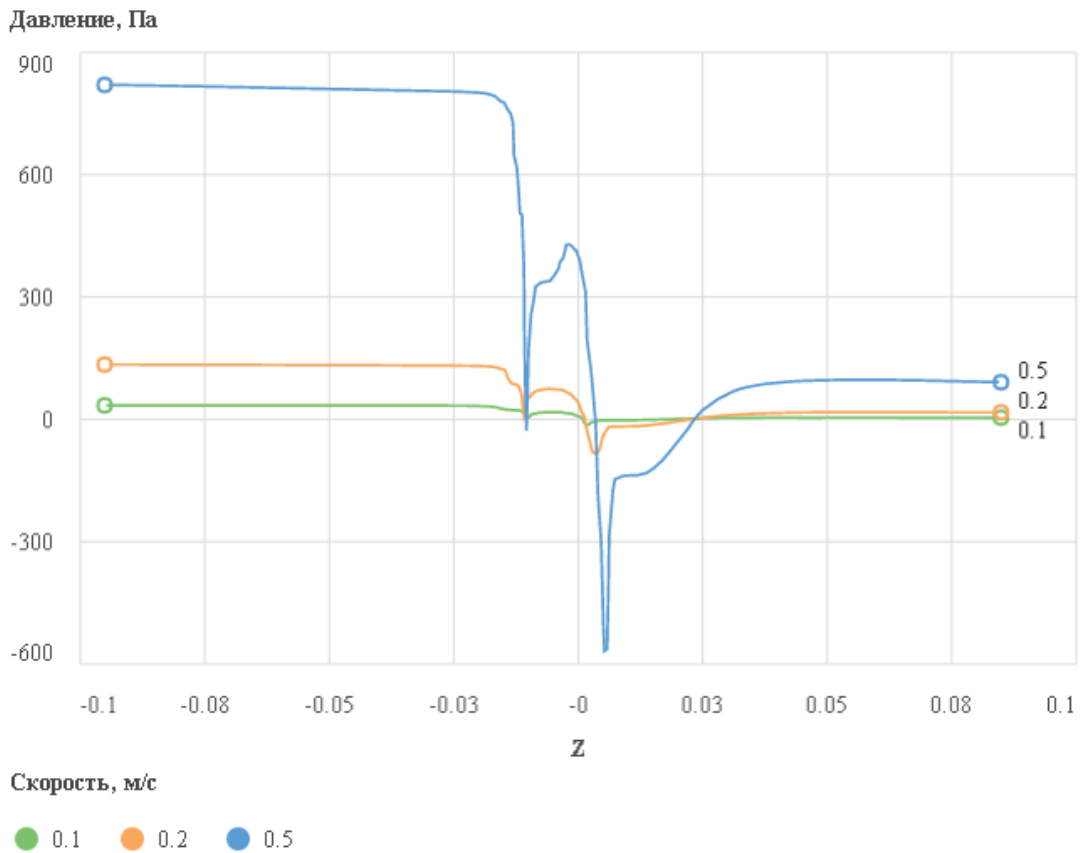
Рисунок 7. График изменения давления по длине канала

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WAYS TO INCREASE THE EXPORT POTENTIAL OF SMALL BUSINESS AND PRIVATE ENTREPRENEURSHIP

Abstract: This article examines the need and ways to increase the export potential of small business and private entrepreneurship. In this, the reforms implemented and the measures being implemented to increase the export potential of small business and private entrepreneurship in our country have been described. Scientific-practical proposals and recommendations have been developed to increase the export potential of small business and private entrepreneurship.

Key words: small business, private entrepreneurship, export, investment, foreign trade, diversification, finance-credit, tax system.

Language: English

Introduction

Today, increasing the export potential of small business and private entrepreneurship remains one of the most important tasks. Diversification of the economy, broad emphasis on socio-economic reforms, changes in bringing the development of small business and private entrepreneurship to a new stage are becoming more urgent. In particular, in the speech of the President of the Republic of Uzbekistan Shavkat Mirziyoyev at the open dialogue meeting with entrepreneurs of our country on August 20, 2021, business financing, improvement of the financial-credit and tax system, reducing the tax burden on business as much as possible, the issue of land allocation, development of infrastructure necessary for business, exporter supporting enterprises, widely involving small businesses in export activities, making our products competitive, entering new markets, improving the transport-logistics system in connecting interregional trade and cooperation relations, reducing interference in business activities, simplifying procedures in the field, strictly enforcing the policy on the inviolability of private property to continue, to expand the scope of freedom given to small business and private entrepreneurship, to radically reduce the intervention of state agencies, to

ensure the prevention of violations, to increase the effectiveness of their prevention and to prevention of foreign interference was defined as the priority direction of state policy and the first-level task of state bodies.

Small business and private business entities are adapted to multiple market conditions, they have a flexible management system, but they do not have large financial, economic and production capacity like large enterprises. Such a problem is widespread in the remote regions of Uzbekistan, especially in enterprises that produce products of low quality, which do not meet international standards, and which do not have a high level of processing.

In recent years, the foreign economic cooperation of the Republic of Uzbekistan has been characterized by a high rate of development both at the regional level and in individual enterprises and companies. Trade relations of the Republic with foreign partners have a clear export direction. There is a stable direction of exports to the markets of the CIS countries. The share of exports of the Republic of Uzbekistan with non-CIS countries was 72% (in 2000 - 98%), in import purchases - 62% (in 2000 - 68%).

In the Republic of Uzbekistan, small businesses and private enterprises mainly export food products,

chemicals and products made from them, textile products, leather and footwear products, construction materials and various services.

A significant share of the volume of exported goods falls on food industry products, light industrial products, chemicals and products prepared from them, and services. In 2020, the export volume of small businesses and private enterprises made up 20.5% of the total volume of goods exported abroad by all enterprises in the country.

Most of the products exported by small businesses and private enterprises are raw materials that are not deeply processed and do not have high added value. Such a situation requires the development of drastic measures aimed at directing the sale of high-tech products for export in the country.

Currently, there are different approaches to defining the "Export potential" category. Under the concept of export potential, we understand the available resources or the possibility of exporting manufactured products.

Export potential can be studied based on modern methods and divided into classes. In our opinion, the export potential can be divided into 2 classes:

1) Structural - according to the results obtained by studying the structural elements of the export potential;

2) Comparative - according to the results obtained based on the evaluation of the performance of enterprises producing competing products and comparison of the export potential.

Based on the specific characteristics of each industry, the level of export potential of small business and private business entities is manifested differently. This affects the change in quality and quantity aspects. Continuing in this sense, it is worth saying that it is necessary to study the level of export potential of small businesses and private enterprises, and these studies will help to make a reliable and complete conclusion about the current situation. According to the obtained results, it is necessary to develop a reasonable state policy to support small business and private entrepreneurship, taking into account the most effective way of distribution of limited resources. It is desirable to support not all enterprises, but first of all vulnerable enterprises exposed to negative factors.

When talking about the potential of small business and private business entities in the industrial sector, it can be concluded that the chemical industry, food industry, as well as light industrial enterprises have the greatest opportunities for export activities. More than 80 percent of light industrial enterprises have a high potential for export activities. First of all, this is due to the formation of an important production base in these sectors.

Along with the emerging threats to the development of small business and private entrepreneurship in the country, there are, of course, a number of promising opportunities. Thus, the most promising enterprises from the point of view of development of export potential are chemical, food industry and light industrial enterprises.

A survey of experts in the field of foreign economic activity was conducted to obtain more detailed information about the state of export potential of small business enterprises in the country. According to the results of the survey of experts, the level of export potential of small business and private business entities in the Republic of Uzbekistan is estimated as average. A quarter of experts consider the export potential to be low, and the remaining experts consider its level to be above the norm.

According to experts, the following sectors have the greatest export potential: food industry products, light industry products, and chemical industry products.

The results of the research showed that export-oriented enterprises have the potential to conduct foreign economic activities, but it was found that the potential is not fully used. It was shown that chemical, food industry enterprises, as well as light industry enterprises have great opportunities for conducting export activities. Most of the export-oriented enterprises in the Republic of Uzbekistan have an average level of export potential, so they need state support and improvement of foreign trade infrastructure.

It is appropriate to develop a long-term strategy to increase the competitiveness of export-oriented small business entities as a priority for developing the export potential of small business and private business entities in the Republic of Uzbekistan.

One of the most effective means of increasing export potential is production cooperation, which attracts business representatives with the following possibilities: low production costs of the subcontractor; lack of production capacity in the firm when the volume of orders is too large; availability of marginal batches of products, etc.

In the near future, the following can be pointed out as a promising direction of support for export-oriented small businesses and private entrepreneurship entities:

creation and development of services infrastructure needed for small business and private business entities;

formation of a structural unit responsible for the implementation of a unified policy in the field of development and activation of export-oriented enterprises in the country;

to further improve the attraction of foreign direct investments in increasing the export potential of small businesses and private enterprises;

support of export activities of small business and private entrepreneurship subjects by the state on the basis of tax policy liberalization.

In conclusion, the implementation of these measures will help to increase the export potential of small businesses and private enterprises, and to develop the country's economy in general.

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INFORMATION AGENDA OF THE NEWSPAPER «HÜRRIYET»

Abstract: This article examines the features of the functioning of modern Turkish publications on the example of the newspaper "Hürriyet". The authors comprehensively analyze the main thematic blocks, analyze the ways of presenting information, and consider the information agenda of this publication.
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ИНФОРМАЦИОННАЯ ПОВЕСТКА ГАЗЕТЫ «HÜRRIYET»

Аннотация: В данной статье рассматривается особенности функционирование современных турецких изданий на примере газеты «Hürriyet». Авторы всесторонне разбирают основные тематические блоки, анализируют способы подачи информации, рассматривают информационную повестку данного издания.
Ключевые слова: Медиаиндустрия, медиасфера, информационная повестка, информационное общество.

Введение

Турция является одним из важнейших партнеров Узбекистана в Азиатском континенте, к тому же самый близких партнер во многих сферах общественной жизни. Поэтому, анализ ситуации на информационном пространстве и СМИ Турции является актуальной темой для нашего региона тоже. В этой статье мы анализировали деятельность одной из влиятельных газет страны как «Hurriyet».

В медиапространство Турции представлено обширным перечнем журналов и газет. В стране насчитывается около десятка основных национальных и сотни местных ежедневных газет Из всех издающихся в стране газет и журналов более трети приходится на Стамбул крупнейшие газеты, выходящие в Стамбуле «Джумхуриет» (Cumhurriyet, «Республика»), «Гюнайдын» (Gun aydin, «Добрый день»), «Гюнеш» (Gunes, «Солнце»), «Миллиет» (Milhyet, «Нация»), «Hurriyet» и другие.

По мнение Тахи Озкана, крупного медиаэксперта, а также специалиста по взаимоотношениям журналистики и политики. Согласно Озкану, «споры о том, что собой представляет система СМИ в Турции, никак не утихнут. Более того, говорить о проблемах в данной области невозможно без отрыва от проблемы взаимоотношений власти и СМИ. После того как Партия правосудия и развития пришла к власти, отношения власти и СМИ перешли на новый уровень. Важно также учитывать и тот факт, что в течение долгого времени именно позиция правительства служила решающим фактором в определении медийной политики» [1].

