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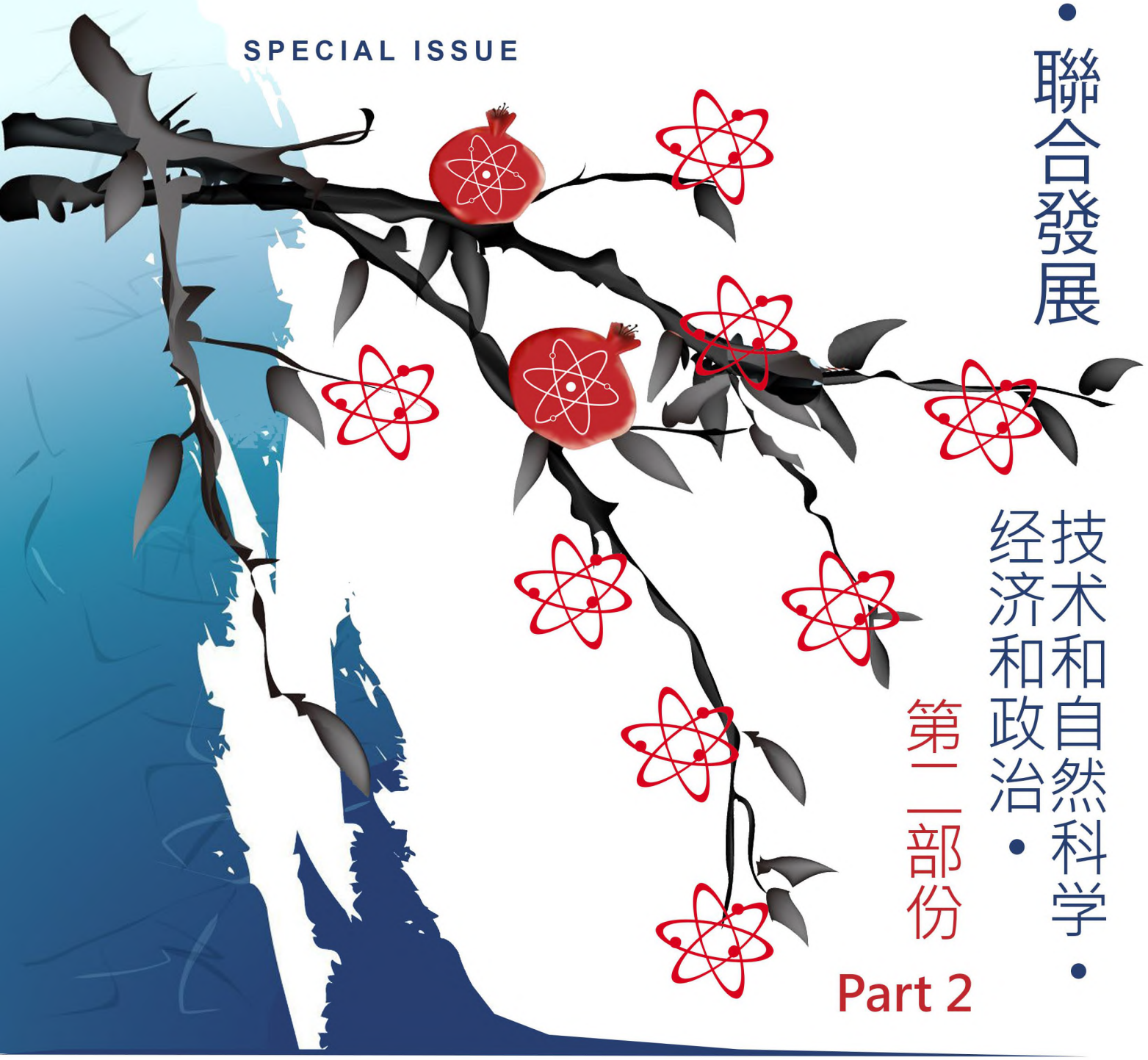

技术和自然科学 •
经济和政治 •
第二部份
Part 2

HARBIN
CHINA

MAY 30, 2024

人道主义国家研究所"国家发展"

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（大学协会常设秘书处，俄罗斯-中国）合作。

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2024年5月

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JOINT INNOVATION-JOINT DEVELOPMENT

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關於減少與氣候因素相關的農業損失

摘要：提出了氣候變遷對北高加索山麓和低地氣候區農作物生產條件影響的分析結果。為此，利用位於這些氣候帶的氣象站的數據，確定了1961年至2022年期間的熱液加濕係數值。對此係數時間序列的分析和預測結果表明，該地區氣候變遷的後果是農產品生產條件迅速惡化，即土壤含水量下降。

关键词：氣候變遷，農工綜合體，適應計畫目標，水分供給係數，乾旱。

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ON REDUCING CLIMATE-RELATED AGRICULTURAL LOSSES

Abstract: the results of analyzing the impact of climate change on crop production conditions in the foothill and plain climatic zones of the North Caucasus are presented. For this purpose, using data from meteorological stations located in these climatic zones, the values of the hydrothermal coefficient of hydration for the time period 1961-2022 were determined. The results of analysis and forecasting of time series of this coefficient showed that the consequence of climate change in the region is a rapid deterioration of agricultural production conditions, namely, a decrease in soil moisture content.

Keywords: climate change; agro-industrial complex; objectives of the adaptation plan; moisture availability coefficient, drought.

1. On changes in the conditions of agricultural production in the foothill and plain climatic zone of the North Caucasus

Let us dwell on the trends of climate change in the foothill and plain climatic zones of the North Caucasus, which belong to the most important agrarian areas of the Russian Federation [5]. Figure 1 shows the values of average air temperature and precipitation, as well as the results of forecasting their dynamics in different seasons of the year in the foothill zone of KBR (meteorological station of Nalchik). It can be seen that since the mid-70s of the last century, there is a steady increase in the average air temperature in all seasons of the year. The rate of its increase is the highest in summer seasons. As for the amount of precipitation, it remains practically unchanged. This trend is more clearly observed in winter, spring and summer seasons, when the role of precipitation in the development of agricultural crops and in the formation of yields is great.

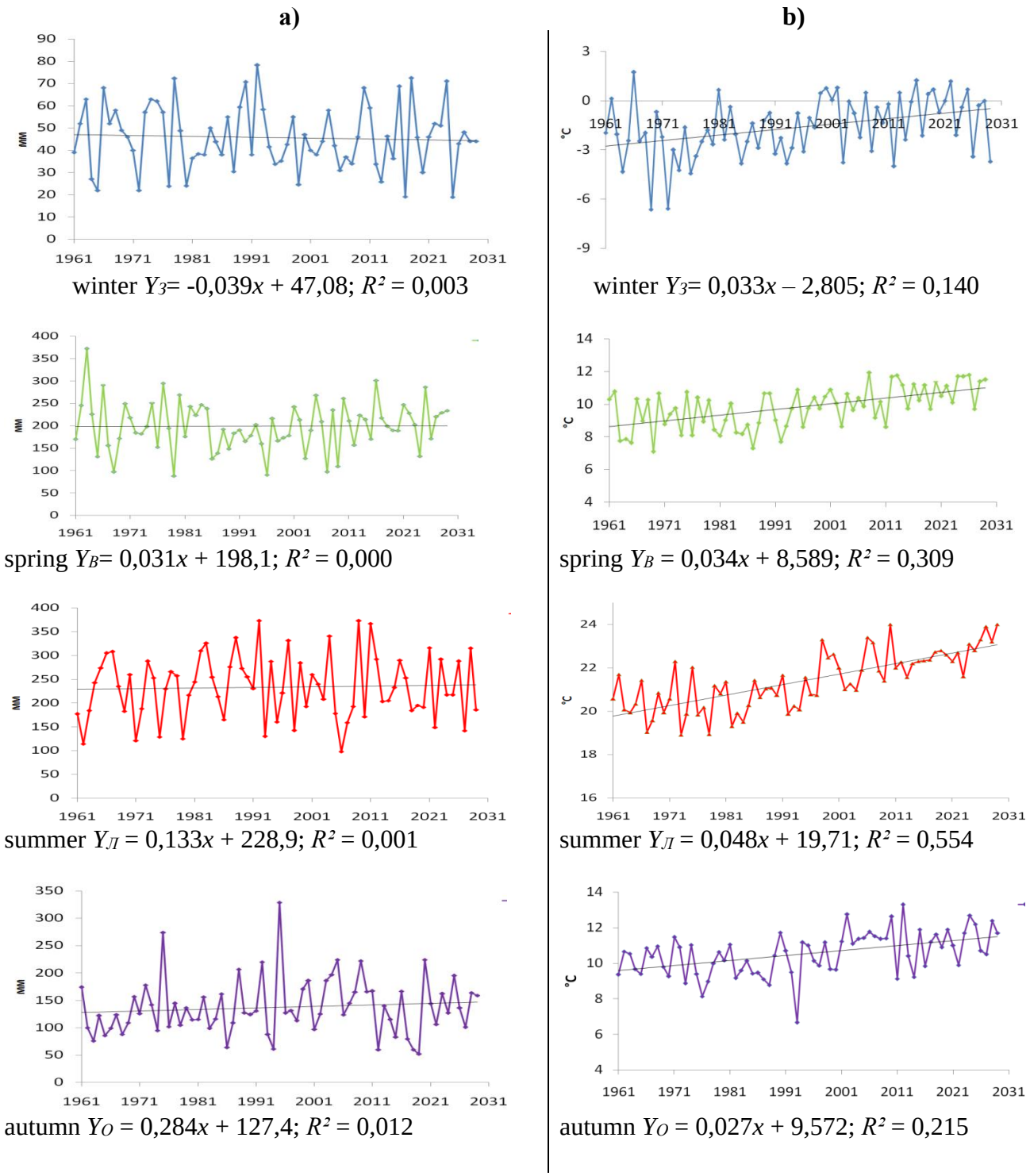

Figure 1. Actual (1961-2018) and forecast (2019-2031) values of rainfall (a) and mean air temperature (b) during winter, spring, summer and autumn seasons with linear trends.

Note also that there is an increase in absolute maximum and minimum temperatures, the number of ‘hot’ and a decrease in the number of ‘cold’ extremes for average and maximum temperatures [5]. The result of such changes in air temperature and precipitation is a deterioration of crop production conditions associated with a decrease in soil moisture content due to an increase in air temperature with virtually unchanged precipitation. The research was carried out using data from 13 meteorological stations located in the climatic zones of the North Caucasus for the period 1961-2022.

To investigate changes in crop production conditions, the values of the hydrothermal wetting coefficient in the marked climatic zones were calculated using these data [8]. The studies showed that the wetting coefficient K decreases in both climatic zones. The rate of decrease of this parameter is different in different climatic zones, it is greater in the foothill zone, in which the rate of decrease in

precipitation is greater. In about 20 years, the values of the K coefficient in a significant part of the foothill zone will be in the arid zone, i.e. less than 1. The values of this coefficient in the plain zone are already in this zone, while in the eastern part of this climatic zone they were in the zone of severe drought at the beginning of the time period under consideration.

As an example, Figure 2 shows the dynamics of K obtained from the data of meteorological stations located in the foothill zone. The figure shows that the highest moisture availability over the time period under consideration is observed at Vladikavkaz meteorological station, followed by Kislovodsk meteorological station. In 1976, they were located in the zone of excessive moisture. The lowest moisture availability in 1976 was observed at the meteorological station Stavropol, which was located in the zone of secured moisture supply. The values of this parameter for the other meteorological stations are located between them.

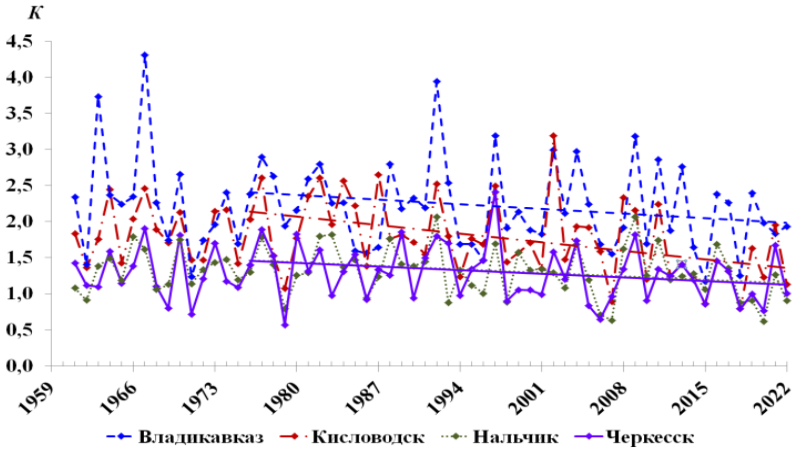

Figure 2. Moisture availability coefficients obtained from meteorological stations Vladikavkaz, Kislovodsk, Nalchik, Cherkessk

Thus, it can be said that the result of climate change (precipitation and air temperature regime) in the North Caucasus will be an increase in agricultural losses from water shortages and droughts while reducing the impact of hailstorms on the functioning of the industry. Therefore, the search for water sources in the region becomes a problem, the solution of which will determine the development of not only agriculture, but also other spheres of activity. And there are few such sources.