По мнению еще одного турецкого журналиста – Явуза Байдара, в настоящий момент наиболее серьезная проблема для турецких СМИ — свобода слова. По данным некоторых международных организаций, Турция — это страна, где огромное количество журналистов находятся в тюрьме. По некоторым данным, в тюрьмах содержатся около 200 студентов и 72 журналиста и активиста (в основном курдского происхождения). А согласно www.engellinweb.com, примерно 9 тыс. веб-сайтов заблокированы. Но говорить о полном отсутствии свободы в стране было бы неправильно. Скорее, можно сказать о наличии в стране частичной свободе [2].

С.Ю. Ермолова и К.О. Икинджи в статье «Культурная трансформация информационного пространства Турции: современные тенденции развития телевидения» описывают состояние СМИ как быстро развивающей сферой турецкого общества: «В последнее десятилетие в стране создаются все необходимые условия для активного развития сферы массовых коммуникаций и создания информационного общества. Сегодня у турецкого общества есть доступ ко всем информационным технологиям, а охват населения товарами и услугами рынка коммуникаций постоянно растет. Последующая модернизация этой сферы является острой необходимостью, потому что именно телекоммуникационная отрасль считается неотъемлемой частью создания развитой медиасферы в современной Турции. И здесь правом выдвигать страну на высокий уровень обладает только руководящий аппарат».

Одним из влиятельных и авторитетных периодических изданий является «Hürriyet». «Hürriyet» была основана 1949 году Седатом Симави, является ежедневным изданием, относящимся к группе «Доган» [4]. После смерти Седата Симави в 1953 году он продолжил ту же линию во время правления своих сыновей Халдуна Симави и Эрола Симави, взявших на себя совместное управление. Привлекая внимание читателей с помощью методов, которые имеют значение, таких как печать первой цветной фотографии и публикация первой серийной рекламы, Hürriyet воплотила концепцию общественной газеты с большим тиражом в Турции.Газета «Hürriyet» привлекают читателей такими новаторскими идеями, как печать первых цветных фотографий или первой полосы объявлений на своих страницах.

Газет «Hürriyet» действует под лозунгом «Каждое утро начинается новый день и вращение ротационной печатной машины», сегодня является одной из самых читаемых газет Турции и многогранным отображением общественной жизни[5].

Интернет сайт газеты существует с 1997 года, согласно проведенному в феврале 2011 года статистическому исследованию, занимает по посещаемости 7 место в Турции и 474 место в мире. Интернет сайт hurriyet.com.tr в июне 2011 года благодаря 9.5 миллион просмотров стал четвертым по посещаемости информационным сайтом в Европе[6].

Известный турецкий журналист и ученый Эртугрул Озкок сказал о газете «Hürriyet» следующее: Моментом, ознаменовавшим начало процесса модернизации турецкой прессы, стало основание газеты «Hürriyet» в 1948 году. С момента основания этой газеты начался период, который в технологическом и концептуальном смысле дал возможность человеческому фактору быть вовлеченным в газетные новости[7].

Сегодня многие национальные и международные газеты издаются на иностранных языках, в том числе Wall Street Journal и Financial Times, а также Milliyet, Fanatik и другие групповые газеты, а также Hürriyet на своих объектах недалеко от Франкфурта, Германия.

Hürriyet усилила свои публикации по проблемам интеграции Турции с Европой, особенно за последний год, в европейских изданиях.

К тому же редакция газеты делает все возможное, чтобы оставаться в самом центре информационной повестки дня. На данный момент издание специализируется на международных и общенациональных новостях. Здесь публикуются колонки, посвященные текущим новостям, событиям из мира экономики, культуры и другие. Электронной версии газеты https://www.hurriyet.com.tr/ имеются такие рубрики как: GÜNDEM (Повестка дня), DÜNYA (мир), SPOR ARENA (спортивная жизнь), YAŞAM (Жизнь) и другие.

Международные события в газете освещаются в рубрике «повестка дня». Например: в новости от 10 октября 2022 года на первой странице сайте была размещена новость «Son dakike.. Kiev kabusa uyandi! Art arda bùyùk patlamalar» (В последнюю минуту… Киев проснулся в кошмаре! Большие взрывы подряд) информационной статье речь идет об масштабном обстреле со стороны российских войск города Киева. Интересный момент, информационная статья разделена на несколько частей, первая часть называется «Первое заявление Зеленского» и в нем даётся высказывание президента Украины: «Они хотят нас уничтожить и стереть с лица земли». А вторая часть называется «объявлено количество погибших», «Через несколько минут после этого заявления МВД Украины сообщило, что в результате нападения 8 человек погибли и 24 получили ранения». Информационное сообщение

полностью соответствует критериям современной информационной журналистики.

Вторая информационная публикация посвященной Украинской теме появилась на сайте газеты в 09-19, и оно продолжается тему обстрелов городов Украины российскими войсками, оно даётся под заголовком: «3 больших взрыва в Киеве, столице Украины» [8]. Корреспонденты газеты взрывы связывают со взрывом Крымского моста, «Со стрельбой по мосту, соединяющему Россию и Крым, Украина , где напряженность достигла пика , проснулась от звуков взрывов.»

Особый интерес вызывает рубрика «Yasam», в которой публикуется различные материалы, в них рассказывается простые жизненные прелести и премудрости. В материале «Пойдет за пчелами по дороге» автор делятся своими впечатлениями о жизни в этой стране, сосредотачивая внимания на отдельных культурологических аспектах. Так, например, «Самый опасный, но самый фотогеничный сбор меда в мире происходит в непальских Гималаях. Когда я снимал свой

документальный фильм о меде, мне очень хотелось поехать. Я не смог осуществить эту мечту, когда въезд и выезд из Непала были закрыты из-за пандемии. Этот дикий мед производится Apis Laboriosa, диким видом, который считается самой крупной медоносной пчелой в мире. Эти пчелы висят на скалах, строят соты на скалах и производят мед. В результате доступ к меду требует мастерства. Гнезда большинства медоносных пчел находятся на недоступных крутых скалах, чтобы избежать хищников и чрезмерного воздействия солнечного света»[9].

И так можно сделать следующие выводы: в данном издании достаточно широкий и разнообразный и информационный палитра. Корреспонденты газеты в публикациях уделяют большое внимание разнообразным событиям в данный отрезок времени от политической обстановки в стране и кончая ситуаций в сфере образования. Более того, на страницах данного издания встречаются и критические высказывания.

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PRODUCTIVITY OF F1 HYBRIDS OF FINE-FIBER COTTON VARIETIES IN CONDITIONS OF UZBEKISTAN

Abstract: *The article carry out information about combining ability of the parent varieties of fine-fiber cotton varieties. Information about combining ability of parents and crossings is crucial in breeding efforts. Genetic variety is crucial to the effectiveness of yield improvement efforts because it helps to broaden gene pools in any given cotton. The presence of statistical differences in total productivity trait indicators in some reciprocal combinations of F_1 generation of fine-fiber cotton varieties suggests that cytoplasmic genes as well as nuclear genes are involved in the genetic control of these traits. In combinations F_1 Surkhan-9 x Termez-32, F_1 Surkhan-9 x Surkhan-10, F_1 Surkhan-10 x Termez-32 and F_1 Surkhan-10 x Duru Gavkhar, the positive heterosis effect on total productivity was 122.7-157.2%. These hybrid combinations can be use as a valuable resource for heterosis selections. It was noted that the nonadditive effect of genes on plant productivity in F_1 plants of varieties was strong.*

Key words: *G.barbadense, cotton, variety, hybrid, combining ability, plant productivity.*
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Introduction

Currently, the growing population is leading to an increase in demand for fiber and other products of cotton, which are the main agricultural crop in many countries, along with food sources. Cotton was and still is the most important and popular crop providing natural fiber for the textile industry (T.Akter *et.al*., 2019). The most important species of cotton are *G.hirsutum* L. and *G.barbadense* L. (A.Rehman *et.al*,

2020). Currently, the world's cotton area is around 35 million hectares, of which about 1.0 million are in Uzbekistan where the cotton is grown under different climatic conditions (Worldbank.org, 2020). In the international cotton market, the fiber of fine-fiber *G.barbadense* L. cotton varieties is more expensive than the fiber of *G.hirsutum* L. Several times more fabric is spun than a ton of this type of fiber, and the cost is also high. 8620 m^2 of fabric is made from

medium fiber varieties of fiber type V, 15510 m² of fabric is produced from 1 ton of fiber of fine fiber types of type I (http://tadbirkor-fermer.uz/ingichka-tolali-uza-ustirish/).

In the analysis of the leading countries growing fine-fiber cotton, the United States (11%), Egypt (47%), Sudan (17%), Uzbekistan (25%), Spain (38%) accounted for 7% of the world's cotton area growth was observed. Declines were observed in India (-7%), China (-14%) and Israel (-33%) M.A.Avliyoqulov *et.al.*, (2021).

The Republic of Uzbekistan is one of the countries in the world that has mastered the cultivation of fine-fiber cotton. The main reason for this is the high temperature in the southern regions of the country, the high heat reserves in Sherabad compared to Cairo (Egypt), and in Termez to Alexandria (Egypt) and Bayram Ali (Turkmenistan), and also many years of effective works of advanced breeders and seed scientists (M.I.Iksanov, 2009).

Recently scientific and practical researches in speice of *G.barbadense* L. in our country conducted by scientists such as B.Kh.Amanov *et.al.* (2020), J.Shavkiev *et.al.,* 2021, N.E.Chorshanbiev *et.al.* (2021), M.A.Avliyakulov *et.al.* (2021).

The main goal of Egyptian cotton breeders is to find high-yielding genotypes. There is also a lot of research going on to study the unused genetic variability of Egyptian varieties and to create new varieties (A.Yehia *et.al.,* 2019).

In the selection process genes were achieved through combining ability to create high-yielding varieties (M.A.Abdel-Monaem *et al.,* 2020).

N.Avliyokulov *et.al.* (2018) also conducted research on fine-fiber cotton varieties and created L-858, L-914, L-1532 ridges, which yield 4-26% higher than standard varieties.

Gamal I.A. Mohamed *et.al.* (2009) identifies that all traits were under the control of additive and non-additive genes in F₁ combinations of fine-fiber cotton varieties. The plant productivity trait was found to inherit complete dominance in generation F₁ and incomplete dominance in generation F₂.

Combining ability analysis is particularly important in cross-pollinated crops since it aids in the identifi cation of probable inbred parents for hybridization. Such research also aids in determining the nature and amplitude of various types of gene action influencing the manifestation of quantitative economic features (Pal AK, Prodhan H.S.,1994).

At present, researches on the study of the combining ability of initial forms using various genetic and statistical methods in interbreeding was escalating. The most accurate informative method of assessing general and specific combination ability is diallel crossing.

There are two types of combining abilities examined in biometrical genetics: general combining ability (GCA) and specific combining ability (SCA).

General combining ability is a measure of additive gene activity that relates to the average performance of a genotype in a series of hybrid combinations, whereas specific combining ability is the performance of a parent in a specific cross in combining ability (Ali Q., Ali A., 2014).

Many scientists (S.Abro *et.al.,* 2009; S.Karademir *et.al.,* 2009; S.Singh *et.al.,* 2010) have conducted research to assess the general and specific combinig ability of several varieties and found the best performing donors for genetic improvement of cotton.

Conditions and methods for experiments

Our research was conducted at the experimental field of the Institute of Genetics and Plants Experimental Biology, District Zangi-Ota, Tashkent Region, Uzbekistan. The soil conditions of the experimental field are typical gray soil, unsalted, groundwater is deep (more than 8.0 m), damaged by natural vilt. Agrotechnical measures were the same for the entire experimental base. Local Surkhan-9, Termez-32, Duru Gavkhar, Bukhara-7, Surkhan-10 cotton varieties belonging to *G. barbadense* L. species, as well as their inter-varietal F₁-F₂ plants were used as research sources.

In our experiment were used as a initial forms with their genetically different origins local Surkhan-9, Termez-32, Duru Gavkhar, Bukhara-7, Surkhan-10 cotton varieties and their inter-varietal F₁, F₂ plants. In the research, combinations of each varieties and their F₁ hybrids were grown in three replication, each replication for 4 rows, and 25 nests in each rows using the randomized complete block design method. Planting scheme 90x20x1.

In the during of the experiment, the inheritance and variability of important morphobiological and economic valuable traits in F₁ plants, and the extent of variability of some economic traits in F₂ combinations were studied by comparing them with parental forms. We were studied 30 plants of each of the varieties, their F₁ combinations and 150 plants of each of the F₂ combinations.

The degree of dominance in F₁ plants was determined according to S.Wright's formula given in G.E.Beil and R.E.Atkins (1965):

$$hp = \frac{F_1 - MP}{P - MP}$$

hp – dominance coefficient;

F₁ – the avalute arithmetic mean of the hybrid;

MP – the avalute arithmetic mean of the both parents;

P – the avalute arithmetic mean of the best parents.

Results of research was carried out method statistical processing of B.A. Dospekhov (1985).

In this case, the indicators obtained for each character were analyzed by dispersion, that is, the

reliability of differences between varieties and hybrids using Fisher's criterion (F), total mistake of experiment S $\bar{x}$, error of the mean S_d and the smallest difference (LSD$_{0,05}$) was determined by the level of reliability for 95%, also the data obtained for each traits were statistically analyzed using the modern analysis of variance with ANOVA program. P.P.Litun, N.V.Proskurin (1992) say that B.I.Griffing's 4 method (model 1) is widely used in the sphere of practical selection to determine combining ability.

RESULTS AND DISCUSSION

According to our data on plant productivity, the Bukhara-7 variety (46.2 g/plant) had the highest productivity in the group of studied fine-fiber cotton varieties. Sign of plant productivity was respectively 42.3 g/plant, 42.2 g/plant, 37.4 g/plant and 35.7 g/plant in Surkhan-9, Surkhan-10, Termiz-32 and Duru Gavhar varieties (Table 1).

According to the readings of the dominance coefficient (hp), out of 20 hybrid combinations of F$_1$, in 18 combinations the trait was inherited by the type of overdominance, in 17 combinations with positive, and one with negative heterosis.

Table 1. Inheritance of a trait "plant productivity" of F$_1$ plant of fine-fiber cotton varieties

№	Varieties and hybrids	$\bar{x}$	hp	heterosis; %
1	Surkhan-9 P1	42,3	-	-
2	Termez-32 P2	37,4	-	-
3	Duru-Gavkhar P3	35,7	-	-
4	Bukhara-7 P4	46,2	-	-
5	Surkhan-10 P5	42,2	-	-
6	P1 x P2	66,5	10,9	157,2
7	P1 x P3	44,6	1,7	-
8	P1 x P4	63,9	10,1	138,3
9	P1 x P5	52,8	211,0	124,8
10	P2 x P1	53,7	5,7	127,0
11	P2 x P3	50,9	16,9	136,1
12	P2 x P4	47,4	1,3	-
13	P2 x P5	62,9	9,6	149,1
14	P3 x P1	60,2	6,4	142,3
15	P3 x P2	56,8	23,8	151,9
16	P3 x P4	57,9	3,2	125,3
17	P3 x P5	52,7	4,2	124,9
18	P4 x P1	60,7	8,4	131,4
19	P4 x P2	54,4	2,9	117,8
20	P4 x P3	46,0	1,0	-
21	P4 x P5	34,6	-4,8	82,0
22	P5 x P1	51,9	193,0	122,7
23	P5 x P2	66,1	11,0	156,6
24	P5 x P3	62,8	7,3	148,8
25	P5 x P4	42,8	-0,7	-
	LSD$_{0,05}$	3,1		

A positive heterosis state observed in the reciprocal combinations of Surkhan-9 and Surkhan-10 varieties, which do not differ from each other. Thus, the plant productivity trait was inherited in a superdominant state with positive heterosis in F$_1$ combinations.

A high heterosis effect (from 117.8% to 157.2%) was found in the reciprocal hybrids obtained by crossing the Surkhan-9 variety with the Surkhan-10 and Termiz-32 varieties. These hybrid combinations can be used in heterosis selection.

In our opinion, the reason for this is that the author chose geographically distant varieties and lines that are very different from each other as the starting source. Vik.A. Avtonomov *et.al.* (2007) stated that the

positive heterosis for this character was 30-40% compared to the high index variety, depending on the hybrid combinations.

Variance analysis showed that there was a statistically significant difference between the variants of plant productivity (F$_f$>F$_{05}$). Reciprocal effects were detected in direct and reverse hybrids of varieties: Surkhan-9 with Termez-32, Duru-Gavkhar and Bukhara-7; Termez-32 with Duru-Gavkhar, Bukhara-7 and Surkhan-10; Duru-Gavkhar with Bukhara-7 and Surkhan-10; Bukhara-7 with Surkhan-10. Presence of reciprocal effects in advantageously most F$_1$ combinations points to the essential role of cytoplasmic genes in the regulation of this trait.

Clarivate Analytics indexed

Obtained results on productivity of raw-cotton testify on selective value of the studied local fine-fiber cotton varieties at obtaining of intraspecific heterozygous hybrids with a set of economically valuable traits for further refinement of them to the level of a more perfect variety than existing ones.

Analysis of GCA (general combining ability) effects showed that on "plant productivity" positive effects of GCA are Surkhan-9 and Termez-32 ($\hat{g}_i$ respectively, on 4,69).

Table 2. GCA effect ($\hat{g}_i$), SCA constant ($\hat{s}_{ij}$), GCA variance (σ^2_{gi}) and SCA variance (σ^2_{si}) according to plant productivity sign of varieties

♀ \ ♂	Surkhan-9	Termez-32	Duru-Gavkhar	Bukhara-7	Surkhan-10	$\Sigma\hat{s}_{ij}{}^2$	σ^2_{si}	σ^2_{gi}	$\hat{g}_i$
Surkhan-9		3,72	-11,05	9,09	-1,75	221,632	73,08	21,68	4,69
Termez-32			-4,65	-7,41	8,35	160,092	52,57	21,68	4,69
Duru-Gavkhar				10,32	5,39	279,280	92,30	6,19	-2,55
Bukhara-7					-11,98	387,559	128,39	10,44	-3,28
Surkhan-10						245,358	80,99	12,29	-3,55

This indicates to prospects of using varieties Surkhan-9 and Termez-32 as high-level donors yields at the selection of highly-productive cotton varieties. Other varieties, i.e. Duru-Gavkhar, Bukhara-7 and Surkhan-10, possessed negative effects of GCA ($\hat{g}_i$, respectively – 2,55, -3,28 and -3,55) with an average yield of 35,7 grams, 46,2 grams and 42,2 grams of raw cotton per bush. Inadequacy between the high values of $\bar{x}$ in last two varieties and their low values of GCA effects, in our opinion, was due to the different concentration of dominant and recessive genes in the genotype of these varieties (Table 2).

In all varieties the condition $\sigma^2_{si} > \sigma^2_{gi}$ is present, which indicates the high effect of non-additive genes on total yield.

High positive SCA constant in combinations of Duru Gavkhar x Bukhara-7 ($\hat{s}_{ij}$=10.32), Surkhan-9 x Bukhara-7 ($\hat{s}_{ij}$=9.09) and Termez-32 x Surkhan-10 ($\hat{s}_{ij}$=8.35), i.e. The sign is in the superdominant combinations with positive heterosis (hp 3.23, 10.08 and 90.63, respectively), and the high negative SCA constant in the Bukhara-7 x Surkhan-10 and Surkhan-9 x Duru Gavkhar combinations ($\hat{s}_{ij}$ respectively - 11.98 and -11.05) were recorded.

CONCLUSION

The presence of statistical differences in morpho-economic traits in some reciprocal combinations of the F_1 generation of fine fiber cotton varieties indicates that nuclear genes as well as cytoplasmic genes are involved in the genetic control of these traits.

Organized that F1 as such as Surkhan-9 x Termez-32, F1 Surkhan-9 x Surkhan-10, F1 Surkhan-10 x Termez-32 and F1 Surkhan-10 x Duru Gavkhar combinations showed a positive heterosis effect of 122.7-157.2% on plant productivity. These hybrid combinations can be used as a valuable resource for heterosis selection.

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A AMOUNT OF PROTEIN IN THE CONTENT OF YIELD OF PHASEOLUS AUREUS AS A SECONDARY CROP

Abstract: The article presents the data of experience on the influence of the term and rate of sowing on the amount of yield and biologically valuable indicators of stubble mung bean in the conditions of takir-like soils of the Kashkadarya region. When sowing mung bean in the third decade of June with a norm of 14 kg/ha, the bulk densite in the arable and subarable soil layer decreased by 0,03 g cm³ compared to the norm of 10 kg/ha, and soil porosite increased by 1,0-1,2 %. It has also been observed that the amount of nitrate nitrogen increases with increasing seeding rate.

When growing mung bean as a secondary crop, later dates and increased seeding rates lead to a decrease in the amount of crude protein in the grain. In other words, when sowing at a rate of 10-14 kg/ha of seeds per hectare in the early stages (in the third decade of June), the amount of crude protein in the grain was 21,5-22,6 %, the difference between the options was 0,8-1,1 %. When sowing in the first decade of Jule (10.07.) 10; 12; at 14 kg/ha mung bean per hectare, the content of crude protein in the grain was 19,8-20,6 %, or the content of crude protein was 1,6-2,6 % lower than in the early sowing period.

Key words: soil, secondary, Phaseolus aureus,mung bean, terms and norms of sowing, root and crop residues, agrophysical properties of the soil, protein.

Language: English

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Introduction

Every year in the republic more than one million hectares of irrigated fields are cultivated with autumn cereals. After harvested of this area of autumn cereals, it becomes possible to grow secondary crops on that land.

Given that, first of all, the main attention should be paid to the cultivation of legumes, cereals and vegetable crops that satisfy the daily food needs of the population as secondary crops, in the future, the ground will be created to further strengthen food security in the republic, to fully satisfy the population's needs for agricultural products, and secondly, in the lands where the soil fertility is decreasing, the ground will created for enriching the soil composition with organic fertiliser along with the planting of repeated crops.

There was cultivated 135 million hectar of leguminous crops on earth. Among leguminous crops, in terms of the width of the cultivated area, after soybeans (about 74 million hectares of soybeans in the world), it takes the second place (about 25 million hectares), and the third place is peas (about 10 million hectares in the world). In our republic leguminous crops are grown annually as a repeated crop on more than 18-25 thousand hectares. Uzbekistan also has a significant place in the export of *Phaseolus aureus* in the world market, until to 67 thousand tons of mung bean are exported per year [1].