As one of them we can consider increasing the amount of precipitation from clouds by active impact. But there are reasons that will hinder wide use of this method for water supply of the region. One of the reasons is insufficient efficiency and reliability of technologies of active influence on precipitation processes in clouds. Other reasons limiting the possibilities of this method for water supply to the region can also be noted. These include, firstly, a decrease in the probability of formation of clouds suitable for active action to increase precipitation, and secondly, significant expenditure of resources (financial, human, etc.) to carry out active actions on clouds.

Thus, it can be said that the relevance of developing methods to reduce agricultural losses in different climatic zones of the North Caucasus related to climate change has significantly increased. At that, the mechanisms of climate change impact on the industry can be related to both ‘slow’ climate change and extreme weather events [6]. In the first case, the method of reducing the effects of climate change is the adaptation of the industry to climate change, in the second case – the use of methods to reduce the risks associated with extreme weather events. It is important to note that the practical use of methods should not be resource intensive.

The works [1-4,7,9] provide the results of research in these directions. Below we will focus on the methods of adapting agriculture to climate change and reducing losses of this industry from droughts or lack of moisture in the soil, which, in our opinion, can be effective in the current conditions of functioning of this industry.

2. Challenges of adapting the region's agriculture to climate change

Adaptation of regional agriculture to climate change is part of the problem of adapting the regional economy to climate change. Adaptation of the regional economic system requires solving a number of tasks, for the formulation of which we will introduce notations. The length of the time interval in which the adaptation of this system should be carried out is denoted by T, i.e. the solution

of the problem is considered in the time interval [0; T]. It should be borne in mind that the solution of such complex and large-scale problems as the adaptation of systems (economic, social, environmental and others) cannot be done “blindly”. It is necessary to know the target indicators of the elements of systems, as well as the trajectories along which they should be achieved, the constraints to be imposed by the elements and parameters of systems, and their changes in time, etc. It is also necessary to investigate the change in societal and human needs associated with changes in the conditions of society's functioning, etc.

In this regard, the development of a system adaptation plan should be preceded by:

- development of the system development strategy for the time interval [0; T_c] with the indication of target indicators of its elements and trajectories of their achievement.

- analyzing and forecasting the structure of human and social needs in the products of the economic system under consideration.

The length of the time segment T_c, for which the system development strategy is developed, will be determined by the possibility of solving the problems arising on the way of its development. In the time segment T, we introduce the grid $t_0=0$, t_1, t_2...t_n. Let us call the time segment $\Delta t=t_{i+1}-t_i$ the adaptation interval. The length of this time interval Δt cannot exceed the length of the time interval on which sufficiently reliable solutions to the adaptation plan problems of ‘elementary’ systems (branches of the economy) can be obtained. As an example, we note that the value of Δt for agriculture cannot exceed 5-7 years [3].

Then, the region's economic system is decomposed on the grid $t_0=0$, t_1, t_2...t_n, and the corresponding adaptation tasks are formulated for the sectors of the economy sensitive to climate change at each interval Δt (adaptation interval). As a result of solving the adaptation plan tasks for each sector, the measures required for their adaptation to climate change are determined. The indicators of the economic system at the end of the adaptation interval are also determined.

Let us focus on the problem of adaptation to climate change in regional agriculture. This sector of the economy is a rather complex system, so “adaptation of agriculture” is usually understood as the adaptation of the crop sector. In this case, due to the great diversity of crops, there is a need to identify a set of crops whose production, including adaptation to climate change, should be in the state's field of vision. This set should include crops that are necessary to ensure food security of the country, such as cereals, potatoes, sunflowers, fruits and vegetables. However, due to the great diversity of natural and climatic characteristics, crop production indicators in the regions may differ significantly. Therefore, the problem of crop sector adaptation to climate change should be considered at different levels, including the regional level. As for the crops that are not included in this group, we believe that it would be advisable if their production is carried out by farmers and other private farms.

Adaptation of an economic sector to climate change requires the formulation and solution of a wide range of tasks, which can be grouped into the following groups [2]:

- tasks of forming an industry adaptation plan;

- tasks aimed at reducing the industry's exposure and vulnerability to climate factors;

- tasks, the solution of which is aimed at reducing the industry's impact on the climate;

-tasks, the solution of which is aimed at using the favorable effects of climate change.

The works [1,2,4,5] contain some results devoted to the formulation of adaptation tasks of the agro-industrial complex, the results of analyses of the features of their information support, and possible approaches to their solution. It should be noted that at the regional level it is inappropriate to limit adaptation to the crop sector only. This problem should be considered for the system ‘crop production – processing industry’ taking into account the interrelationships of its elements. This will increase the efficiency of functioning of this system and its elements [5].

Let us dwell on the tasks of forming a plan of adaptation of the mentioned system to climate change:

1. Analysis and forecast of climate change and dynamics of climatic factors affecting crop productivity.

2. Analysis and forecast of changes in external and internal conditions (natural, economic, technological, political, social, demographic, etc.), under the influence of which this system will function.

3. Building models of agroclimatic resources, determining their dynamics on the adaptation interval.

4. Development of a model and solution of the problem of formation and coordination of target indicators of development of the system ‘crop production – processing industry’ on the considered time interval.

5. Determination of climate-saving agrotechnical measures, with the help of which it is possible to bring the yield of crops, conditioned by natural factors, to the target indicators.

6. Development of a model and study of different scenarios of crop production and processing over the adaptation interval in order to determine the most promising one.

7. Development of a method and selection of the most acceptable scenario of development of the system ‘crop production – processing industry’ on the adaptation interval.

8. Improvement of the existing and development of new methods to reduce risks in agriculture associated with extreme weather events.

9. Optimization of the structure of auxiliary services (supply of technical means and equipment, supply of fertilizers, construction of various facilities, scientific support of the industry, etc.) taking into account changes in the conditions of the industry functioning.

The above method of formulating the tasks of adaptation of this system is not the only one, these tasks can be detailed and their number can be changed.

As it was noted, the adaptive properties of systems at higher levels are formed at the level of ‘elementary’ branches of the economy. The purpose of solving problems 1-2, is to determine the conditions of functioning of the system under consideration. As for tasks 3-5, we can say that the purpose of their solution is to synthesize the system, which should be obtained at the interval of adaptation of the system “crop production-processing industry” to climate change. In this case, the solution of problem 5 allows us to take into account the dynamic properties of the system, i.e. the system parameters at each point of the adaptation interval should contribute to the achievement of the system's goals. It is as a result of solving problems 3-5 that the system under consideration acquires adaptive properties to changes in the conditions of its functioning. The goal of solving problem 8, as can be seen, is to reduce losses of the crop production industry during the adaptation interval associated with extreme weather events. And the purpose of solving problem 9 is to adapt the structure of auxiliary services to changes in the conditions of their functioning.

3. Formulation of the task of reducing agricultural losses from extreme weather events

The proposed method uses the fact that the vulnerability of different industries to these phenomena can vary significantly as a mechanism for reducing economic losses associated with extreme weather events. The peculiarities of information support make it natural to consider this task within the framework of decision-making theory [3,5,10]. In the case of agriculture, for example, the problem of reducing drought losses can be considered as a single-criteria decision-making problem, which greatly simplifies its solution.

In general, the formulation and solution of this problem for a particular extreme weather event requires:

- formation of a set of variants U_1, U_2, U_3,...,U_N of extreme weather event manifestation in the considered territory;
- formation of a set of measures A_1, A_2, A_3,...,A_M, the use of each of which leads to a certain reduction of industry losses from the considered weather event;
- selection of the most acceptable of the given set of measures on the basis of one or another criterion.

The quality of the decision will depend to a significant extent on the successful solution of these problems. But there are serious difficulties on the way of their solution [3,5]. Without dwelling on them in detail, we note that one of them is the impossibility of predicting the parameters of extreme weather events, which makes it more promising to consider the problem of reducing the losses associated with them in the framework of the theory of decision making. In [3,5], in order to solve this problem, the set U_1, U_2, U_3,...,U_N for the considered weather phenomenon using multiyear data was proposed to be represented as a discrete random variable (Table 1).

Table 1

Drought states (n) and their corresponding probabilities (p) in the area under consideration

n	U_1	U_2	U_3	.....	U_N
p	p_1	p_2	p_3	.....	p_N

The availability of such information about weather phenomenon allows us to consider the choice of the most appropriate measure as a decision-making problem under risk conditions.

As an example, we note that according to the values of the hydrothermal coefficient of moistening K, the following states of soil moistening can be distinguished [8]:

1. K > 1 – absence of drought; 2. 0.7 < K ≤ 1.0 – weak drought;
3. 0.5 < K ≤ 0.7 – medium drought; 4. K ≤ 0.5 – severe drought.

On the way of formation of the set A_1, A_2, A_3,..., A_M there are difficulties associated with the need to take into account the requirements to its elements. In the case of droughts, for example, the requirements for the volume of crop production, financial and other resources used for their production must be taken into account.

Let us focus on the method of solving the problem of reducing risks in agriculture associated with droughts. This method does not require the formation of a set of measures A_1, A_2, A_3,..., A_M. It is based on the solution of the problem of optimising the structure of sown areas, in which, for example, the maximum expected gross output, taking into account the impact of droughts, is used as the target function.

When the mathematical expectation of the gross output of a product is used as the target function, the target function can be written as:

$$maxV = p_1V_1 + p_2V_2 + p_3V_3 + p_4V_4 \quad (1)$$

where V_1, V_2, V_3,...,V_4 – gross crop yields in the absence of droughts and when droughts are observed in states 1,2,3,4.

The gross crop yield in the absence of drought V in expression (1) is calculated using the expression:

$$V_1 = \sum_{i=1}^{m} x_i Y_i Ц_i, (i = 1, 2, \ldots\ldots, m). \quad (2)$$

The values of this indicator, taking into account possible drought states, are calculated using the following expressions:

$$V_j = \sum_{i=1}^{m} (1 - k_{ij}) x_i Y_i Ц_i, (j = 2,3,4) \quad (3)$$

where x_i-area of arable land occupied by the i-th crop; Y_i and C_i – yield and selling price of the i-th crop; k_{ij}- vulnerability of the i-th crop to drought in the j-th state ($i=1,2,.....,m$; $j=1,2,.....,N$).

The system of model constraints describing the utilisation of resources of different types and requirements for output production is of the form:

-restrictions imposed on the use of land resources:

$$\sum_{i=1}^{m} x_i \le S_o, \quad (4)$$

- adherence to crop rotation:

$$x_i = \alpha_i S_o, (i = \overline{1, m}) \quad (5)$$

where α_i is the share of arable land occupied by the i-th crop.

- requirements for crop production volumes:

$$\sum_{i=1}^{m} Y_i x_i \ge W_i, (i = \overline{1, m}), \quad (6)$$

where

W_i is the minimum permissible production volume of the i-th crop.

- requirements for the use of limited financial resources:

$$\sum_{i=1}^{m} Y_i x_i s_i \le F_o, \quad (7)$$

- conditions of non-negativity of variables x_i (areas of arable land occupied by crops):

$$x_i > 0 \ (i=1, 2,\ldots, m) \quad (8)$$

A system of linear constraints is obtained, which are satisfied by the production and economic indicators of agriculture. As a result of solving the problem (1)-(8), the variables x_i, ($i=1, 2..., m$) that satisfy the constraints of the problem and maximize the target function (1) should be found. Note that, if necessary, the model can be supplemented with constraints describing the use of other resources.

To investigate the model performance, modelling calculations were carried out on the example of the steppe zone of KBR (m/station Prokhladnaya). Possible drought states are given in Table 2.

Table 2

Drought states K_j and their corresponding probabilities p_j

K	*K > 1,0*	*0,7 < K ≤ 1,0*	*0,5 < K ≤ 0,7*	*K ≤ 0,5*
p	0,47	0,33	0,16	0,04

The table shows that in the considered climatic zone of the region, the condition when agriculture is under the influence of droughts is more often observed (p=0.53), respectively, the probability that there is no drought is equal to p=0.47. It can also be observed that although the probability is low, there are severe droughts in this climatic zone (K ≤ 0.5). For carrying out the calculations, a 600ha plot was considered. The problem of finding the optimal production structure of winter wheat (1), maize (2), oats (3), potatoes (4) on this plot, which maximizes the gross output of production taking into account the influence of droughts, was considered. Table 3 shows the results of solving the problem and the values of some agricultural indicators.