Grain of mung bean is rich in amino acids and magnesium, calcium, sulfur, sodium, iron, manganese, copper, boron, cobalt, nickel, iodine, phosphorus salts. On average 60-80 centner of hay or 240-300 centner of green mass was obtained per hectare. The amount of digestible protein in blue mass is two or three times higher than in corn leaf and its stem. Silage made by mixing corn with mung bean differs in its high nutritional quality.

In the researches of M.V.Donskaya and S.V.Bobkov, it was found that made on 82 varieties and lines of mung bean the hotter the weather during the growth period of most of the samples, the faster the grain will fill [3]. In the dissertation work of I.G.Aukina, under conditions of chestnut soils in the Volga region of Saratov feeding mung bean with mineral fertilizers were increased protein from 23.6% to 29.4%, oil from 4.87% to 6.57%, but reduced the amount of starch [4].

Research results show that there is a strong relationship between the amount of nitrate nitrogen and mobile phosphorus in the soil and productivity.

Methods for experiments: In the research field observations and laboratory analyzes were conducted based on methodological manuals such as "Methods for agrochemical analyzes of soils and plants" [6], "Methods of conducting field experiments" [9].

Conditions for experiments: The place of the experiment is Kashkadarya region, located in the south-western part of the republic, the summer is hot and long, the winter is short and cold, in the spring there is mostly high humidity. A total temperature of 4900-5000^{0}C is observed throughout the year, of which 2500-2900^{0}C is considered a useful temperature.

The spring of 2019, when the research was conducted, was characterized by mild and low temperature, hot summer months and cool autumn months. In 2020, the spring was characterized by mild and low temperature, summer by relatively low temperature and slow warming activity, and autumn by relatively coolness and relatively hot October.

In the experiment "Durdona", "Kahraba" and "Marjan" varieties of mung bean were planted as repeated crops.

RESULTS AND DISCUSSION

According to the results of the experiment carried out in the conditions of takyr soils of Kashkadarya region, in the fields the initial indicators of porosity of soil of replanted mung bean were 49.2% in the 0-30 cm layer, also under the plow this indicator was 47.3% in the 30-50 cm layer.

According to the results obtained at the end of the growing season, soil porosity was 46.7-48.1% in the 0-30 cm soil layer, besides in the 30-50 cm soil layer 46.1-47.3% when planted in the 30.06 period. The highest indicator was observed in the version planted with mung bean seeds at the rate of 14 kg per hectare, and it was 48.1% in the 0-30 layers. So, it was observed that the soil porosity improves by 1-1.2% as the planting norms increase.

The soil of the experimental field was 0-30 and 30-50 cm the amount of humus in the layers is 0.799; 0.701%, the total nitrogen amount is 0.125; 0.081%, phosphorus amount 0.281; 0.296%. The amount of nitrate nitrogen in mobile forms of nutrients is 8.15; 3.79 mg/kg, mobile phosphorus 17.09; 16.01 mg/kg, commutable potassium 215; 209 mg/kg. This means that the soil is very low in nitrate nitrogen and low in mobile phosphorus and commutable potassium.

Among leguminous crops, mung bean (Phaseolus aureus) is an annual leguminous crop belonging to the leguminous family, one of the types of beans. There are India, China and Iran divided into subspecies. Mung bean's homeland is South-West Asia, where it began was cultivated in 4-3 thousand years BC.

Now mung bean is grown in Central Asia, India, Pakistan, Afghanistan, Iran, China, Japan and other countries. The arrowroot penetrates the soil up to 1.5 meters, forming nitrogen-fixing nodules. The fruitful stem spreads 20-100 cm, grows erect or unbranched, the leaves are wide and large. The flower is bisexual, butterfly-like, arranged in 3-12 leaf axils, yellow or yellowish-green in color. The fruit is a pod, thin, cylindrical, 6-18 cm long, with 6-15 seeds inside. The seeds are yellow, green, and black, the weight of 1000 seeds is 40-80 g. The mung bean is heat-loving, its seeds germinate in 5-7 days at a temperature of 12-15°C. The grasses will die at -1°C, -2°C. The mung bean is a moisture-loving plant. It is necessary to give water equal to its weight in order for the seed to germinate. It requires a lot of water, especially during

the flowering season. It grows well in shady areas. It grows well in fertile meadow soil. Basically, it pollinates itself. It ripes 85-95 days after plant grain in spring, and 60-65 days after plant it in late summer in Uzbekistan. They will harvest when ripe 75-80% of pods. Grain of mung bean contains 24-28% protein, 46-50% starch, 2-4% oil and vitamins. The mung bean is used in food, it is easily digestible, it is used in making pasta. Green grass are nutritious fodder in animal husbandry, and silage can be pressed from the stems. The yield is 10-16 centners per hectare on irrigated land, and 8-12 centners per hectare when it planted after cereal crops.

The mung bean's grain differs from other crops in terms of nutritional value. Because the level of digestibility of raw protein of mung bean is on average 86%. The amount of crude protein in mung bean varies according to the plant variety, growing area, weather conditions, applied fertilizers and agrotechnological measures. Especially, if mung bean is grown as a secondary crop, the crude protein content of the grain is even higher. High hot temperature can affect the crude protein content of mung beans to a certain extent. It has been found in researches that the duration and standards of mung bean planting have an effect on the amount of crude protein in grain of mung bean.

Similar data were obtained in the scientific observations of H.Kh.Saydaminova and et.al. [11], that is, this stress condition had different effects depending on the biological characteristics of the varieties when mung bean cultivars were maintained in soil drought. That is in some varieties the norms of protein decreased slightly, while the amount of fat increased significantly, and in some varieties, it was the opposite.

For this reason, it is important to study the influence of the crude protein content of grain of mung bean grown as a repeated crop in the fall wheat field on planting dates and norms. So, it is important to study the influence of the crude protein content of grain of mung bean grown as a secondary crop in the fall wheat field on planting dates and norms. Table 1 shows data on the dependence of the crude protein content of grain of mung bean on sowing rates and periods when mung bean was grown as a repeated crop in the field of winter wheat in the experiment.

Table -1. Amount of crude protein of mung bean grown cereal at different periods and amount

Samples	Sowing dates	Samples of mung bean	Amount of sowing, kg	Amount of crude protien, %	Defference between amount of sowing, + -	Defference between times of sowing, + -
1-variant	30.06	"Durdona"	10	22,6	-	
2- variant			12	21,8	-0,8	
3- variant			14	21,5	-1,1	
4- variant		"Qahroba"	10	20,6	-	
5- variant			12	20,3	-0,3	
6- variant			14	19,7	-0,9	
7- variant		"Marjon"	10	21,5	-	
8- variant			12	21,0	-0,5	
9- variant			14	20,2	-1,3	
10- variant	10.07	"Durdona"	10	20,6	-	-2,0
11- variant			12	20,2	-0,4	-1,6
12- variant			14	19,8	-0,6	-1,7
13- variant		"Qahroba"	10	19,7	-	-0,9
14- variant			12	18,9	-0,8	-1,4
15- variant			14	18,2	-1,5	-1,5
16- variant		Marjon"	10	18,6	-	-2,9
17- variant			12	18,2	-0,4	-2,8
18- variant			14	17,8	-1,8	-2,4
19- variant	15.07	"Durdona"	10	20,3	-	-2,3
20- variant			12	20,2	-0,1	-1,6
21- variant			14	20,8	+0,5	-0,7
22- variant		"Qahroba"	10	19,2	-	-1,4
23- variant			12	18,9	-0,3	-1,4
24- variant			14	18,8	-0,4	-0,9
25- variant		"Marjon"	10	20,3	-	-1,2
26- variant			12	18,2	-2,1	-2,8
27- variant			14	18,8	-1,5	-1,4

	Durdona			Qahroba			Marjon		
10	22,6	20,6	20,3	20,6	19,7	19,2	21,5	18,6	20,3
12	21,8	20,2	20,2	20,3	18,7	18,9	21	18,2	18,2
14	21,5	19,8	20,8	19,7	18,2	18,8	20,2	17,8	18,8
r	-0,97	-1	0,78	-0,98	-0,98	-0,96	-0,99	-1	-0,69
r		0,97	-0,59		0,93	0,89		0,99	0,59
r			-0,78			1,00			0,69

According to the results of the research the amount of crude protein was observed to decrease up to, when sowing in the early season (30.06) 10-14 kg of seeds per hectare and in the grain is 21.5-22.6% the difference between them is 0.8-1.1%.

The mung bean is planted at the beginning of July (10.07) when at 10-14 kg per hectare, the amount of crude protein in the grain is 19.8-20.6%, compared to the early planting, the amount of crude protein is 1.6-2.6% decreased.

When mung bean grown cereal was sown in the second ten days of July (15.07) with the consumption of 10-14 kg of seeds per hectare, the amount of crude protein in the grain was 20.2-20.8%, compared to the samples planted in the early period, the amount of crude protein was observed 0.7-2.3%.

In "Kahraba" and "Marjon" varieties of mung bean the above laws are also repeated, and the amount of crude protein in the grain is 19.7-20.6% in the "Kahraba" variety, it was 18.2-21.5% in "Marjon" variety it was found that depending on the planting dates and norms.

The results of the analysis showed that increasing the amount of planting and delaying the dates ensured a decrease in the amount of protein in the grain, regardless of the varieties. Analyzing the correlation between these indicators showed that there is a moderate (r - 0.69) and strong (r - 0.78; - 0.99) inverse correlation between the amount of protein and the planting rate. Just in one of nine cases, i.e. Durdona variety, the protein content of mung bean's grain planted in the second decade of July was observed to have a strong correlation with the date of planting.

Analytical data showed that the delay in planting mung bean seeds caused a decrease in the protein content of its grain. It was found that the amount of protein depending on the planting period, had a moderate (r 0.59; 0.69) and strong (r 0.89; 0.99) correlation with the planting period.

So, when mung bean is grown as a repeated crop, delaying its planting dates and increasing its norms will lead to a decrease in the amount of crude protein in the grain.

CONCLUSION:

1. In the conditions of barren soils of Kashkadarya region, planting mung bean as a secondary crop at the end of June at 14 kg per hectare the volume mass of soil in plowed and under-plowed layers reduces on 0.03 g/cm^3, and porosity of soil increased on 1.0-1.2%.

2. In the conditions of barren soils of Kashkadarya region, it was observed that by the end of the period of growing, the amount of nitrate nitrogen increases with the increase of the planting rate, when repeated crops are planted in the field. That is, when planting mung bean at the amonut of 10 kg per hectare, the amount of nitrate nitrogen was 6.92 mg/kg, and when the planting rate was increased to 4 kg, it was 10.82 mg/kg and increased by 3.9 mg/kg.

3. Delaying the sowing period and increasing the amounts when growing mung bean as a repeated crop leads to a decrease in the amount of crude protein in the grain. That is, when mung bean was sown in the early period (30.06) with 10-14 kg of seeds per hectare, the amount of crude protein in the grain was 21.5-22.6%, and the difference between them decreased to 0.8-1.1%. At the beginning of July (10.07) when the grain is planted at 10-14 kg per hectare, the amount of crude protein in the grain is 19.8-20.6%, compared to the early planting the amount of crude protein is 1.6-2.6% decreased.

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THE DRAMATURGY OF A. KOZLOVSKY'S BALLET "TANOVAR"

Abstract: The article devoted to the dramaturgy of the Ballet of A. Kozlovsky "Tanovar". The history of origin of ballet genre and the usage of Uzbek national song "Tanovar" in this genre type is described in the paper. What is more, the analysis of "Tanovar" Ballet is given.
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Introduction

Composed by Uzbek composers and performed by many singers and musicians, "Tanovar" is a popular work in the culture of Uzbekistan. The "Tanovar" ballet is dedicated to the first Uzbek actresses, whose life ended tragically in the post-revolutionary period. The struggle for revolutionary changes has become a struggle for freedom of women in Uzbekistan from the ruthless medieval laws of feudal society, the liberation of women's beauty from the paranja and artistic freedom of a woman.

Main part

The first Uzbek actresses passed the hard way of life. The Enemies of the revolution, bigots of customs and Shariat laws - the code of Muslim laws began to take revenge in a new way, trying to kill red agitators, Komsomol members, communists and actresses. That is because of "the women with an open face who were the most dangerous campaigners for the clergymen". Both talented dramatic actress Tursunoy and the young dancer Nurkhan were killed.

The subject of Nurkhan was brought up several times by Uzbek composers. A symphonic poem "Nurkhan" (1933) devoted to the memory of the murdered Uzbek actress was created by M. Leviev. A musical drama "Nurkhan" (K. Yashin's composition; music by T. Jalilov, 1943) has been created. Later, a statue of Nurkhan was erected in front of the House of Culture in Margilan (1968, sculptor V. Klebantsov).

The short and bright life of the actress Nurkhan is described in the ballet Tanavor. The name of Nurkhan, who was killed in order to frighten all Uzbek women, becomes a legend a year after her death and the symbol an invincible desire for freedom, a high sense of human dignity, and a natural desire for beauty. The music of Tanovar was written by in the XX century N.Mironov, V.Uspensky, E.Romanovskaya, A.Kozlovsky, Yu.Rajabi in the XX century. The composer A.Kozlovsky wrote the music for "Tanovar" in the performance of H.Nasirova in 1936 and remade it for the singer and Symphony Orchestra (this work of art was shown to the audience in the performance of H.Nasirova and at the A.Kozlovsky's conducting symphony orchestra). Later, the composer wrote symphonic poem "Tanovar" (1940) and ballets "Tanovar" (1971) on the basis of this melody. T.Sadikov made the composition for the singer and orchestra Based on "Tanovar", M.Burkhonov recreated the song "Now as you" for a despicable chorus, creating a kind of original work. M.Ashrafiy and S.Vasilenko also used the song "Tanovar" in their opera "Storm". A.Nabiev recreated "Tanovar" for piano play and created a unique work.

Tanavor ballet is not a definite historical story, but a tentatively poetic and dance composition, in which the images of the heroes and the events themselves are compiled. A plastic general intonation covering the plot of music with an idea is instilled and lifelong poetic image of beauty is manifested in the

Tanovar ballet. The libretto of the ballet was created by Galina Kozlovskaya with great talent. Music wass written by Alexey Kozlovsky. The ballet dance was staged by Nikolay Markaryants. The opening night of the ballet took place in 1971with great success. The ballet consisted of 3 Acts, and 9 scenes. But today it is impossible to comment on the choreography of the ballet. Because there were no video recordings at that time and the actors, most of the choreographers who played in Tanovar ballet died or moved to another countries.

At present time, only suites No.1 and No.2 have been kept in the library of the Union of composers and musicians of Uzbekistan. I personally restored this suites based on computer graphics. The combination of national and classical choreography attracts attention with the inherent elegance of the coloring of the names, which sounds throughout the whole musical score. That is to say, A. Kozlovsky's ability to use orchestral instruments skillfully and flashy oriental rhythms correctly and appropriately was an achievement of the performance in genre scenes, testifying to his sensitivity.

The dramaturgy of the ballet Tanovar reflects a definite idea. Ballet includes choreography, music and the plot.The ballet embodies gloom, dispute, lie, love, death and life, as the main idea. The Tanovar ballet consists of the following sequence of dramatic stages:

Exhibition
Plot
Action development
Culmination
Denouement

These dramatic stages connect logical bunches of views and acts at large-scale level. The ballet performance involves three main components – choreography, music and drama. Scenes, suites and individual names make up the musical form of ballet. The heroes and their experiences are shown in the exposition: *the courtyard of a non-poor house in the village. The sounds of the army march are heard from the distance and the observers of the soldiers are shown. The courtyard is filled up with conspirators and their young leader. The conspirators swear revenge on those who took away their force and wealth. And, as a guarantee of the restoring the previous laws, the leader gives the father of Nurkhan an expensive necklace as the payment for the bride. Father greedily touches shiny stones…*

Three presentations of suite No1 can be attributed to these events namely, overture, men's dance and expensive rocks. In the overture, the Red Army showed the March of soldiers through the Bandai, through copper-damned and percussion instruments.

Plot- a sharp turn in the scene acts: there was a conspiracy to sell Nurkhan to the Leader! The mother is looking for her daughter to inform the unpleasant news. Nurkhan's virgins started a wedding ceremony at the bride's house. In despair, Nurkhan begs her father not to give him to the Leader as a wife, but her father wears a necklace to Nurkhan and orders the wedding to begin. However, Nurkhan escapes with the master Aziz. People are furiously chasing after them. Nature comes to help them for their future. The avengers cut the branches of the willow, but they grow again and again, multiply, tie. The avengers get tired and disperse. A. Kozlovky shows the development of these events in suite through the performances of Agadio, Nurkhan's pleading, Chase and the Folk dance.

Action development - the development of the main conflict leads to scenes of high emotional tension: Aziz and Nurkhan celebrated their achievement; their art was seen by the people! But suddenly, in a meadow where Nurkhan once learned to dance, the leader (Nurkhan's engaged) of conspirators appear with vengeful retinue. Aziz protects the actress, and it is not known how the fight will end, but suddenly Nurkhan inadvertently screams, Aziz rushes to her side, but it was late. The enemies hit the waist of the Nurkhan with a knife. These events take place in the 2nd Act of the ballet, which the composer describes through Nurkhan and Aziz' Adagio.

Culmination is the highest moment of action and confrontation: Nurkhan's father, the Priest and the Leader perform the oath ceremony. The brother is forced to kill his sister, with encouragement to protect Shahriat's sacred laws and take revenge on the gunsmiths who violated commandments of the God. This culmination event takes place in the third Act of the ballet, which is performed through the cries of Nurkhan and scene disorders.

A Denouement is the management of the conflict, the action or counter - action, or both of them. Nurkhan, stabbed with a knife at her waist, is fighting for life. The young actress, who has been able to bear her pain, gradually goes to sleep, an unknown woman in black calls all the misfortunes of fate at the head of "infidel". But the actress imagines something else, the fields bloom, beautiful girls are standing among the trees, willow branches are calling them to dance, the master appears and shakes his hand – then the dancers begin to dance. The actress is happy - the dream of Aziz and Nurkhan has come true! But the dream does not come to an end. This stage of dramatic development is described by composer through A vision in the dark, A night extravaganza, A meeting with childhood, Adagio of Nurkhan and Aziz, Offering white roses and through four variations.

Suite No1

A. Kozlovkiy tries to reflect the Uzbek national instruments in orchestrating the ballet through the instruments of the symphony orchestra. Suite 1. Beginning with the introductory number, it contains musical pieces of several themes:

1. A theme starting with the note *fis* is given in stringed instruments (v-ni I, v-ni II, v-le, v-c) in 3-4 measures.

Valtorna v A is given a theme reminding the timbre of the trumpet is given, starting with the 2nd rhythm up to number 1 with French horn and other horns.

The extract similar to Tanovar theme between trichord is shown with oboe beginning from number 1.

For the second time, this topic will expand to the 3rd octave si-bemol note, passing to the flute. The introduction of the si-bemol note causes some tension and dramatic paint.

The wider assignment of a Marsh character theme is observed in the pipes performing behind the stage.

It is possible to see the enrichment and return of the initial musical materials and the dynamic decline beginning from the number 4. In addition, a small rhythmic theme is given in litaurs for the next number.

Symmetrical and syncopated rhythms are often found in Uzbek folk instrumental melodies. The syncopation of rhythm sounds can be found in many genres of Uzbek music, both folk and Uzbek classical music.

Conclusion

The deep roots of the Tanovar tradition at the level of various arts, both the fact that it had a large number of variants, made it possible for this song to manifest itself in the language of ballet dance. This opportunity was realized in two musical genres – symphonic poem and ballet by Alexei Fyodorovich Kozlovsky, a daredevil of the Uzbek compositional school and a person with great talent. The era of the creation of the Tanovar ballet, the sight of the stage face – coincided with the most flourished period of Uzbek musical art. The names of the ballet masters who took part in it are now shining and sparkling in the jewels of history.

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UZBEKISTAN'S STOCK MARKET ANALYSIS AND STOCK PRICE ESTIMATION IN THE MARKET

Abstract: *Although stock exchanges are built and operating effectively in developed countries, there are still certain challenges involved in the process of calculating the market price of shares in states with lower levels of economic development. During the first decade of the 2000s, the stock market in Uzbekistan did not perform particularly well, and investors did not view equities of joint-stock companies in Uzbekistan as being reliable or profitable. As a result, the proportion of money invested via the stock market during that time was extremely low. However, during the second decade of the 2000s, there was a good trend in the Tashkent Stock Market in Uzbekistan, and the activity of the Stock exchange and JSC also marginally improved after certain measurements. However, there are still certain questions that need to be answered about the calculation of equities' fair market value. This article investigates the current situation of the stock exchange in Uzbekistan, evaluates the impact of macroeconomic indicators on the activities of the stock exchange, and draws some conclusions and makes some recommendations as a result of its findings.*

Key words: *Stock, stock price, market price, stock exchange, Tobin's Q-ratio, Uzbekistan.*
Language: *English*
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Introduction

Financial assets, such as stocks and bonds, have emerged as one of the most effective ways to generate and/or entice investment in recent years. The vast majority of investors are successful in turning a substantial profit from their stock and bond investments. However, there are some problems with determining the market value of the equities; sometimes they might be overpriced, and other times they can be undervalued. During the early years of Uzbekistan's independence, there were not many choices available to those who desired to make investments with their discretionary funds. Reforms are necessary in the financial markets in Uzbekistan, particularly the secondary financial market. People worry that they won't receive adequate information regarding stock prices, and as a result, they avoid investing in the types of assets that fall under this category. Even while stocks are seen as having a bigger potential for loss than other sorts of financial instruments, the returns that may be anticipated from this kind of asset are also higher. When determining the value of stocks on the market in industrialized countries, there are a number of different methodologies and procedures available. There is not a reliable secondary stock market in Uzbekistan. This is primarily due to the high volume of non-liquid and low liquidity shares. As a result, the evaluation of the market value of stocks is sometimes carried out on a simplistic and unskilled level. The imperfection of the system can be inferred from the flawed pricing technique. [Case in point:] The theory of price formation and the methods of technical analysis are not working since the secondary market has not yet matured into a stable long-term market. However, methods of valuing the worth of stocks are employed for fundamental analysis because these approaches are more accurate. In Uzbekistan, there is a severe lack of confidence in the market value of the shares of joint stock enterprises due to the absence of a specific technique or strategy for determining the value of the stock on the market. The currently available method

does not satisfy the requirements of the most up-to-date macroeconomic policy. This is seen as one of the challenges that must be overcome in order to successfully attract foreign investment in the nation. The price at which a share of stock can be purchased and sold on the market at the present time is referred to as the share's market value. The market value of the company's own money, also known as the capitalization indicator, can be calculated by multiplying this price by the number of shares that have been placed in circulation.