Table 3

Table Excel (SOLVER) with solutions of the problem and values of some indicators

S=600 ha (P^j, j=1, 2, 3, 4 – drought conditions)			
Defined variables x_i *(i =1,2,3,4 – agricultural crops),* ha			
1. wheat	*2. maize*	3. *oats*	4. *potatoes*
x_1	x_2	x_3	x_4
100	100	60	320
Coefficients of the target function *V*			
44469	45292,5	36229,2	116775
V= max, ф. (2.16) = **48517, 9** RUB thousand.			
1. Crop area limitation coefficients, ha			
ф. (2.17а) ≤600 ha			
2. Restriction coefficients by crop area shares (α_i), ha			
α_1=0,18	α_2=0,18	α_3=0,14	α_4=0,50
ф. (2.18а) x_{ij}≤108	ф. (2.18а) x_{ij}≤108	ф. (2.18а) x_{ij}≤64	ф. (2.18а) x_{ij}≤320
3. Crop volume limitation factors W_i, c			
W_1	W_2	W_3	W_4
x_1	x_2	x_3	x_4
40	50	35	150
ф. (2.19а) ≥4000	ф. (2.19б) ≥5000	ф. (2.19в) ≥2100	ф. (2.19г) ≥75000
4. Funding constraint ratios by site F_i, RUB thousand.			
F=14 000,0 RUB thousand.			
28000	27500	14700	123000
ф. (2.20а)		*F* ≤14 000,0 тыс. руб.	
Profit		**34517, 9** RUB thousand**.**	

* cells with solutions to the problem are highlighted with grey shading

The table shows that the calculations resulted in the following structure (optimal) of crop production: x_1=100 ha, x_2=100 ha, x_3=60 ha, x_4=320 ha. The gross volume of crop production corresponding to this structure is equal to 48.52 million rubles. Taking into account the costs of their production (14.0 million rubles), the profit amounted to 34.52 million rubles.

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大气空气中乙硫醇的光度测定

摘要：研究了兩種光度法測定乙硫醇的方法。在 0.004 μg/ml 的廣泛濃度範圍內建立了光密度對乙硫醇濃度的線性校準依賴性。

关键词：硫醇、硫醇、乙硫醇、大氣、光度法。

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PHOTOMETRIC DETERMINATION OF ETHANETHIOL IN ATMOSPHERIC AIR

Abstract: Two methods for determining ethanethiol by the photometric method have been studied. Linear calibration dependences of optical density on the concentration of ethyl mercaptan were established in a wide range of concentrations from 0.004 μg/ml.

Keywords: thiols, mercaptans, ethanethiol, atmospheric air, photometric method.

One of the air pollutants in populated areas near oil, gas, pulp and paper and chemical industries are thiols (mercaptans). Sanitary and hygienic control over their content in the air is necessary due to the high toxicity of organic sulfur-containing compounds.

Extremely low values of maximum permissible concentrations (MPC), amounting to several micro- or nanograms per cubic meter, determine the requirements for high sensitivity of methods for determining thiols in a gas-air environment.

Most existing methods are based on the capture of thiols from air with absorption solutions or sorbents, which are analyzed by spectrophotometry, gas-liquid chromatography or potentiometric titration.

The least labor-intensive and more reproducible in a laboratory for monitoring atmospheric air pollution on the state observation network of Roshydromet is the spectrophotometry method.

The main disadvantages of the photometric method for determining methyl mercaptan (methanethiol), specified in clause 5.3.4., Part I [1], are low sensitivity and accuracy, non-specificity, difficulty in preparing for analysis of air samples (synthesis of components to establish calibration characteristics), strict requirements when working with potent and toxic substances that are used during sample preparation. The nonspecificity is due to the fact that in this method, ethanethiol and other thiols react similarly to methanethiol. In connection with the above, as well

as due to the need to refine the mentioned methodology and expand the measurement range, the task was set to develop a highly sensitive and selective photometric method for the determination of thiols in atmospheric air.

Solutions of mercury, cadmium, and zinc acetates, as well as a solution of sodium hydroxide and a solution of acetic acid were analyzed as absorbers. Based on the results of the experiments, it was found that:

- a solution of mercury acetate is unstable even with acidification with acetic acid and hydrolyzes to form insoluble mercury (II) hydroxide within a week;
- solutions of zinc acetate and sodium hydroxide have insufficient absorption properties.

The use of solutions of cadmium acetate and acetic acid as thiol absorbers provides the required degree of absorption; These solutions are stable during long-term storage and are less toxic compared to mercuric acetate solution.

We used N,N-dimethyl-p-phenylenediamine dihydrochloride (DM-p-PDA) as an indicator for the colorimetric reaction when determining thiols; to establish the calibration characteristics, we used a standard sample of the composition of a solution of ethyl mercaptan in ethanol (GSO 9430-2009). For photometry, two methods were used for determining organic sulfur-containing compounds: the first (method 1) in the presence of potassium iron sulfide with ferric chloride in an acetic acid medium at a wavelength of 600 nm and the second (method 2) with the formation of non-volatile ethanethiol compounds with cadmium ions, which in the presence of ferric chloride form red-colored compounds with two light absorption maxima with DM-p-PDA - at 496 and 515 nm.

The linearity of the calibration characteristics was studied in the range of ethanethiol concentrations from 0.032 to 56 μg in an 8 cm³ solution. We used cuvettes with a light-absorbing layer thickness of 20, 10, 5 mm, which made it possible to determine the subranges of the calibration dependencies in which the optical density increases linearly with increasing concentration of ethanethiol in the solution. The data obtained from the determination of ethanethiol in the presence of potassium iron sulfide correlate with an experiment in which cadmium mercaptides act as a light-absorbing agent.

Based on the results of the studies, it was possible to determine linear calibration dependences of optical density on the concentration of ethanethiol in the concentration range from 0.032 to 56.0 μg in 8 cm³ solution for method 1 and from 0.32 to 16.0 μg in 8 cm³ solution for method 2. B In order to develop a measurement technique, it is necessary to conduct a series of experiments to clarify the conditions for carrying out the analysis and to minimize the influence of the presence of other sulfur-containing compounds in the atmospheric air.

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用于创建触觉地图和计划的添加剂技术

摘要：創造無障礙環境是白俄羅斯共和國國家政策的重要方向。對於盲人和視障人士來說，最重要的輔助工具之一是觸覺和印刷地圖和計劃，用於這些人群的社會適應。本文討論使用積層技術製造觸覺地圖和平面圖的技術。描述了這些技術的優點和缺點。

关键词：增材技術，觸覺地圖學；點字；浮雕圖像；觸覺地圖和計劃。

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ADDITIVE TECHNOLOGIES FOR CREATING TACTILE MAPS AND PLANS

Abstract: Creating an accessible environment is an important direction of the state policy of the Republic of Belarus. One of the most important assistive tools for the blind and visually impaired people are tactile and topographic maps and plans that are used in the social adaptation of these population groups. In this article, the technologies of manufacturing tactile maps and plans using additive technologies are considered. The advantages and disadvantages of these technologies are described.

Keywords: additive technologies, tactile cartography; Braille; relief image; tactile maps and plans.

人在一生的過程中，每天都要與外界接觸。然而，並非所有人（由於身體限制）都能正確感知周圍世界的訊息。作為落實無障礙環境概念的一部分，最重要的領域之一是改進輔助器具的製造流程。在輔助工具中，可以區分出製圖作品（觸覺地圖和平面圖）。

如今，有多種技術可用於創建觸覺地圖和平面圖。創建這些地圖作品最活躍的發展領域之一是使用積層技術進行製作。

積層製造技術使得基於電腦記憶體中儲存的數位 3D 模型逐層生產各種產品成為可能。傳統生產技術是透過切除工件或變形來製造產品，而積層技術則不同，新產品是由非晶態消耗材料製成的。通常使用聚合物作為起始材料。值得注意的是，3D列印機最近開始越來越多地開始應用於人類生活的各個領域：軍事和民用（建築、製造、醫學等）領域[4]。

增材技術的主要優點是：

- 改善成品的性能。因此，由於採用逐層結構，產品具有一系列獨特的性能；
- 節省原料。與傳統技術相比，積層技術可將原料成本降低高達 80-85%；

• 生產不同複雜程度的產品的能力。積層製造設備使得生產其他方式無法生產的物品成為可能；

• 生產的移動性和資料交換的加速。產品設計和施工流程的自動化和最佳化。

一般來說，積層製造流程包括以下主要步驟：

• 使用CAD 軟體、3D 掃描器或攝影測量程式（用於創建製圖作品的地理資訊系統）進行3D 建模；

• 透過將三維模型轉換為STL 檔案進行數位化；

• 將STL 文件資料轉換為G 程式碼文件，其中包含3D 模型中每個切片2D 層的幾何資訊；

• 逐層列印材料。

如今，印刷方法有很多種。然而，要創建製圖作品，可以區分以下增材製造技術：

• FDM（熔融沈積成型）- 此方法基於用熔融塑膠線逐層建構產品。這是世界上最常見的3D列印方法。全球有數百萬台 3D 列印機使用該技術。 FDM 印表機適用於各種類型的塑料，其中最受歡迎且價格實惠的是 ABS 塑料和 PLA（聚丙交酯）。使用此技術創建的產品，特別是製圖作品，非常耐用、靈活，非常適合原型製作；

• SLA（立體光刻技術的縮寫）－雷射立體光刻技術。立體光刻印表機是僅次於 FDM 印表機的第二大流行和廣泛使用的印表機。此方法是基於液態光聚合物材料在雷射輻射（紫外線輻射）作用下的固化（光聚合）。該技術可以讓您創作出高品質的地圖作品；

• LOM（層壓物製造）－使用層壓法生產物體。此方法包括順序黏合片材（紙張、塑膠、金屬箔），並使用雷射或機械切割形成每層的輪廓。透過這種方法生產的物體通常在列印後經過額外的機械加工。施加層的厚度直接取決於所使用的片材的厚度。

這些方法中的每一種都有其自身的優點和缺點。所以FDM技術的優點是：

• 可用性。 FDM 技術可讓您以最低的成本建立物件。 FDM 列印設備成本低於其他類型的 3D 列印。耗材成本也較低。

• 材料選擇廣泛。各種類型的塑膠都適合 FDM 列印：ABS、PLA、HIPS、PETG、TPU、木材等。這使您可以選擇最適合特定任務的材料。

• 高列印速度。 FDM 印表機的列印速度高達每秒幾公分。這比大多數其他 3D 列印技術要快得多。

• 能夠列印大型物件。透過使用大量材料和高列印速度，FDM 印表機可以列印尺寸達數公尺的物件。

• 靈活性。 FDM 列印可讓您創建任何形狀和尺寸的物體，包括複雜的幾何形狀和詳細的紋理。

• 強度和耐用性。使用 FDM 列印創建的物件非常耐用且耐用。它們能夠抵抗機械應力和溫度波動。

FDM 技術的缺點：

• 垂直和水平解析度較小會導致未來產品的分層；

• 將模型固定在工作空間上的問題（未來模型的第一個創建層必須黏在平台表面，以便可以輕鬆移除完成的模型）；

• 懸垂元件需要創建支撐結構，隨後必須將其拆除。

• 在創建複雜產品時，模型必須分為單獨的組件，然後透過黏合或其他方式連接。

SLA 技術的優點：

• 生產任何複雜程度的模型（薄壁零件、小零件）；

• 製造的產品易於加工；

• 施工精度高、表面品質高；

• 與 3D 列印機相比，工作室的傳統尺寸較大；

• 用於支撐的消耗品比例較低；

• 立體光刻機噪音水平低。

SLA 技術的缺點：

• 需要以機械方式將桿狀支撐件與創建的原型分開；

• 最終紫外線照明的需要。生長的部分必須經過清洗，然後放入紫外線室進行最終固化。

LOM技術的優點：

• 生產成本低；

• 使用廣泛使用的材料；

• 製造物體的精確度相對較高，可達 0.3 毫米；

• 某些LOM 印表機具有用於建立色彩模型的內建功能。

LOM技術的缺點：

• 產品沿層方向強度不夠高，有層層分層的可能性；

• 3D 列印機普及率低、品種少；

• 增加表面粗糙度。

因此，我們可以得出結論，積層製造技術可用於創建地圖作品。然而，值得注意的是，在觸覺測繪中使用該技術的主要限制因素是組織將地理資訊系統環境中的數位模型導出和導入到電腦輔助設計系統中的過程的問題，該系統用於在3D 列印機上列印產品。目前，有大量的數位模型庫，但沒有一個包含針對盲人和視障人士的適應模型。在大多數情況下，所有模型都有大量元素對於此類公民來說是多餘的。另一種方法是創建您自己的模型，該模型可以輕鬆用於創建觸覺地圖和計劃，並供盲人和視障人士使用。

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中国学者视角下的俄罗斯政党及其对华外交关系研究

摘要：本文重点分析了中国学者对俄罗斯议会政党以及这些政党与中国共产党互动关系的研究，旨在总结这一研究领域的特点和不足。

关键词：政党、国际关系、中国、中国学者、俄罗斯。

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A STUDY OF RUSSIAN POLITICAL PARTIES AND THEIR DIPLOMATIC RELATIONS WITH CHINA FROM THE PERSPECTIVE OF CHINESE SCHOLARS

Abstract: This article focuses on the analysis of Chinese scholars' research on Russian parliamentary parties and their interactions with the Communist Party of China, aiming to summarize the characteristics and shortcomings of this research field.

Keywords: political parties, international relations, China, Chinese scholars, Russia.

苏联解体至 21 世纪初，俄罗斯社会经历了各个层面的变迁，与之相对应的是俄罗斯的政党制度也随之发生变化。这些变化不仅引起了俄罗斯学者的密切关注，同时也吸引了中国学者的注意。俄罗斯政党的发展历史、现状以及与中国的关系成为中国学者研究的重要课题。在叶利钦执政时期（1991-2000 年），俄罗斯的多党制并不稳定。直到 2011 年，多党制才逐渐趋于稳定：统一俄罗斯党、俄罗斯共产党、公正俄罗斯党和自由民主党进入国家杜马，成为第六届议会的主要政党，进而形成了俄罗斯近代左、中、右三派稳定的多党制度。[1]。

1.统一俄罗斯党

统一俄罗斯党是目前俄罗斯最大的政党，成立于 2001 年 12 月 1 日，由“统一”党、“祖国”运动和“全俄罗斯”运动合并而成。该党自成立初期就自诩为一个中派主义政党。在 2003 年的选举中，该党在国家杜马中取代俄共的位置成为第一大党。随后，俄罗斯议会开始出现“权力党”为主导的力量，进而形成了一党独大、多党并存的政党格局。该党强调俄罗斯的文化和价值观，以爱国主义为基础，致力于促进经济发展和政治改革以确保国家稳定，并努力使俄罗斯成为世界大国。中国学者李兴耕对 2000 年至 2010 年间统一俄罗斯党的意识形态进行分析，得出其意识形态趋于“俄罗斯保守主义”的结论[2]。与其他国家的学者相比，中国学者更加注重对政党意识形态的关注和分析。

中国学者庞大鹏对“统一党与中国共产党”两党的党际交往进行了深入研究，指出中俄两党合作具有多层次、宽领域、全方位的特点[3]。自2009年中俄执政党对话机制启动以来，治党治国经验成为双方相互交流和了解的重要话题。因此，2018年5月26日，以"凝聚政党智慧，弘扬上海精神，推动构建人类命运共同体"为主题的首届上海合作组织政党论坛召开。2020年10月22日，中共积极参与由统一俄罗斯党组织的"上合组织+"国际政治论坛举行。中俄两党还在 "金砖国家政党、智库和民间社会组织论坛 "框架内积极开展合作。

2．俄罗斯联邦共产党

俄罗斯联邦共产党目前是俄罗斯议会中的第二大政党。其前身是苏联解体前成立的苏维埃联邦社会主义共和国共产党。作为当局政府最大的反对党，俄共经历了从重建、崛起、政治影响力下降到后来重新崛起的艰难发展历程。

中国学者李亚洲指出俄罗斯共产党目前面临着一系列的严峻挑战。其中包括：党员人数减少、党员结构老龄化、活动经费短缺不足、内部矛盾以及来自政府当局的持续压力。面对日益严重的危机，俄共也开始通过不断调整政策纲领，寻找适合现代化发展的道路进而实现改革。与之相应的是该党的意识形态也发生了重大变化。2008年党章规定，党的战略目标是在俄罗斯建立 "新社会主义--21 世纪的社会主义"。2013年的俄共第十五次代表大会的主要关注点则是是加强国家安全，对资本主义国家持谨慎态度。[4]。通过分析中国学者的研究，我们可以发现，俄罗斯共产党和中国共产党的合作基础是承认马克思主义是其政治活动的主要思想为基础的。正是因为相似的意识形态和特定时期的紧密联系使得中国学者对俄共的研究展现出了独特的中国关怀－学者们对俄共的研究兴趣明显高于其他政党。

2016年俄共领导人久加诺夫提出了题名为“走向幸福生活的十大步骤”的竞选纲领。李亚洲在文章中写道，在外交政策上，俄共呼吁俄罗斯坚持独立自主的外交政策，在自愿的基础上恢复与前苏联国家的联盟[5]。

久加诺夫认为有必要加强与中国、印度、越南和古巴的关系，在互利的基础上发展与美国和西欧国家的关系，在不损害俄罗斯国家利益的前提下，奉行多方位外交政策，并将独联体作为战略重点。俄共认为俄罗斯外交政策的目标是积极推动多极化进程，恢复俄罗斯的大国地位，保护国家利益，为俄罗斯的经济复兴创造有利的外部条件。[6]

俄共中央会议主席曾多次访问中国，对中国所进行的社会主义的道路表示赞赏。俄共第十五次代表大会通过的章程修正案在很大程度上受到了中国共产党第十八次代表大会成果的影响。同时俄共的其他领导人也对此表示积极评价。在俄共青年干部考察团与中共中央政法委副书记王乐泉会谈时，俄共中央书记诺维科夫表示 "愿学习借鉴中共在党的建设和领导国家建设方面取得的宝贵经验，通过密切两党合作推动国家关系发展"[7]。

3. 公正俄罗斯党

成立于2006年10月28日的中左翼政党"公正俄罗斯"在政治舞台上推动了政党结构的分化。在中国学者冯颜利看来，"公正俄罗斯 "党是一个代表中下层民众利益的左翼政党，其价值核心是公正、自由和团结，其长远愿景是 "新社会主义"。公正俄罗斯党选择保存苏联遗产中优秀的社会成果，同时支持与欧洲实现一体化的道路。[8]。

近年来，该党与中国建立了日益密切的关系。在"公正俄罗斯"的官方网站上，可以看到一个单独的栏目用于介绍与中国各种外交活动。虽然该党与中国一直在保持着积极的外交关系，其价值观上也与中国共产党十分接近，但其在国家杜马中的影响力比较有限，因此相较于前两个政党，中国学者对该政党的研究相对没有那么丰富。由此可见政党的影响力也是影响中国学者研究兴趣的一个因素。

4．俄罗斯自由民主党

俄罗斯自由民主党（简称自民党）于1992年由苏联自由民主党改组而成。虽然该党声称国家应该自由、民主，应当将资本主义和社会主义的优势结合起来。但李兴庚总结说，自由民主党属于极端民族主义政党，具有典型的俄罗斯民族主义倾向的政党。该党支持所有权多元化、个人自由、市场自由、反对独裁和一党垄断权力等西方价值观。然而，自民党是反对西方的主要政党[9]。

与其他政党相比，俄罗斯自由民主党在对华接触方面最不积极，这一点在其官方网站上有所体现。中国学者指出，该党对华态度可能更加谨慎和保守，倾向于采取相对独立和果断的立场。因其意识形态和政治影响力，中国学者对该党的研究也相对较少。

5.研究难点

经过三十多年的不断探索和调整，俄罗斯的政党制度从混乱走向稳定，从无序走向有序，从一党制走向多党制。这一过程引起了中国政治学者的浓厚兴趣。然而，中国学者对于俄罗斯政党的研究主要集中在议会政党上，尤其是统一俄罗斯党和俄罗斯联邦共产党这两大政党上。而对非议会政党以外的政党研究较少，之所以出现以上情况主要基于两点考虑。首先是与中国学者所采用的方法论有着相关性。与俄罗斯和西方学者相比，中国学者在研究过程中倾向于采用马克思主义方法论进行政治分析，因此意识形态相近的政党天然能引起中国学者的“共情”。其次，政党的政治影响力也是影响中国学者研究兴趣的重要因素。

尽管在研究俄罗斯政党与中共的外交方面取得了一些成果，但仍有许多问题尚未研究。缺少丰富的研究资料是阻碍研究进一步发展的一大难题。学者们大多局限于分析官方文件，而对有关政党内部活动的资料则无从获取。此外，研究方法缺乏跨学科性，无法充分利用最新的研究方法进行分析。最后，中国学者的注意力仍集中在老牌议会政党上，对于新兴政党和非议会政党尚未表现出充分的兴趣。

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中俄都是世界和平的維護者。
透過創新的球形人工智慧促進經濟、投資和商業加速成長的球形邏輯

摘要：文章結合中俄領導人五月份的談判，概述了作者和他的同事們歷時約 50 年發展起來的一門新的宏觀社會學「和平科學」的基礎，它揭示了締造和平的社會人類基因組及其可持續發展的球形邏輯。它確保創建一個新的球形人工智慧，作為加速經濟成長和確保「世界和平」的工具。

关键词：世界科學，球體，球體發展邏輯，加速成長，社會基因組，球體人工智慧。

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CHINA AND RUSSIA FOR WORLD PEACE. SPHERAL LOGIC OF ITS PROMOTION THROUGH INNOVATIVE SPHERAL AI AND ACCELERATED GROWTH OF THE ECONOMY, INVESTMENT AND BUSINESS

Abstract: In connection with the China and Russia leaders negotiations in May, the article sets out the foundations of the new macrosociological “Peace Science”, developed by the author with colleagues of about 50 years, which reveals the peacemaking societal genome of humanity and the spheral logic of its sustainable development. It provides the creation of a new, spheral class of planetary AI as an instrument of accelerated growth of economy and providing “peace around the world”.

Keywords: peace science, spherons, spheral logic of development, accelerated growth, societal genome, spheral artificial intelligence.

今年5月16日，中國國家主席習近平在一次非正式會議上。與俄羅斯總統普丁的會面，宣布了中國打算「與俄羅斯和其他國家合作…促進世界和平與整體發展」[1]。問題。

中俄領導人這一意圖的深層含義在於，「世界和平」或全球和平與經濟發展是辯證聯繫的，既是經濟加速增長的最佳前提，也是其自然結果。但這種深層連結並不體現在傳統的、碎片化的產業邏輯或社會發展與思維的部門邏輯中，而只體現在其創新的、整體性的領域邏輯或球形邏輯中。

可以肯定地說，中俄兩國領導人在今年5月16日的北京談判中奠定了對社會發展和思維球形邏輯的政治認知的開端。這體現在雙方對「中俄關係永續發展不僅造福兩國，也造福兩國」的「新途徑、新時期、新模式、新架構」的共同認識。 [4:5； 6]

球形逻辑为球形行星和安全AI

今天，越来越明显的是，如果没有人工智能（AI）的创新优先发展，社会发展和思维的进一步进步是不可能的[7]。 然而，人工智能的发展反过来又产生了与其安全性，行星缩放，社会知识系统映射，人类和机器信息"对齐"等相关的基本认知问题。 认识到AI关键问题的解决方案是"弱到强泛化"，即 基于部分，特定行业或弱模型构建整体，强大的模型几乎是不可能的，并且为了这些目的而诋毁了整个AI语言模型。 [8; 9; 10]

在1976年以来开发的宏观社会学"世界科学"（NM）框架内，建立一个强大的行星AI是可能的，该框架基于其"必要和足够领域的社会，整体逻辑"或社会发展和思维的"领域逻辑"，在我们与同事合作的许多作品中提出[11;12;13]。 其中，最有成效和最有效的是自2005年以来，来自50多个国家的700多名NM共同作者的GGHA近20年的工作。 省略所有进化阶段及其版本，行星人类在其社会领域常数中的基本和经过验证的宏观社会结构目前以NM表示，其尺寸为4X4球体的理论视觉模型如下，图。1:

世界的科学。 行星人类整体逻辑中的结构分形模型

圖 1. 4x4 社會領域的常數

结构模型表达了世界科学的本质-人类永恒的社会基因组（SOCIONOM）和社会各个层面的永恒细胞，从个人和家庭开始，直至其行星完整性。

同時，這個模型是關於全球社會的球體/社會常數的科學社會知識整體圖的語義核心，在所有文明的所有歷史變化中都是一致的，以實現安全的行星人工智慧，這被正確地稱為「球體」 」。

這種結構中的「社會、必要和充分領域的邏輯」是什麼，在NM的各個層面上「對所有文明都相同」？

它首先理解並證明社會各個層面生產的四個恆定社會領域的資源/產品的必要性和充分性，從個人和家庭開始。這些資源/產品的領域是：人、資訊、組織、事物。縮寫：LIOV。

為什麼它們是“資源/產品”？因為它們首先被當作產品生產出來，作為後續生產新產品的資源，如此不斷地進行。在它們作為「產品/資源/產品」/資源的無盡鏈條中的功能角色的這種連續的辯證關係中，存在著它們無盡的歷史變化動力的源泉。

為什麼需要 LIOV 球體？因為 LIOV 的每個領域對於社會各層面的生活都同等必要，從個人和家庭開始。因為任何 LIOV 資源的缺失、零都是相同的，同樣排除了它們的生命。這是透過思想實驗證明的，從個人開始，如果在他的生活條件下每個 LIOV 依次重置為零。任何有思想的人都能夠在這種存在邏輯中進行類似的思想實驗，並不僅對他個人，而且對從家庭到國家和人類的任何其他社會對象，都確信其真理。