Approaches to determine market value of stocks

The ownership of a stock, which belongs to its own unique category of securities, confers to its holder the ability to participate in the management of a joint-stock company and claim a portion of the issuer's profits.

There are two distinct routes one can take to profit from stock trading. The first approach is to make payments in the form of dividends, which are calculated as a percentage of the business's overall profit. The second method is to trade shares on a stock exchange, both buying and selling them.

A stock's market price, or its worth on the market at a certain point in time, is an important aspect of a stock that investors should take into consideration. The capitalisation of the company can be calculated by multiplying the current price of a share by the total number of shares that have been issued (the market value of the equity of the issuing company). This price is able to be anticipated, and the appropriate transactions of buying and selling can be carried out in order to generate a profit.

There are three ways that the market value of shares can be determined in today's practice around the world. The decision to take a particular course of action as a result of the availability of the necessary knowledge.

Fundamentalist approach

The approach is based on the assumption of discounted future income. With a stable market, the following formula may be applicable for calculating the market price of shares:

$$Pa = \sum_{k=1}^{\infty} \frac{Ea}{(1+R)^k}$$

Where
Ea – potential income
k – number of years
R – required rate of return

In the case of a constant dividend size, the market price is defined as:

$$Pa = \frac{D}{R}$$

D – annual dividend amount

When dividends steadily increase, you should use the formula:

$$Pa = \frac{D_1(1+L)}{R-L}$$

D_1 – the last dividend amount
L – percent growth of dividends

Technocratic approach

Use of technical analysis for market price pricing the technocratic approach is based on the application and analysis of statistical data of stocks, with the help of which various trends are built in different time intervals. As a rule, such an option is used in Uzbekistan practice. Its disadvantage is the insufficiency of information required for the assessment (inefficient use of market mechanisms, insufficient liquidity of issuers).

Approach "at random"

This approach is characterized only by analysis of current indicators and denies dependence on past prices. This approach often cannot give an objective assessment.

Thus, the market price of shares is an objective indicator, due to both the prospects of the market and the expectations of its owners.

Reasons for a change in market price

As you know, the market price of shares is constantly changing. Moreover, the nature of these changes can be represented on the graph in the form of certain waves. Specialists identified several factors that have an important impact on the market price:
- ➢ competitive position in the financial market of the company whose shares are held by the investors;
- ➢ supply and demand for this type of securities;
- ➢ increasing the economic stability of the country where the issuing company is located;
- ➢ global course of economic policy;
- ➢ political tensions between states;
- ➢ the relationship of large financial corporations among themselves.

Methodology

In Uzbekistan the amount of investment that was attracted through stock market was very low. Compared to total investment in Uzbekistan i.e. investment through stock market to total investment was about 1 percent from 2010 to 2003. From 2014 to 2018, it increased slightly and accounted for 5.7 percent in 2008. However it decreased in 2011 and made up 4.5 percent of total investment in Uzbekistan. Investment through stock market did not make up even 6 percent of total investment in 2010 to 2020. It indicates that there is an actual issue that should be taken into consideration immediately. Share of investment through securities in GDP was 0.4 percent in 2015 and 2016. The highest indicator was 1.3 percent in 2018. But in 2020, it decreased and accounted for 1.1 percent of GDP. Obviously, these

indicators show that attractiveness of stock market of Uzbekistan was not very high for investors.

Below we assess the impact of macroeconomic indicators to the stock market in Uzbekistan using the data from Statistics Commitee of Uzbekistan.

Years	Investment growth X1	Monetarization coefficient X2	Refinancing rate X3	Mandatory reserve rate X4	Tax on profit X5	GDP X6	Trade volume in Stock market Y
2010	1,0	10,2	32,3	20	31	3,8	138,2
2011	3,7	10,2	26,8	20	26	4,2	152,9
2012	3,8	9,4	34,5	20	24	4,0	159,8
2013	4,5	9,3	27,1	20	20	4,4	180,5
2014	5,2	10,3	18,8	20	18	7,4	154,1
2015	7,0	14,2	16,0	15	15	7,0	123,8
2016	9,1	14,9	14,0	15	12	7,5	232,1
2017	22,9	17,3	14,0	13	10	9,0	117,8
2018	28,3	18,8	14,0	15	10	9,0	181,2
2019	47,7	20,0	14,0	14,0	10,0	8,1	106,0
2020	22,8	21,5	12,0	9,0	9,0	8,5	197,5

Figure 1. Macroeconomic (monetar and fiscal) policy, dynamics of Stock Market indicators
Source: Author's compilation.

Final conclusion

Regression analysis			
R-squared	0.7259		
Adjusted R-squared	0.3148		
Standard error	401.6727		
Observations	11		
	Coefficients	Standard error	t-statistic
Y-cross point	-401.7938	401.6727	-1.00
X 1 variable	-6.923485	2.399134	-2.89
X 2 variable	0.375751	16.46815	2.28
X 3 variable	1.297859	4.39806	0.30
X 4 variable	29.27025	14.18539	2.06
X 5 variable	-11.70916	5.006449	-2.34
X 6 variable	-28.03277	18.57205	-1.51

According to results R-squared is 0.726. It shows close connection among these economic indicators. The result show that increases in Tax, GDP and investments have a negative impact to trade volume in stock market. Among these indicators, 1 unit increase in mandatory reserve rate leads 29.270 unit increase in Trade volume in Stock market. Monetarization coefficient does not have any influence on Trade volume in Stock market.

We will try to determine if the JSC's stocks are overvalued or undervalued using Tobin's Q ratio.

At the most basic level, the Tobin Q-ratio expresses the relationship between market valuation and intrinsic value. In other words, it is a means of assessing whether a given business or market is overvalued or undervalued.

$$Q\ ratio = \frac{\textbf{Equity Market Value}\ +\ \textbf{Liabilities Market Value}}{\textbf{Equity Book Value}\ +\ \textbf{Liabilities Book Value}}$$

It is often assumed that the market value and the book value of a company's liabilities are equivalent.

This reduces this version of Tobin's Q-ratio to the following:

$$Tobin's\ Q - ratio = \frac{\textbf{Equity Market Value}}{\textbf{Equity Book Value}}$$

However there are some challenges to determine Q-ratio in Uzbekistan, because although we can get the Book value of Equity and Liabilities determining their market value is slightly difficult and requires much data to determine. Roughly taking this data may mislead investors and cause the result to be wrong. However calculating market value of equity and liabilities becomes easier, from our point of view using Tobin's Q-ratio will be a good method to find out fair value of stocks of JSC.

Conclusion

According to our analysis and research the following conclusions and proposals have been developed:

➢ After independence it took considerably long time to develop the activity of stock exchange in Uzbekistan. We even consider that it is still improving at lower speed than expected. Stock Exchange started performing better since 2014.

➢ The first IPO took place in 2018, and from our point of view this IPO had a positive contribution in the present progress of Uzbekistan;

➢ An increase in mandatory reserve rate leads higher increase in trade volume in stock market.

➢ Tobin's Q-ratio cannot be used to determine if stocks are undervalued or overvalued. Because there are some challenges to determine market value of equity and liabilities.

➢ The trade mechanism of stock exchange is not well developed. There is no information of β ratio of stocks in stock exchange, so investors may not determine their risk premium. From our point of view, if JSC give information about their securities β it will increase the trade volume in stock exchange.

➢ Theoretically there are many approaches to determine the market value of stocks, but because of lack of information about dividend policy of JSC, these approaches cannot be used to determine market value of stocks.

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INTERPRETATION OF THE TOPIC OF ECOLOGICAL CULTURE AND EDUCATION IN THE PRESS OF KARAKALPAKSTAN

Abstract: *This article discusses the role of environmental culture and education in the prevention and elimination of environmental problems in society. The opinions of researchers about the goals and objectives of ecological culture and education were also studied. On this basis, today's press of Karakalpakstan was analyzed and appropriate conclusions were drawn.*
Key words: *Society, ecological culture, ecological education, problem, culture, newspaper, youth.*
Language: *English*

Introduction

The situation in ecology, which is one of the global problems of our time, first of all requires the formation of an ecological culture of each member of society. A high level of ecological culture in society depends on the positive attitude of the population towards the environment, especially on careful attitude towards it. Therefore, it is permissible to dwell on what ecological culture and education are and at the level of its interpretation in the media.

The main part

Ecology has become one of the main topics and issues for all mankind, especially in recent years. Therefore, it is necessary to maintain an ecological balance between nature and society, to form a positive attitude towards nature, to become an integral part of human life. In our opinion, in this regard, it is natural that the formation of an environmental culture in society will also contribute to finding one's own solution to the problem. Ecological culture is interpreted by philosophers as a new direction that studies the relationship between man and nature. For example, in the "Philosophical Dictionary" this concept is defined as follows: "Ecological culture is a generalization of environmental knowledge, a philosophical concept, the principles of ethics and their rules, ideals in culture, methods of natural and human interaction" [1; 115]. But a number of scholars have emphasized that this definition is not complete. For example, K. I. Shilin says: "Ecological culture is a future, universal and global culture, it is a conscious integration of environmental opportunities, that is, all world cultures" [2; 62]. It focuses on the integrative importance of environmental culture [3; 65-73].

According to F. Reimers, "Ecological culture is a stage of development and an integral part of human culture. Understand environmental issues that are considered important in life and in the future development of mankind" [4; 19].

We see that the concept of "ecological culture" is a special type in the works of A. Hukumov. For example: "Environmental culture in a broad sense refers to the land, flora and fauna of a person in society, the naturalness of a person reveals cultural aspects, and shows the extent to which a person understands and deeply knows nature" [5; 19].

Kh.Abullaev "Adaptation of the spiritual-theoretical and material-practical certain quality level of the society to each other and to the nature, to express the organization and development of the improvement of its restless life. The meaning of all

human social relations, all aspects of social life go back to the relationship between man and nature" [6; 220], gives it a broad definition.

In turn, L.P.Simonova and M.V.Mashcharina look at ecological culture as a characteristic of a person, and see it as "an interest in solving problems related to nature, and at the same time, it is seen in moral feelings related to the environment" [7; 51], he emphasizes.

Similar views were developed by A. Khramenko. The combination of an emotional and purposeful attitude to nature helps to understand nature and the place of man in it [7; 51], he said.

Russian scientist D.S. Likhachev distinguishes the concept of "ecological culture" not as a field of ecology, but as a department of culture. He says: "This term applies to all aspects of human life and activity. Ecology cannot be limited only to the tasks of preserving the natural biological environment. For a person, the environment created by his ancestors and his culture is more important. Preserving the cultural environment is like preserving the environment" [8; 2]. In his works, the scientist emphasizes that first of all, it is necessary to develop the spiritual-enlightenment and cultural level, only this is to help a person become fully enlightened, ecology cannot be separated from culture, and ecological culture should be considered as an integral part of culture.