為什麼 LIOV 球體就夠了？因為沒有其他社會領域的各級社會生活所必需的人造產品/資源。然而，NM 與 LIOV 一起認識到自然資源作為其基礎和來源的絕對必要性，沒有自然資源，生物圈（包括人類圈）的生命就不可能存在。畢達哥拉斯在大約三千年前就確定了生物生命的必要和充足的自然資源範圍。 他和他的追隨者教導說，“取之不盡的生命源泉的四元數”和“永恆宇宙秩序的存放處”，指的是四個行星圈：地球（岩石圈）、水（水圈）、空氣（大氣層）、太陽（日光層）。 其中任何一個的缺失（為零）都排除了生物生命的可能性，因此也排除了社會生命作為其一部分的可能性。人類和社會沒有能力生產自然資源領域，但透過從中生產人造社會資源，他們能夠用與工業文明和核文明中的生物圈和社會生活不相容的污染來破壞它們。這表明需要用一種新的和諧且環境友好的文明的適當的球形邏輯來取代它們，這種文明是在 NM 中，在球形學中定義的。

為什麼社會的其他 12 個社會領域是必要且充分的？因為它們的同等必要性和聯合充分性 (RNSD) 是由 RNSD LIOV 規定的。

每個 LIOV 資源只有透過其生產、分配、交換和消費 (PROP) 四個 RNSD 流程領域才能成為產品，這不僅對於事物而言是公理化的，對於其他 LIOV 領域也是如此。

每個 LIOV 的性質都由獨特的法則和屬性決定，彼此之間的差異不可減少。因此，它們的創造根據其內在規律產生了四個不同的 RNSD 生產領域：人的生產的社會圈、資訊的生產的資訊圈、組織的生產的組織圈、生產的技術圈事物，所有物質商品和服務（經濟）。縮寫為 SIOT 球體。 SIOT 領域也是永恆不變的，就像其資源/產品的 PIOT 領域一樣。

由於所有 PIOV 產品的唯一參與者、活的生產資源是人，因此在 SIOT 領域僱用相應 LIOV 產品的人是不同的，並且根據這一關鍵的僱用標準分為四個 RNSD SPHERON。球體的結構是恆定的，但社會歷史內容是可變的。他們的名字足以適應他們作為活生生的演員所從事的生產領域：社會領域中的 SOCIOSPHERON、資訊領域中的 INFOSPHERON、組織領域中的 ORGSPHERON、技術領域中的 TECHNOSPHERON。縮寫：SIOT 球體。正如您所看到的，RNSD LIOV 的邏輯決定了 RNSD 12 個其他社會領域的邏輯。

因此，總而言之，所有列出的 16 個 RNSD 社會領域在其一般 4x4 四邊形結構中的各個層面都構成了人類的常數，其中任何層面上至少有一個的缺席使其生命不可能，滲透到其整個歷史，只有在其球形邏輯的基礎上才能被科學地理解。

如果在 16 個 RNSD 社會領域的邏輯中，活著的參與者的關鍵角色是由人/人口的範圍發揮的，那麼如何以更詳細和更證據的方式呈現它們，而不僅僅是術語？

Spherons 是一種恆定的社會結構，在每個國家和人類各個層面的就業人口統計中，其在以下模型中呈現，圖 2：

СФЕРОНЫ. Социальная структура людей: населения, общества, народа, человечества				
Люди (Л), **занятые** в 4-х сферах. **Л = 100%. Л = Лн + Лр**				
Неработающие **люди**, занятые аутопоэзисом. Дети, нетрудоспособные, Пенсионеры: **Лн** = ~50%.	**Работающие люди** в 4-х сферах. Лр = ~50%			
	Работающие в Социосфере Л1р	**Работающие в Инфосфере** Л2	**Работающие в Оргсфере** Л3	**Работающие в Техносфере** Л4
СОЦИОСФЕРОН: Л1 **Л1 = Лн+Л1р**		**ИНФОСФЕРОН** **Л2**	**ОРГСФЕРОН** **Л3**	**ТЕХНОСФЕРОН** **Л4**
Л = 100% = Л1 + Л2 + Л3 + Л4				

圖2. 就業人口的社會結構

恆定社會結構的部門內容如圖3所示。

圖 3. 按部門就業劃分的 spherons 社會結構

該模型透過按領域（部門員工的總和）對社會生產部門進行分類來詳細說明，其中年度統計數據證明了任何社會物件上球體的客觀現實。不同等級的球體：學校、大學、企業、城市、地區、區、國家等。 GGHA 集體著作《Gandhica》，2019 年，以四種語言呈現[14]。

每個有文化的人，從掌握算術的小學生開始，都能夠使用我們的簡化方法在 2 小時內驗證任何社會物體的球體，並確信它們的客觀真理和普遍現實 [15]。球體的驗證在其 RNSD 邏輯中提供了對社會所有其他領域的真相的驗證，但其「大數據」需要足夠的球體人工智慧以及其中創建的其他 NM 工具。這裡定義了六類球形邏輯 NM 的創新通用工具[12]。

因此，球形邏輯是恆定的、社會的、非暴力的、和諧的、整體的社會球體的RNSD邏輯，確保其作為一個整體的生命。其中不存在初級與次級、高級與低級、選擇與註定、支配與邊緣等之分。球體球形邏輯是非歷史的、不變的，它的規律決定了社會本質，社會本質是永恆不變的，就像自然法則是永恆不變的一樣。但球形邏輯被實現並充滿了不斷變化和瞬態產業的邏輯，被剝奪了RNSD屬性。產業的邏輯是產業部分在每個領域內的無限極小極大或鏡像極大極小[16]範圍內連續波動的邏輯。

球形邏輯組織並簡化了部門邏輯，如果沒有第一個邏輯，部門邏輯仍然是自發性的，充滿混亂、不穩定、不平等、不公正、不和諧、部分對整體的統治、暴力、戰爭等。 A. Einstein 研究了接近球面邏輯的哲學先決條件，並由德國哲學家 P. Sloterdijk 在「球面學」中得到了最充分的發展[17； 18]。球形邏輯是多元的，而不是一元的，因此它建立在球體的和諧和非暴力之上，為它們提供更好、自然的優化和效率。 相反，部門邏輯導致一元論，即歷史上最強大但短暫的部分的主導地位，只有這樣才能通過壓制/壓迫其他部分來確保組織其內部混亂“所有人與所有人的鬥爭”，最大限度地減少社會生產的效率及其成長。如果球体的逻辑符合整个社会的利益及其所有部分的和谐，那么工业的逻辑就符合最强大的部分，即寻求支配它的整体公司的利益，这对整体及其部分都是破坏性的。

世界先驱科学（NM）提供了一个系统的、科学的和经过验证的球形逻辑视野，以圣雄甘地的名字被称为"甘地球形学"。甘地首先发现球形学是一种物质，也是社会和平方式的唯一参与者。

接下來，我們將簡要介紹中俄社會發展與思維「球形」邏輯實踐的第一階段。

2．邓小平及其社会发展与思考的"球形"逻辑

从1980年到2010年，邓小平确保了有效的现代化和"中国的经济奇迹"，平均每年以超过15%的前所未有的速度增长[19;20]。 他的"改革开放政策"是中国发展的领域逻辑的直观体现，为他提供了从落后的农业和贫困国家到经济和社会发展的领导者的飞跃。 他遵循中国古代"以事实求真"的命令，这一命令确认了寻找最有效的真正解决方案的实用方法，而不是意识形态的优先地位。 因此，他在球体逻辑上的方法和运动巧妙地直观，不受意识形态教条的约束。

他开始改革的时候不是经济学，而是在1978年成立了一个独立的"中国社会科学院"（KASN），为中国的经济现代化提供了创新的技术优先事项，而俄罗斯迄今为止 社会科学已经成为该国所有领域现代化的引擎，其中的领域创新，NM现在已经准备了相应的KASN现代化。 邓小平为经济的快速增长提供了优先投资，而不是在经济领域，而是在其他非经济领域，这些领域以创新科技（infosphere），先进管理经验（orgsphere）和受过高等教育的劳动力（sociosphere）

从传统的、部门性的思维逻辑来看，"中国经济奇迹"的本质是无法解释的。 它以创新的、全面的方法,在其文明领域的必要和充分的社会生产、投资和商业领域的逻辑中找到解释,消除了工业逻辑的限制和障碍。 邓小平的球形逻辑及其儒家和谐的精神基础，为中国提供了世界领先的地位，从一开始就被NM整合在一起，GGHA作为其支柱之一，伴随着毕达哥拉斯球体的数字和谐，与康德永恒世界的和谐，以及甘地球体和许多其他天才的和谐。 这是NM的综合性、整体性及其球体的逻辑，它就像一群蜜蜂从人类认知的历史领域收集真理的花蜜。 儒家和谐的中国花蜜在NM的优点在很大程度上属于世界着名的意大利记者和GGHA的联合创始人自2004以来，Rosa Dalmigli，他一直在中国和平基金会工作超过20年。 她的贡献反映在她的个人页面上[21]。

3．习近平和普京。 全球责任的球形逻辑

5月16日首脑会谈时简要概述的中俄合作的"新模式和新架构"，只能充分理解为邓小平发展逻辑和思维逻辑的自觉延续和深化。它现在正在扩展到俄罗斯，要求从中获得足够的务实变革和解决方案，以及金砖国家，为他们提供加速全球南方所有国家经济增长，投资和商业的逻辑[2]。 現在，重要的是要把對鄧小平球形邏輯的認識從一般政治宣言的層面提高到基本的科學層面。 去年年底，我和我的同事在金砖国家今年的峰会上提出了相关项目，并提出了类似邓小平在俄罗斯、南非、巴西、印度、非统组织等国的"和平与加速增长学院"组织的具体建议。

NM的球形邏輯對於他們希望確保最初的優先目標：「加強國際和平與安全」發揮著特別重要和關鍵的作用[24]。因此，在北京峰會上，中俄兩國領導人多次強調，不僅有責任確保國家利益，也有責任維護國際和平。中國國家主席特別強調了中國「與俄羅斯和其他國家

合作…促進世界和平與整體發展」的願望[1]。 球形邏輯NM的獨特優勢體現在，它的社會領域框架在認知史上首次決定了康德和許多思想家的人類社會性「永恆世界」的意義和內容。NM因此被稱為“和平的科學”，因為只有它證明了和平是人類社會本質的唯一存在方式，由甘地式球體決定，其邏輯排除了戰爭和暴力，構成了和諧與非暴力。戰爭只有在其本地和短暫主體之間的工業邏輯中才可能發生，作為其歷史遺傳病理學，僅此而已。 人類的社會基因組（圖1）及其恆定的社會結構（圖2）本質上沒有為戰爭留下任何空間，戰爭是未發展的智人的一種外來且危險的病理學，他們尚未成熟地理解NM 並實現他們唯一可能的和平存在。社會的和平存在只與球體相同。它的科學理解為球子學提供了關於球子及其球體類別的“全新的思維方式”，確保了“人類的生存”（愛因斯坦）。

在此基礎上的社會領域邏輯透過加速經濟成長、投資和商業，保證了世界上每個民族和國家的人類永續繁榮。 但它不仅需要邓小平所做的相关科学研究院的认知制度化，还需要在中国和俄罗斯政府的"和平部门"在其领导人的领导下进行政治制度化。 該部門的計劃是美國「開國元勳」之一的本傑明·拉什在兩個多世紀以來提出的，美國國會迄今十次嘗試均未能實施。 中俄成立這樣一個部門，不僅可以證明他們相對於美國的絕對維和優勢，而且可以向全世界展示他們的維和性質，排除他們今天侵略性的西方故意指責他們的侵略性和乾涉主義。其自身的擴張主義辯護。 NM的GGHA从一开始就一直在开发和提供这个项目[13;14]。

NM領域的邏輯表達了所有文明的普遍社會本質，甚至是極端敵對和敵對的文明，揭示了克服對抗、防止戰爭的方法，並在它們之間建立不是暫時的休戰，而是持久的「永恆和平」。 尚未有任何行星概念提出這一點，但在全球核戰邊緣的今天，這一點至關重要。NM spheres的逻辑对于所有不同的文明都是一样的，无论他们的内部阶级，精英，政治和经济矛盾在他们的行业逻辑中，通常总是抵制今天在西方观察到的这种共 在一種或另一種短暫的工業邏輯中迴避它總是會導致文明的瓦解和死亡——這是歷史的規律。

NM球體的邏輯對於多極世界秩序的球形性質的基本理論理解也很重要，這種秩序在軍國主義的折磨中自發地形成，但不可避免地在本世紀開始形成。 球形、和諧的多極化是軍事力量幾極的部門對抗的替代方案，這不可避免地導致文明的軍事衝突[25]。 NM球體的邏輯整合了這一秩序的理性思想[26]，為它們提供了邏輯證據，為它們提供了科學驗證，並為它們配備了創新工具。 包括球形的行星人工智慧，沒有它，球形的、和諧的多極化將變得面目全非和實用主義。

4．中國共產主義球形多黨制的球形邏輯：新「經濟奇蹟」的源頭

社會一切都在變化，需要變革，需要現代化，這是鄧小平用中國改革開放40多年來的球形邏輯出色地掌握和出色地實施的。這次改革要求在新的水平和中國的另一個關鍵領域——組織和管理領域進行新的現代化改革，為此，過去幾十年來已經準備好了所有必要的資源和先決條件。 中国这个领域的核心是中国共产党，因此，中国组织领域的基本结构改革只能从邓小平儒家"实事求是"原则的中国共产党领域结构改革开始，即优先考虑的不是意识形态，而是新"中国奇迹"务实成功的方法论。

在第一个粗略的近似中，这种球体逻辑的方法是苏共在1980中提出的，当时它在口号下更新了党的计划："当前一代苏联人民将生活在共产主义之下"，即在20-25 我的計畫的本質是透過融入共產主義球形多黨制度（CSM）來改革蘇共的結構。 這將為其提供與蘇聯社會生產球形結構的基本結構對應。 这样的改革将确保其增长，首先是其萧条的经济有时的增长，承诺其"经济奇迹"并加强其所有16共和国的团结。 CSM将能够将国家公共生产的萧条部门组织转变为其管理的球形分形组织，这有时会提高其公共劳动的效率和生产力。CSM球形邏輯的思想在12年後的1992年我們的第一本授權書《球形方法、哲學、民主、市場、人》的“球形民主和球形政治學”部分中提出[27，p.11]。 83-166]。

到这个时候，贫困的苏联已经崩溃，而不是承诺的共产主义，苏共完全以其部门和意识形态的教条主义抹黑自己，表明其管理无力进行全领域的组织重组，并在我们的项目中压制其科学理由。

與鄧小平不同，蘇共的意識形態教條高於實際團結、科學創新和國家福祉，這導致了其不可避免的崩潰。這段悲慘的經歷顯然對中國共產黨具有啟發意義，正如鄧小平在中國改革的整體邏輯中務實優先的非凡經驗對俄羅斯至今仍具有指導意義一樣。 因此，传统的共产主义只有在中国国家主席习近平宣布的"新方法"精神的基础上，进行突破性的组织改革，才能使自己恢复和复兴。

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来自中国的游客堪察加边疆区旅游和酒店业发展的困难和前景

摘要：文章考察了堪察加半岛与中华人民共和国文化旅游合作的前景。 特别注意考虑该地区在旅游和招待领域的潜力，以及来自中国的游客的需求及其吸引他们前往堪察加半岛的能力。 作者指出了该地区旅游业发展的困难和障碍，并提出了克服这些困难和障碍的措施。

关键词：堪察加边疆区，中国，中国，旅游和酒店业。

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CHALLENGES AND PROSPECTS OF DEVELOPMENT OF TOURISM AND HOSPITALITY INDUSTRY OF KAMCHATKA KRAI FOR TOURISTS FROM THE PRC

Abstract: The article examines the prospects of cultural and tourist co-operation between Kamchatka Krai and the PRC. Particular attention is paid to the region's potential in the field of tourism and hospitality, as well as the needs of tourists from China and their opportunities to attract them to Kamchatka. The author identifies difficulties and obstacles in the development of tourism and hospitality industry of the region and proposes measures to overcome them.

Keywords: Kamchatka Krai, China, The PRC, tourism and hospitality industry.

The tourism sector is an important component of Russian-Chinese humanitarian cooperation. The Kamchatka Territory, having a huge tourist and recreational potential, attracts a considerable number of tourists from various parts of the world [1]. Tourists from China are no exception. Detailed information confirming this thesis is presented in table 1.

Table 1

The dynamics of tourists served from 2014 to 2022,
taking into account the top 5 countries (in quantitative terms - people)[1]

	2014	2015	2016	2017	2018	2019	2020	2021	2022
The total number of tourists served, including:	**175181**	**183850**	**198605**	**199352**	**215485**	**241500**	**128985**	**245380**	**339295**

[1] The data were obtained thanks to the assistance of the Government of the Kamchatka Territory

USA	2 973	1 759	1 598	1 819	4 299	5 364	21	129	19
China	**226**	**1 387**	**1 618**	**1 591**	**2 582**	**3 793**	**187**	**73**	**233**
Germany	1 103	1 219	1 340	1 168	1 737	2 237	64	416	80
Japan	1 358	1 378	1 655	780	1 279	1 731	21	28	17
Republic of Korea	142	633	693	473	990	1 747	211	81	247
Other countries	8 818	7 738	9 731	8 089	14 531	21 180	1 141	12 533	13 557
The number of Russian tourists served, including residents of the Kamchatka Territory	160561	169736	181970	185432	190067	205178	127551	232120	325142

Let's define the key methodological framework of this study. The purpose of the study is to assess the possible level of potential of the tourism and hospitality industry of the Kamchatka Territory for tourists from China.

The object of the study is the paradiplomacy between the Kamchatka Territory and the People's Republic of China, and the subject is the potential of the tourism and hospitality industry of the Kamchatka Territory for tourists from China

We can also hypothesize that the Kamchatka Territory has a high potential to attract Chinese tourists due to its unique natural and cultural environment, however, for the successful development of cultural and tourist exchange, it is necessary to strengthen historical and cultural interaction and develop tourist infrastructure.

The research uses a set of general scientific and special methods. The latter include:

- discourse analysis (analysis of statements by government representatives and significant persons in the industry under consideration and related industries);

- systematic and analytical approaches (in terms of the influence of external and internal factors of the system).

The methodological basis of the study was the existing agreements between the Kamchatka Territory and the People's Republic of China,[2] namely:

- "Agreement on visa-free group tourist trips between Russia and China", in force since 2000, interrupted due to Covid-19 and resumed its work on August 1, 2023) [3];

- The program of cooperation between the regions of the Far East and Eastern Siberia of the Russian Federation and the North-East of the People's Republic of China (from 2008-2018), which included the project "Construction of an all-season international ski resort of the Kamchatka Territory on the basis of: Mount Moroznaya, Avacha Volcano Zones, Topolovy Ridge, Petrovskaya Hills";

- Agreement between the Government of the Kamchatka Territory (Russian Federation) and the People's Government of Heilongjiang Province (PRC) on cooperation in trade, economic, scientific, technical, cultural and other fields (June 15, 2010) [2];

- Agreement between Kamchatka State University named after Vitus Bering and Heilongjiang University on the exchange of teachers and students (2013);

- Cooperation Agreement between the Kamchatka Territory Development Corporation and San Zhun Corporation LLC (March 20, 2018);

- Memorandum of Cooperation between the Ministry of Economic Development of the Kamchatka Territory and the Department of Commerce of Heilongjiang Province (June 25 2023).

It should be noted that large-scale business meetings with Chinese partners are held approximately 1-2 times a year at the following sites: the Ministry of Tourism of the Kamchatka Territory, the Kamchatka Territory Development Corporation and the Government of the Kamchatka Territory. In addition, according to the protocol service of the Governor of the Kamchatka Territory, recent negotiations in the humanitarian sphere, including issues of the tourism and hospitality industry, were held:

[2] The data were obtained thanks to the assistance of the government of the Kamchatka Territory

- in 2018-2019, when a cooperation Agreement was signed between the Kamchatka Territory Development Corporation and San Zhun Corporation LLC, its CEO Zhou Kiksian expressed readiness to create an airline in the region specializing in transporting tourists to its natural monuments, and also became interested in the conditions for the construction of hotel complexes in the tourist area-recreational areas; as a first step towards cooperation, he proposed to organize a visit to Kamchatka by a large delegation of businessmen from Shandong Province, to discuss in detail the nuances of organizing trips of Chinese tourists to the Russian peninsula; the dialogue between the parties continued within the framework of the VI Sino-Russian EXPO 2019 [11,12];

- in the period from August 1 to 5, 2022, a delegation of the Russian – Chinese Business Council Association visited the Kamchatka Territory, during which an official meeting was held with the Governor of the Kamchatka Territory, V.V. Solodov, with the participation of representatives of the executive bodies of the Kamchatka Territory, public associations, Kamchatka Development Corporation JSC and the business community of the region; where the investment potential of the Kamchatka Territory was presented;

- August 4, 2022 – meeting of the Governor of the Kamchatka Territory V.V. Solodov with the Consul General of the People's Republic of China in Vladivostok via videoconference, during which the parties discussed prospects for the development of cooperation between the Kamchatka Territory and the People's Republic of China in various fields, including tourism;

- April 4, 2023 – presentation of the Kamchatka Territory at the GlavUpDK Cultural Center under the Ministry of Foreign Affairs of the Russian Federation, which was attended by representatives of the Chinese Embassy in Russia and business of the People's Republic of China;

- May 16, 2023 – meeting between V.V. Solodov, Governor of the Kamchatka Territory, and Piao Yangfan, Consul General of the People's Republic of China in Vladivostok [10];

- June 24-26, 2023 – meeting of the delegation of the People's Government of Heilongjiang, headed by Li Haitao, Deputy Chairman of the Political Advisory Council of Heilongjiang Province, with V.V. Solodov, Governor of the Kamchatka Territory, with the Minister tourism of the Kamchatka Territory and representatives of travel companies in the region [8];

- in October 2023, a delegation of the Kamchatka Territory headed by the Governor of the region, V.V. Solodov, paid a visit to the People's Republic of China [9];

- May 17-21, 2024 – Russian-Chinese EXPO with the participation of representatives of the Kamchatka Territory [8].

Currently, active negotiations are underway to resume the program "on visa-free regime with China", deepen relations within the framework of targeted investment in the hospitality facilities of the region by businessmen from Shandong Province and promote dialogue between the PRC and the Kamchatka Territory.

Moreover, by decision of the top leadership of Russia and China, 2024-2025 were declared the Years of Culture of Russia and China, which emphasizes the relevance of the research topic [5].

Having considered the key agreements and events, it is necessary to assess the readiness of the region to accept a large flow of tourists from China.

It cannot be denied that Kamchatka has a high potential to attract tourists from China due to its unique natural and cultural environment. But for the successful development of cultural and tourist exchange, it is necessary to strengthen the interaction of cultural organizations and develop the tourist infrastructure.

The interest in the region on the part of official representatives of the People's Republic of China and business representatives is a favorable factor for shaping the image of the region in the global tourist space. However, there are a number of obstacles to a more in-depth partnership in the field of tourism between China and Kamchatka.

One of the main problems can be attributed to the language barrier and lack of awareness about the cultural characteristics of the parties. Moreover, the culture of the People's Republic of China is highly contextual, and the culture of Russia is low–contextual in comparison with it, which is a kind of deterrent. It should be emphasized that this terminology was introduced by E. Hall, a specialist in the field of intercultural communication, in the book "Beyond Culture". In his opinion, any culture consists of communication systems that consist of hidden rules. They form a special context, which is important for deciphering information. Each culture has its own parameters and volumes of contextual information. Accordingly, the more complex the behavior model, the higher

the contextuality threshold. If there is clarity and clarity in the presentation of thoughts through verbal means of communication, then the level of contextuality decreases [4,7].

Thus, it is important for representatives of the People's Republic of China to create a "positive image" through an indirect style of communication using non-verbal means of communication. Russians, on the contrary, are characterized by a "direct style of communication" through verbal means of communication. Consequently, because of this, some distrust of each other begins to form between the two representatives of cultures, which is a deterrent to the development of Russian-Chinese relations in general, and Russian-Chinese cultural exchange in particular.

In order to overcome the difficulties in the form of a language and cultural barrier, ensuring a constant influx of tourists from China to the territory of the Kamchatka Territory, it is necessary to provide a set of measures by the Government of the region through:

- targeted education at FEFU (Far Eastern Federal University is the best among the Far Eastern universities of the country according to the overall rating of universities "National Recognition". Far East 2022) at the Department of Chinese Studies;
- advanced training courses to deepen knowledge about Chinese culture and history;
- practice-oriented courses on the peculiarities of intercultural communication with departure to China.

It is assumed that these activities aimed at teaching Chinese language and culture will minimize misunderstandings and conflict situations between tourists and employees of the tourism and hospitality sector of the region [4].

From the above aspects, we can conclude that tourists from China are special guests who require a special approach in service. Based on data for June 2022, 165 units of collective accommodation facilities are concentrated on the territory of the Kamchatka Territory [8]. But not all of them are able to accept tourists from China due to various reasons: the official website is inaccessible and not understandable to the Chinese tourist, non–compliance with international quality standards, lack of necessary positions of dishes in the menu of hotel restaurants, language difficulties, ignorance of the specifics of the needs of such tourists, inconsistency of information on the website and in reality, etc.

The solution to this problem is the introduction of a voluntary certification system "China Friendly" on the basis of one of the hotels on the peninsula [13].

The criteria for the adaptability of the accommodation facility for this program includes four blocks, for which the accommodation facility receives points. They are presented in the form of: information support, payment methods, hotel services, including room stock and requirements for service personnel [13].

In order to maintain a friendly atmosphere and comfort for guests of all nationalities in both "China Friendly" hotels in the Kamchatka Territory, it is worth providing:

- a separate catering area for tourists from China;
- differentiation of flows (tourists from China and domestic tourists) in the use of public areas (swimming pool, entertainment area, etc.).

The launch of this program will allow to standardize and unify service activities for the provision of hotel services on the basis of one of the hotels of the peninsula specifically for a guest from China, guaranteeing high-quality service. In Table 2, the information is systematized and formed into a SWOT analysis.