Scientist A.R. Malikova, who studied ecological culture as a pedagogical process, gives the following concept of ecological culture: "Ecological culture is the concept, knowledge, thinking, consciousness of the interrelationship between living beings and the environment, and the ability to apply them in practical activities. , competence and responsibility. More precisely, it is an indicator of practical activity that ensures the mutual balance and harmony of nature and society" [9; 8].

Also, the issue of the pedagogical foundations of environmental education is discussed in academic I.D. Zverev, A.N.Zakhlebniy, E.O.Turdiqulov, I.Suravegina, I.Matrusov and a number of other scientists were also reflected in the scientific research works. Uzbek scientists Yu. Shodimetov, B. Ziyomukhamedov, A.S. Tokhtaev, E.V. Kadirov, O. Kudratov, J. Kholmurodov, A.N. Nigmatov, etc., in their researches, the concept of ecology, its content, various economic, natural, social aspects of environment and human relations, studied socio-philosophical aspects of environmental education.

Environmental education is of great importance in the formation of ecological culture and ecological awareness among young people. "Environmental education means the formation of a conscious use of the environment in people, that is, the correct use of resources" [10; 76].

Yu.G. Markov shows the following directions of environmental education:

1. *Political*. At this stage, the basic conditions of society's attitude towards nature are visible, ecological culture and ecological consciousness are formed. The work in this direction is controlled by government organizations at the legal level.

2. *Natural-scientific*. There are scientific views about the unity of man and society. Society develops in relation to the environment at all stages. Human activity is created by nature and is carried out as a result of frugality, rational action.

3. *Legal*. Its main regulator is the government, which develops and enforces environmental legislation.

4. *Ethics, aesthetics*. At this stage, consideration of environmental regulatory guidelines is required.

5. *Worldview*. Education – forms certain views about the world [11; 54].

R.B. Goyibov and others define the concept of ecological education in the article entitled "Ecological culture - the need of the times": "Ecological education is one of the most urgent problems today. The first task of us conscious people is to make things harmful to the environment as harmless as possible, that is, to neutralize them. This is certainly the case for drinking water, soil and air. Every person can protect the house, street, neighborhood, village and city in which he lives from pollution, beautify it, make it green, keep the green, clean air, water, holy places that nature has given him and use them effectively" [12; 38], adds some clarity to the problem.

It can be seen that ecological education forms an ecological culture, which is a set of all values, behaviors, knowledge and skills in an ecological direction. It makes it possible to live in harmony with nature. Any education is closely related to universal and national values and traditions. Thus, ecological education can be seen as the basis of ecological culture in history and national values. After all, the existence of the human world has lived in harmony with nature throughout its development.

If we look at the past of our people, it is known that they have formed their values and wealth over the centuries and passed them on from generation to generation. In these traditions and values, concepts that spread the light of goodness to the human mind are embodied in the education of young people.

Of course, the importance of the mass media in the formation of ecological culture and ecological education in people is highlighted. Because the mass media fulfills the main task of providing guidance in the formation of social opinion, education and behavior of mankind in the society.

The main tasks of journalism specializing in ecology are described in the work jointly created by the researcher A. Kochineva and a number of other authors:

- informativeness;
- enlightenment;
- organization:

Clarivate
Analytics *indexed*

- control [13; 10].

Therefore, the author is required to approach any issue based on the duties of the press and mass media.

On the pages of the modern Karakalpak press, one can see that opinions and comments on the widespread promotion of environmental education, upbringing and environmental culture among the population are widely covered. For example, in the articles "Nature and Man" by Z. Sherlanov [14], "The fate of the island and ecology" [15], "Let's attach importance to the environmental education of youth" by B. Mambetkabulov [16], "Environmental education for our youth" by R. Khalmuratov [17], "How is ecological culture formed?" in collaboration with M. Tadzhiev and Z. Narimbetova [18].

Therefore, providing materials on the topic of ecological culture in the press is important in establishing a proper relationship with nature among people, especially young people.

Conclusion

In conclusion, due to the deplorable environmental situation in the world, in particular, in our region, ecology, which has been raised to the level of state policy in Uzbekistan, should be further increased in its importance, and mass propaganda and propaganda should be carried out in this regard among the population, especially from the mass media of the republic. it is appropriate to start wide use, to give presentations on the topic of ecological culture. Because the educational and educational function of the mass media is of great importance in the prevention and elimination of problems in the field of ecology.

In our opinion, it is necessary to implement the following measures in order to increase the ecological culture and level of the population:

- providing new innovative directions of environmental education to children and teenagers at preschool and primary education, general education levels. Organization of nature trips and practical activities to form children's and teenagers' relationship with living nature;

- extensive study of world experience in this area and presenting them in an understandable way to the population and especially to the growing young generation in the form of social advertisements;

- Ensuring the diversity of environmental topics in the mass media, expanding the promotion of nature conservation and environmental protection based on life examples.

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ANCIENT REPRESENTATIONS OF MOTIVES OF CHILDHOOD IN THE KARAKALPAK DASTANS

Abstract: The article studies the sources of the appearance of motives related to the topic of childlessness. Used as a source of scientific reasoning made on the topic of childlessness in samples of world folklore.
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Scopus ASCC: 1200.

ДРЕВНЫЕ ПРЕДСТАВЛЕНИЕ О МОТИВАХ БЕЗДЕТНОСТИ В КАРАКАЛПАКСКИХ ДАСТАНАХ

Аннотация: *В статье изучается источники появления мотивов, связанных на тему бездетности. Использованы в качестве источника научные рассуждения, сделанные относительно темы бездетности в образцах мирового фольклора.*
Ключевые слова: *Мотив, миф, сказка, эпос, Коран, Авесто, «Книга Коркыт ата».*

Введение

В каракалпакских народных дастанах существуют ряд научных рассуждений по мотиву бездетности. Они известны тем, что объединившись, создают сюжет, являются основой сюжета и в создании дастана превращаются в естественный эволюционный процесс. Мотивы разделяются на различные виды, среди них мотивы, о которых речь пойдёт в экспозиции дастанов (мотив сна, мотив бездетности, мотив рождения и т.д.) дополняют и развивают друг друга, тем самым являются одним из актуальных вопросов, ждущих своего исследования в типологическом направлении в каракалпакском фольклоре.

Мотив бездетности с древних времен был характерен для эпических жанров, первоначальные их признаки мы можем проследить в памятниках Древнего Египта. В памятниках, где рассказываются «Сказка потерпевшего кораблекрушение» (XX-XVII века

до н.э.) и в сказке «Обреченный царевич» (XIII век до н.э.) приведены немного сведений о бездетном положении родителей, то есть наблюдаются, как они мимоходом затрагиваются. В одном из этих сказок имеют место такие строки: «Мы с родственниками и детьми прожили на этом месте, мы с родственниками и детьми, если не считать младшую дочь, выпрошенную у Бога были семьдесят пять змеями» [9, с.95]. Здесь речь идёт не о людях, а о змеях, это может стать фактом, доказывающим древность произведения. Но, по причине их было много и отличались теми особенностями, что выпрашивали у Высших сил и таким образом осуществляли собственные цели, тут во многом чувствуется, что их действия связаны с человеческими судьбами. Тем не менее, если обратить внимание на период, когда создавались эти творения, то наблюдается, что мотивы бездетности возникли в связи с миром чудовищ. В доказательство этого можно привести сведения из искусства ношения головных уборов,

выполненных на основе внешнего вида различных животных и птиц на голове фараонов Древнего Египта. Они, несомненно имеют символический характер, и бесспорно возникли из потребностей жизни того периода. При всем этом, в этих памятниках не имеет важное место необходимый нам мотив бездетности, а только, можем использовать как в качестве эпического факта, определяющего, что «Младшая дочь, выпрошенная у Бога» является древним сведением, появившимся в ранние периоды. А, в сказке «Обреченный царевич» можем проследить особенности, где можем конкретнее воспринять, чем в предыдущей сказке. В ней рассказывается мотив бездетности, близкий к экспозиции этих дастанов: «Как был бездетным один царь и выпашивал детей у богов своей земли» [9, с. 96]. В этих сведениях, мы можем определить одну из формирующихся систем многобожия, характерных древнему периоду (богов своей земли) и занятия места в них понятий, осуществляющих меры выпрашивания детей.

И в мифах Древней Индии наблюдаются неброские следы образов таких бездетных отцов. В мифе «Наступление Ракшасов на север» Майя сказал Равану следующее: «У меня была красавица жена по имени Хема. Я прожил с ней тысяча лет, был верен ей, сильно любил. Вот, уже четырнадцать лет, как она улетела на небо по велению богов, до сих пор не вернулась. Я построил золотой дворец в безлюдном месте, украшал его драгоценными камнями и живу в золотом дворце в одиночестве, сильно страдаю от разлуки с любимой. От неё осталась только одна дочь. Мы собрались с дочерью в поход, чтобы найти ей достойного жениха. Если сказать правду, быть отцом для дочери - несчастье. Когда она останется одна (если не выйдет замуж) родственники и отца, и матери сталкиваются с большой опасностью, затеряются бесследно» [10, с.104]. Имеются сведения, что этот мотив связан с индийском эпосом «Рамаяна» [10, с.255]. Заметно, что этот эпос имеет схожие черты с тюркскими эпосами. Например, печаль по поводу ухода любимой жены, постройка в безлюдном месте дворца и украшение его драгоценными камнями, сильная тоска, что больше не может иметь детей, поиск жениха, чтобы пошли потомки от дочери и самое главное, в эпосе преобладают чувства сильного огорчения по поводу своей бездетности в этом мире. Верно, что подобные схожести не даны точно и дословно, их мотивационное единство – сохранения разочарования в бездетной жизни обособлены типологическими качествами, основанными на потребностях каждой общественной среды. В приведенных нами выше примерах не шла речь о судьбах отцов, которые были, совсем бездетными. У них есть дочери. Но, есть конкретная потребность в сыновьях. В наших национальных дастанах подобные эпизоды встречаются очень редко. Только в варианте Кияс жырау дастана «Сорок девушек» когда к Бурабай подходит повзрослевшая дочь и просит коня со снаряжением, на что отец выражает свое недовольство, [7, с.10] причину этого можно понять как эпизодов последнего пласта, появившегося под влиянием исламской религии и введен в дастан в непосредственной связи со свободной интерпретацией Кияс жырау (сказитель). Или же, исконные истоки дастана «Сорок девушек» восходят к периоду матриархата, это рассуждение в научной среде было принято несколько раз и подтверждено доказательствами. В этой ситуации невозможно доказать причины недовольства по поводу появления на свет девушек. А, в эпосах древнего Египта и Индии рассказываемые сюжеты и эпизоды изложены в рамках соответствия требований того периода. Особенно, достойно особого внимания сохранение традиции выпрашивания детей у высших сил. Также, в одном из эпосов Древней Индии «Легенда о царе Вене и его сыне Притху» тема бездетности состоит из горестных выводов, имеет место сведение: «Вене остался бездетным и его царство осталось без царя» [10, с. 257]. В легенде «Индра и святые дервиши», появившегося на основе эпоса «Махабхарата» встречаются сведения: «Был царь по имени Бхангаспана. Он был известен своей мудростью и честностью, народ его обожествлял, но он был бездетным, поэтому его не могли успокоить и царский трон и могучая мощь» [10, с.124]. А, в «Легенде о Раме» (IV-III века до н.э.) «Айодхья, как луна покрывала звезд, прикрыл торжества других городов. Им правил славный, справедливый царь Дашаратка. Доброго царя радовали мудрые и преданные советники, прекрасные и кроткие жёны и все пожелания Дашаратка исполнялись непременно. Но, огромная печаль терзала правителя Айодхья, тоску его никто не смог облегчить. У такого щедрого царя не было потомков, не было возможности оставить кому-либо государство и престол» [8, с. 24]. Нет никакого сомнения, что во всех этих эпических сведениях имеются типологические факты, исходившиеся из бытовой необходимости.