Table 2

SWOT analysis of cooperation between the Kamchatka Territory and the People's Republic of China in the tourism and hospitality industry [3]

Strengths	Weaknesses
The willingness of Chinese entrepreneurs to finance projects in the field of tourism and hospitality aimed at the development of the region	Slow resumption of electronic visas and visa-free regime for tourist groups of 5 people or more
The unique nature of Kamchatka, which attracts many tourists from all over the world	The infrastructure of the tourism and hospitality industry, which "has a lot to grow"

[3] SWOT analysis is compiled based on available data

The demand for Kamchatka tourism products in the Chinese market	Lack of experience working with Chinese tourists and the need to adapt to their needs and preferences
Relative territorial proximity	A limited number of translators and guides who speak Chinese
New passenger port complex with the ability to accommodate small cruise ships	Inability to take large cruise ships due to insufficient depth
	Lack of direct flights due to insufficient capacity of the old airport
Opportunities	**Threats**
Connecting a Kamchatka Territory hotel to the China-Friendly program	Possible competition from other regions of Russia and other countries that also offer unique tourism opportunities for tourists from China
Development of new forms of tourism, such like: ecotourism, cultural tourism, etc.	Difficulty in maintaining the China-Friendly trademark
Increasing investment in tourism infrastructure in Kamchatka	Possible “cooling” of relations between the Russian Federation and China
Increase in transactions due to purchases of souvenirs and delicacies by tourists from China	Decrease in domestic tourist flow (reluctance to stay with tourists from China in the same hotel)
Attracting guides and translators who graduated from FEFU in the field of Linguistics and History of the People's Republic of China	
Improving tourism safety	
The new airport, which is planned to be put into operation in December of this year	
Creation of additional jobs	

In conclusion, we note that the Kamchatka Territory and the PRC are currently taking active measures to deepen their partnership in the field of tourism. Despite the existing potential and existing initiatives in this area, the author identifies the following barriers to the further development of cultural and tourism exchange:

- difference in cultures (China is more high-context compared to Russia);
- difficulties in the form of language and cultural barriers;
- outdated number of rooms requiring renovation;
- lack of adaptation of collective accommodation facilities to tourists from China.

However, these obstacles can be overcome through the measures proposed by the author of the study, namely:

- targeted training at the Far Eastern Federal University at the Department of Chinese Studies;
- advanced training courses to deepen knowledge about the culture and history of China;
- practice-oriented courses on the peculiarities of intercultural communication with travel to the PRC;
- standardization and unification of the service through the “China Friendly” program.

Thus, additional jobs will appear in the region. Participation in the implementation of these programs will serve as a successful start to professional activity for young specialists.

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現代資訊社會中的量子密碼問題

摘要：本文對量子密碼學和後量子密碼學進行了比較分析，並討論了在現代使用這些技術來確保資訊安全的相關性。

关键词：量子密碼學、後量子密碼、加密。

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PROBLEMS OF QUANTUM CRYPTOGRAPHY IN A MODERN INFORMATION SOCIETY

Abstract: The article discusses and compares quantum and post-quantum cryptography and their relevance in the modern information society.

Keywords: quantum cryptography, post-quantum cryptography, encryption.

Information security is an essential element in the formation of an information society and the construction of an electronic state. Most countries of the world have recognized the existence of a quantum threat and have begun to develop new methods of information protection – post-Quantum cryptography (Quantum-Safe Cryptography).

There are two completely new approaches: quantum and post-quantum cryptography. Quantum theory is based on the quantum distribution of keys, when bits of information are encoded into single particles (photons). Here you can find the intervention of intruders by the number of errors in data transmission. If it is not higher than a certain level, you can shorten the keys so that the fraudster's information about the shortened keys is incomplete – this is called "increased secrecy". [1] This method has disadvantages: as the length of the quantum channel increases, the transmission rate decreases; the depolarization of photons in the quantum channel leads to a high level of interference; high cost of equipment.[5]

Post-quantum cryptography is based on the creation of new algorithms that use more complex mathematical problems and is good because it can be easily and quickly integrated. [2].

The disadvantages of post-quantum cryptography are that its secrecy is based on assumptions about the complexity of solving certain classes of mathematical problems. It is quite possible that a "post-quantum" computer will soon appear that will deal with post-quantum algorithms.

Experts believe that the transition of all technologies to quantum-stable ones will take about five years. From 2021 to the present, blockchain and quantum cryptography technologies have gained great popularity. Many ISO standards are under development. [2]

Table 1

Comparative analysis of the features
of post-quantum cryptography and quantum key distribution

Property	Post-quantum cryptography	Quantum Key Distribution	Conclusion
Application area	Asymmetric encryption, digital signature schemes, key encapsulation mechanisms	Symmetric Key Distribution	PQC has a large set of primitives that do not overlap with QKD
Safety	It is based on time-tested mathematical assumptions	Based on the laws of quantum mechanics	QKD guarantees attack detection

Realization	Software	Hardware	PQC – in any system, QKD - special equipment
Cost	Low	High	PQC available, QKD coming soon
Certification	Technical Committee 26 and NIST, CACR competitions	ETSI, ISO, ITU-T projects	Will be certified soon
Communications	In any digital types of communication	FOCL and AOCL	QKD may act synergistically with PQC

Post-quantum cryptography is well developed today: there are already commercial libraries, solutions, and products. The technology is currently undergoing a standardization process. The advantages of this technology: simplicity and high speed of integration (since we are talking about software), regular software updates. These solutions are used to enhance information security. [1]

These two technologies can be successfully combined. For example, data transmission channels between large companies can be protected using quantum cryptography. And banking transactions or correspondence using post-quantum cryptography. Thus, quantum is more aimed at the stack level associated with the infrastructure, and post-quantum is associated with the user. [1]

The quantum cryptography standard is still being formed and now there is only one - the BB84 protocol with deceptive states. But new protocols are constantly emerging. Quantum cryptography is tasked with ensuring absolute protection of encrypted data from hacking. Already in Russia there are networks protected by quantum-critographic methods that cannot be hacked.

Post-quantum cryptography faces the challenge of creating algorithms that are resistant to cyberattacks using quantum computers. Research is being conducted in this direction. In 2023, Russia began testing post-quantum protection for video conferencing, and scientists from the National Research Nuclear University “Moscow Engineering Physics Institute” proposed using post-quantum cryptographic algorithms to protect messaging in instant messengers. [3]

Thus, in the world of digital technologies, new methods of data protection have appeared: quantum and post-quantum cryptography and their development relates to issues of national security.

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測試道路建築材料的化學計量方法

摘要：本文探討了利用化學計量學測試方法加速測定築路材料性能的前景。
关键词：瀝青，紅外線光譜法，道路施工試驗，加速方法，化學計量學。

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CHEMOMETRIC TESTING METHODS FOR ROAD CONSTRUCTION MATERIALS

Abstract: This article talks about the prospect of using chemometric testing methods for accelerated determination of the properties of road construction materials.
Keywords: bitumen, IR spectrometry, road construction tests, accelerated methods, chemometrics.

時間是生產中最昂貴的資源。但同時，許多小時甚至幾天的時間都花在築路材料的品質控制上。例如，監測瀝青品質時，最多花費72小時（圖1），選擇瀝青混凝土成分時，3-5天，分析瀝青混凝土品質時，1天，確定等級時混凝土 - 28 天。

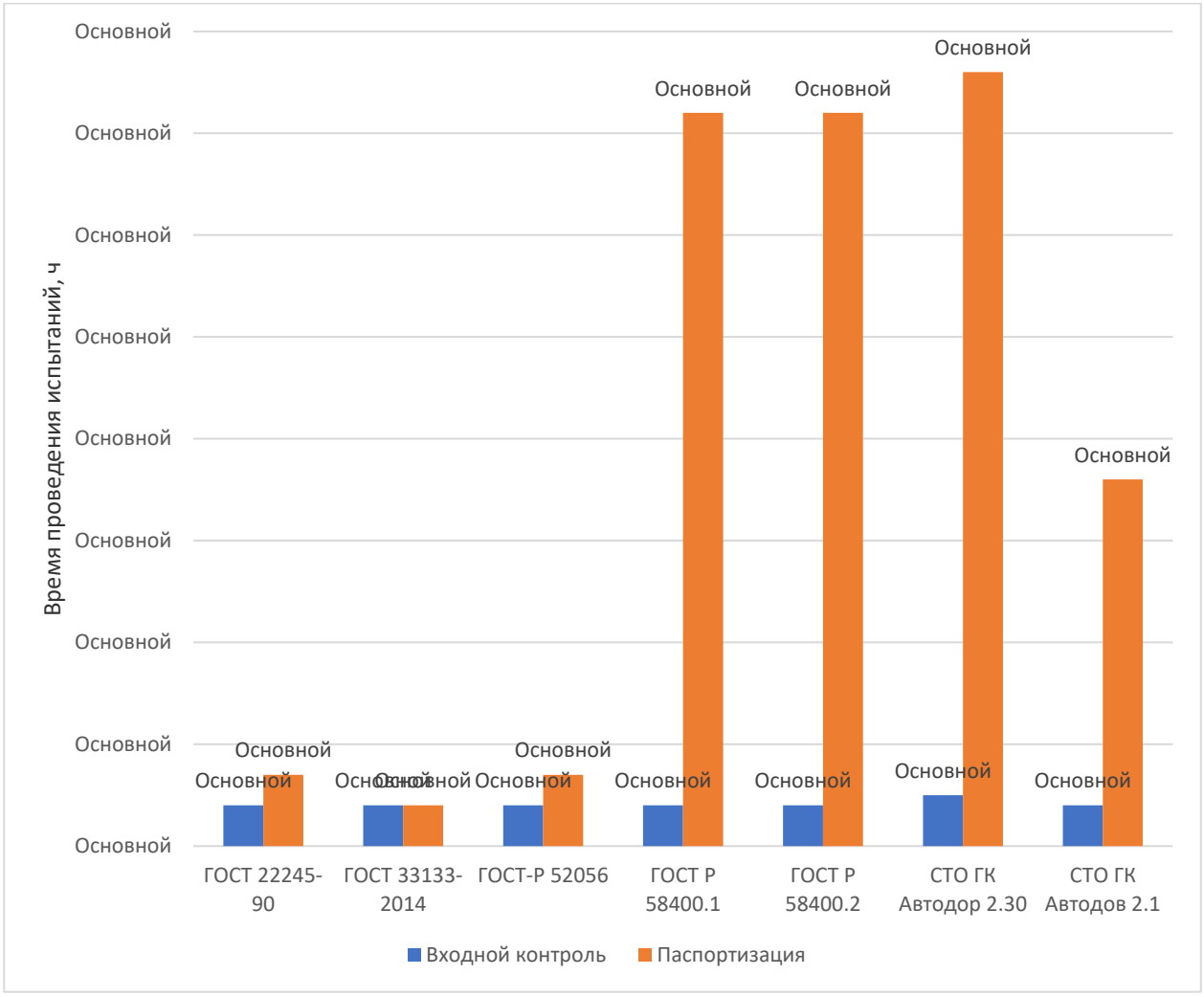


圖 1. 根據現行俄羅斯標準測試瀝青黏合劑所需的時間

早在20世纪中叶，罗伯特*勒米特（Robert Lermit）在他的书中写道，由于延迟，测试结果在收到后立即失去了相关性。 接下来，他描述了煅烧水泥混合物的实验。 作者描述测试是马马虎虎的，但是当在没有警告的情况下进行时，施工现场的工作质量显着增加[1]。

由于测试的长度，其结果的实际意义因延迟获得而贬值，因此失去了其操作意义。

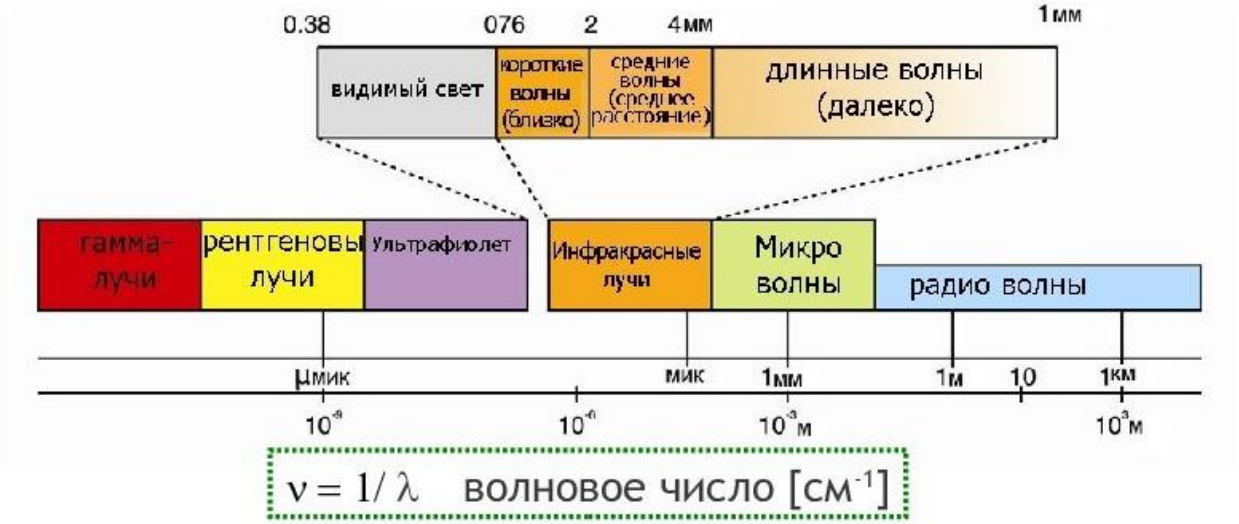
現在，由於科學技術的積極發展，我們對築路材料的測試方法越來越複雜，計算也越來越複雜。沒有複雜的數學計算就不可能獲得測試結果，如果沒有特殊的計算機程式就無法進行這些計算。