И в каракалпакских народных дастанах чаще имеют место печаль и разочарование героев по поводу бездетности. Фольклорист учёный И.Сагитов приходит к выводу, что «Мотив бездетности вождей племени и рода имеют много места наряду со многими дастанами мира, почти во всех каракалпакских героических дастанах он служит одним из главных мотивов». Действительно, примерно среди 70 образцов каракалпакского фольклора, их половина начинается с горестной судьбы бездетных отцов.

Они как бы не изображались и в каких ситуациях и степени, их основные истоки развиваются в тесной связи с мотивом потребности в детях, общего для человеческих судеб.

Например, бездетные отцы заняли место и в древних религиозных книгах. Сторонники Мазды в «Авесто», стремящиеся к добру (приверженцы Ахуры Мазды) с помощью добрых верований ставили себе цель вырастить и воспитать детей и искали способы их осуществления. «К Ахуре Мазде подходили Божьи Матери и несколько раз жаловались на бездетных отцов» [11, с. 131]. Так как, для создания необходимых бытовых условий людям, для стабильности и развития постоянно нужны были приемники-сыновья.

В «Библии» рассказывается о жизни пророка Авраама (Ибрайым) и жены его Сары, их совместной жизни, отмечается, что «Саара была бесплодной» [5, с. 79]. В некоторых религиозных письменных памятниках еврейсого народа отмечается, что жена Маная из племени Данау не могла иметь детей, была бесплодной. В тех источниках приводятся сведения о том, как можно избежать этой тяжелой участи бездетные родители. В одном из них, Авессалом из-за того, что нет у него сына, который вспоминал его белый конь, при жизни в целях увековечить свое имя в королевской площади устанавливает себе памятник и называет его своим именем [9, с. 98]. И тут основная цель предполагает определение тяжести бездетной жизни. В сурах Али Имрона в «Коране» имеют место такие сведения: «Там же Закария стал молиться Всевышнему: «О Всевышний, мне (тоже) дай хорошего наследника из Своего Царства. Несомненно, Ты – слышишь молитвы, - сказал он. (38-аят). Ангелы принесли ему весть, когда он совершал намаз в Махрабе: Да будет так, Аллах тебе вознесёт добрую весть Яхя, (Он) правитель, утверждающий молитвы Аллаха, отрёкся (от наслаждений), хороший пророк. (39-аят). Он сказал: «О Всевышний, я ведь стар уже, жена бесплодна, так откуда же у меня будет сын?!» (40-аят) [6, с. 55]. Известно, что в основе этих аятов лежит намек, объясняющий, что Аллах создал мир один и все потребности и желания людей исполняются по воле Аллаха с помощью его «приказа».

Значит, в наших дастанах занимают место эпические сведения, утверждающие, что дарение ребенка бездетному человеку в руках только самого Аллаха, и это говорит о результате этих влияний. Но, эти понятия в религиозных книгах, несмотря на религию, бесспорно, что это бытовые потребности, оказывающие сильное влияние на освещение в своем содержании проблем о бездетности. Вышеуказанные нами мифы Древнего Египта и мифы Древнего Востока и сведения, в священных книгах, пропагандирующие религию стали причиной распространения их на весь мир и на протяжении долгого времени оказывали свое влияние на появление различных национальных эпических произведений. Отмечаются, что они в виде традиционных источников с глубоким корнем заняли место во многих национальных народных дастанах. Например, в «Книге Коркыт Ата», являющейся письменным памятником VIII-X веков встречаются множество мотивированных сюжетов, эпизодов, свойственных нашим национальным дастанам. Он состоит всего из двенадцати дастанов и ценится в качестве произведения, содержащего богатые сведения об обычаях и традициях по повседневной жизни тюркоязычных народов Средних веков. В «Книге» имеет место сюжеты, связанные с темой бездетности, рассуждаемой нами. В одном из них, в «Дастане Бугачхан сыне Дарсахан» рассказывается: «Была одна приывчка у Байындыр хана. Раз в году созывал собрание, принимал там в гости беков огузов. Сегодня опять организовал созыв гостей … Установил в одном месте белую юрту, в другом месте - красную юрту, в третьем месте – чёрную юрту, украшал юрты и приказал своим работникам: у кого есть сын, того разместить в белую юрту, у кого дочь – в красную юрту. А у кого нет ни сына, ни дочь размещайте в чёрную юрту, постелите под ним чёрный кигиз (ковёр), ставьте перед ними голову чёрного барана. Если захотят кушать, пусть едят, а если нет, то пусть уходят. Знаете же, сам Аллах покарал бездетных и мы караем их» [3, с. 9], - эти строки выделяются особенностями, освещающими понятия, унижающих бездетных. Данный мотив имеет место и в каракалпакском народном дастане «Хурлика-Хамире», например: Царь Касым на свадьбе своего визиря от народа слушает обвинения по поводу бездетности. «По традиции того времени, если бездетный человек приходит на свадьбу, ему на пояс вешали кость, на хвост коня завязывали колючку… Как только царь сел на своего коня, один ловкий парень завязывал ему на пояс кость, а колючку – на хвост коня. Царь, увидев это, вспоминает свою бездетность, «если нет у меня ни сына, ни дочери, то зачем мне править народом?» …лежал на сырой земле и горестно страдает» [12, с. 395]. Направление мотива в обоих дастанах одно – означает результат общественного сознания, зависящих от жизненных фактов, которые доказывают, что бездетных отцов не любит народ, считался отвергнутым со стороны Аллаха и являются не достойными чести Всевышнего.

Немного другой еще один вид мотива бездетности встречается в варианте Жумабай жырау дастана «Едиге». В дастане говорится, что советника Тохтамыс хана Туман ходжу, его враги хотят свергнуть, завидуя его служение во дворце. Добиваются это доказать тем, что он бездетен.

Хан хызметиндеги ақылгөй,	Мудрец на службе у хана,
Мәхреми Туманхожа атлы бендени,	Мехрем по имени Туман ходжа,
Улсыз – қызсыз бенде еди.	Был человеком без сына и дочери.
Улы – қызы жоқ бенде,	Человек, у которого нет детей,
Ханға хызмет етпеге,	Чтобы служит хану,
Түп аржағы жоқ еди…	Не было у него потомков…
Хан хызметине алмақлық	Взять его на службу хану
Ўэжип емес деп еди… [4, с. 298-299]-	Немыслимое дело…

Подобными обвинениями выносили приговор, что бездетные отцы не имеют право править народом при царском дворе и служить при дворе, хотя и освещается понятие, что у человека, которого имеются проблемы в семье, не должны допускаться к власти, на самом деле под ними можно проследить мифологические коды, свойственные некоторым дастанам. Бесспорно, тут можно проследить, что на подобную эпическую характеристику оказало влияние наказы исламской религии.

Процессы трансформации темы бездетности в тюркоязычных народных эпосах изображаются особенностями, близкими друг к другу. Например, в эпосе казахов «Повесть богатыря Алпамыс» в варианте (Майкот Сандыбаева – Султанкула Аккожаева) в монологе Байбори:

Сол ўақытлары болғанда,	Был у него возраст тогда,
Сексенге жасы толғанда	Ровно восемьдесят лет
Жоқ еди ердиң баласы	Не было у него сына
Алланың өзи бермесе	Нет выхода, когда Аллах
Бендениң барма шарасы	Сам не дарит детей
Атадан жалғыз ер еди	Он был один в роду
Еңиреген ердиң бири еди	Был очень одинок
Жоқ екен ини ағасы…	Не было у него братьев…так изображается он
	и в своем монологе горестно рассуждает:
Сүйегим кетти жмық боп,	Кости уже одряхлели
Достым кетти қашық боп	Друзья мои отвернулись
Көретин көзим көр болды,	Глаза стали слепнуть
Бир перзентке ашық боп.	Долгим ожиданием сына
Аққан жасын тыйалмай,	Не могу остановить слёзы
Перзенттиң дағы өртеди,	Огорчает моя бездетность
Баласы жоқ адамның,	У кого не будет детей,
Әркимге ақы кетеди.	У того все напрасно уходит
Байбөри қуў бас деген сөз	Слова «Байбори бездетен»
Сүйегимнен өтеди…	Раздирает мою душу…
Бир баланың жағынан	Не дарив мне детей
Зорлық қылды маңайым.	Судьба не пожалела.
Үким қыла сөйледи,	Говорит мне с упреком
Баласы көп ағайын… [1, с. 8-9].	Многодетный мой сородич…

Как видно, внутренние переживания героя вышли за рамки мифических образов не трудно понять, что в его основе лежит те же древние понятия. Точный на это ответ находим в узбекской версии дастана «Алпамыс». Когда ходили на свадьбу Байбори и Байсары: «Не стали почитать Биев, не взяли с рук коней, не постелили им ковер; принесли плов (ош), принесли не свежий; а остатки плова. Баи, увидев это расстроились, раньше они привыкли к почету – и сказали бии: - Мы баи и шахи шестнадцати родного Кунграда, раньше, когда приезжали мы к вам, держали за узды наших коней, развлекали и почитали, подстеливали нам одеяла, на этот раз нас не уважаете и не приглашаете в дом, в чем мы провинились?» На это ответили следующее: - «Эй, Байбори и Байсары! На этой свадьбе гостевые возвращаются от сына, у кого есть сын, от дочери - у кого есть дочь, а что есть у вас?! Сам помрёшь, после твоей смерти появится много наследников на богатство твоё …» [2, с. 5-6] - подобными словами их оскорбляют на свадьбе. Они тоже испытывают сложные обстоятельства, как и Дарсахан в «Книге Коркыт Ата». Если обратить внимание на приведенные эпизоды, то наблюдается преобладание места наряду с муками и страданиями бездетных отцов, их непочитание и непризнание со стороны народа. А, в сюжетах мифического направления почти не встречаются подобные обстоятельства. Мы эти мотивы сочли

целесообразным назвать результатом влияния исламской религии по отношению к эпическим произведениям средних веков, которое придерживалось «единобожества».

В заключении, мотив бездетности в фольклоре является основной категорией, фактором формирующим и развивающим сюжет произведения. Корни мотива бездетности в каракалпакских народных дастанах были близки между собой в духовном и культурном отношении с фольклором народов Востока и Европы.

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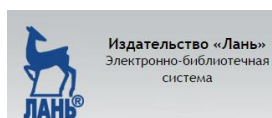
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