例如，瀝青黏合劑LAS-Test的疲勞性能測試是在DSR設備上進行的，並在Excel中進一步進行特殊重新計算。同時，計算過程非常耗費人力，以至於在手動計算數據時，工程師需要花費幾天的時間[連結到 LAS-Test 2]。

化學計量學是一門位於化學和數學交叉的科學學科，其學科是研究化學現象的數學方法[3]。

化學計量學方法之一是紅外光譜法。紅外線光譜法是基於物質的光吸收強度。

紅外線光譜法是一種基於物質吸收紅外線輻射導致分子振動運動增加的研究方法。



«ближняя» ИК область 12500 - 4000 см$^{-1}$

«средняя» ИК область 4000 - 400 см$^{-1}$

«дальняя» ИК область 400 - 50 см$^{-1}$

圖 2. 紅外線光譜覆蓋範圍

在這種情況下，中間區域分為「指紋」區域（600-1500 cm-1）和特徵帶區域。利用「指紋」區域的紅外光譜，可以辨識官能基和有機化合物本身。

例如，化學計量測試方法被積極用於測試油及其衍生物。

可以測量氣體、液體和固體的紅外線光譜。

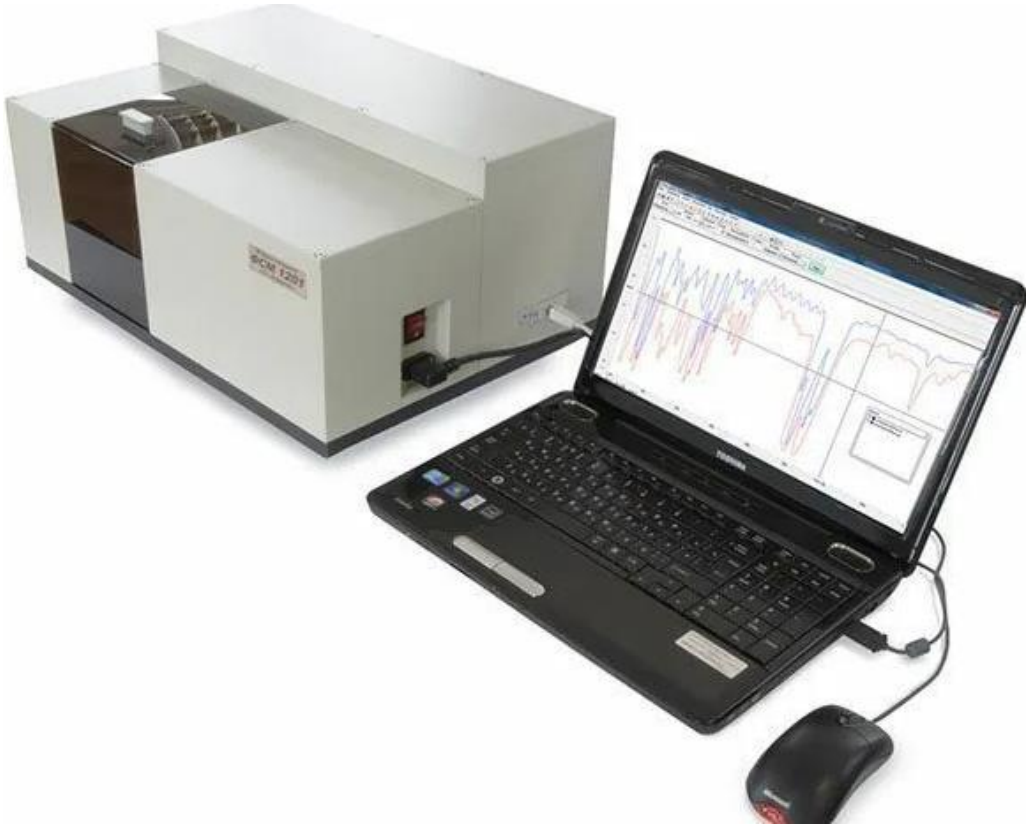


圖 3. 紅外線光譜儀

液體可以以純淨形式或溶液形式進行研究。固體以纈草油膏、溴化鉀壓製片或沉積薄膜的形式進行檢查。 （圖 3、4）

圖 4. 紅外線光譜測定的各種樣品製備方法

紅外線光譜的主要測試方法是使紅外線輻射穿過測試物質的方法（圖5）。問題是…我們研究的大多數材料對紅外光譜都是不透明的。為了進行光譜測定，需要仔細製備樣品。在這種情況下，樣品製備會影響測試結果。我們只能得到定性分析。但不可能使用透射法進行基於化學計量學的定量分析。例如，瀝青必須溶解在溶劑中，這會影響最終的測試結果。

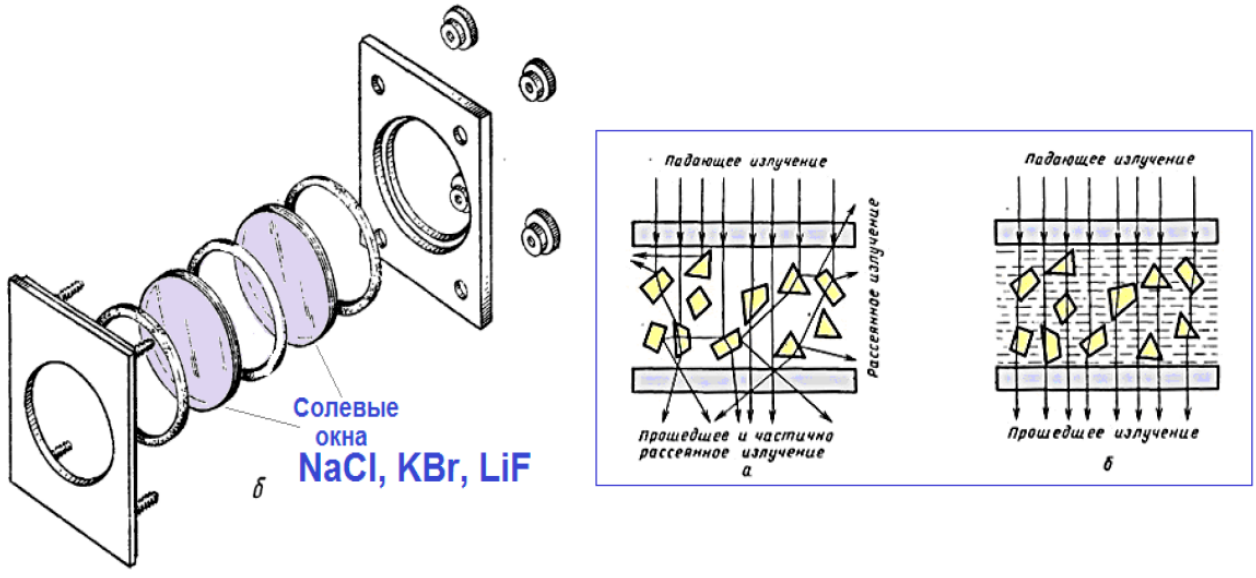


圖 5. 使用透射法進行紅外線光譜測定

圖 6. 紅外線光譜儀的多重衰減全內反射附件

圖 7. 紅外線光譜儀的多重衰減全內反射附件。
鑽石配件

由於固體和不透明液體的樣品製備有其自身的問題，因此還有衰減全反射的方法。這些附件允許測試道路建築材料，無需任何特殊的初步樣品準備。

此外，在收集統計數據時使用化學計量方法測試瀝青黏合劑，將來可以建立瀝青材料資料庫，從而消除道路建設中的假冒和劣質瀝青黏合劑。

結論：

因此，開發使用化學計量學方法來測試築路材料將顯著減少築路材料的品質控制，並將允許更好地組合築路中使用的異構系統的組件。

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適用於北極條件的環保含硫建築材料

摘要：硫磺作為石油、天然氣和冶金工業的大量廢物，提供了環保的建築材料，為在北極極端氣候條件下有效、安全地使用硫磺提供了廣闊的機會，提高了經濟和環境效率。

关键词：北極，改性硫磺，硫磺混凝土。

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ENVIRONMENTALLY FRIENDLY SULFUR-CONTAINING BUILDING MATERIALS FOR ARCTIC CONDITIONS

Abstract: Sulfur, as a large-tonnage waste from the oil, gas and metallurgical industries, provides environmentally friendly building materials, which opens up wide opportunities for effective and safe use in extreme climatic conditions of the Arctic, increasing the economic and environmental efficiency of the construction industry.

Keywords: Arctic, modified sulfur, sulfur concrete

近年來，人們對環保建築材料的關注顯著增加，特別是在北極惡劣條件的背景下。傳統建築材料往往不符合環境安全要求，無法承受北極地區的極端溫度波動特徵。在這種背景下，含硫建築材料代表了一種具有高強度、耐用性和環境安全性的有前途的解決方案[1]。

在北極設施建設中開發和使用含硫材料為這些偏遠地區的永續發展開闢了新的視野。它們獨特的特性不僅可以減少碳足跡，還可以確保建築物在極端氣候下的長期運作。本文將討論使用此類材料的相關性、其優勢以及在北極建設項目中實施的前景。

硫磺是石油、天然氣和冶金工業中產生的大量廢棄物

硫磺作為石油、天然氣和冶金工業的大量廢棄物，造成了嚴重的環境問題。由於石油和天然氣生產和精煉的增長以及冶金產量的增加，硫磺的產量每年都在增加。在所有這些行業中，硫可以被大量提取和積累，但其進一步利用正成為一個日益緊迫的任務[2, 3]。

石油和天然氣工業是硫的主要來源之一。在石油和天然氣精煉過程中，硫化氫（H_2S）和二硫化碳（CS_2）等硫化合物被去除。這是獲得高品質產品和防止設備腐蝕所必需的。這些過程的結果是，大量形成元素硫。碳氫化合物生產和加工的不斷增加導致需要處理的硫量增加。

冶金工業也是硫的重要來源。在金屬冶煉過程中，特別是銅、鎳等有色金屬的冶煉過程中，含有黃鐵礦（FeS_2）和方鉛礦（PbS）的硫礦石需要進行技術改造。在冶煉過程中，硫化合物分解，釋放出硫，硫常以元素硫的形式沉澱在爐渣或氣相中，進行後續的萃取與加工。

回收硫最有效的方法之一是將其用於建築業。環保含硫建築材料代表了一個有前途的方向，對於北極條件尤其重要，因為極低的溫度和傳統建築資源的不可用性造成了額外的困難。

含硫建築材料的生產技術是基於使用改質硫作為黏合劑。硫具有獨特的化學和物理特性，可以改善建築材料的性能。特別是，硫能夠在低溫下形成堅固耐用的化合物，使其成為北極的理想黏合劑。

此外，建築業中硫磺的使用有助於減少硫磺在生產現場的積累，從而顯著減輕環境負荷。硫以垃圾場和庫存的形式累積會導致土壤和水資源污染，也會引起火災。在建築材料生產中利用廢棄物不僅可以解決其處置問題，而且可以獲得高品質和耐用的建築產品。

生產硫磺混凝土的技術過程是建築中使用硫磺最成功的例子之一，涉及將改質硫磺與礦物填料混合。由此產生的材料具有高強度特性以及高水準的防水性和抗凍性，這對於北極地區的建築至關重要。

除了硫磺混凝土之外，硫磺還可用於生產含硫瀝青混凝土混合物，具有更高的耐磨性和耐溫度變化能力，為遠北地區的道路和機場提供長期可靠的塗層。

硫磺改性的必要性

硫磺具有許多獨特的特性，使其適合用於建築材料，特別是在惡劣的北極環境中，那裡的極端溫度和惡劣的氣候影響要求建築材料具有高度的耐受性和耐用性。然而，為了使硫成為建築材料的成熟成分，有必要對其進行改質。這是由於其化學結構和物理性質的特殊性。

最初，硫以幾種同素異形體存在，其中最常見的是斜方晶系和單斜晶系。這些形式的硫的強度低，並且容易發生重大變化，這使得它們不適合在不進行額外轉化的情況下用於建築業。

硫改質的方法之一是將其轉化為聚硫烷（硫聚合物）的形式或使用硫化過程。在硫化過程中，硫聚合，形成新的分子鍵，顯著提高其機械強度和對溫度變化的抵抗力。這種形式的硫能夠更好地承受惡劣的北極條件。

此外，在改質硫時必須考慮環境因素。改質劑和加工方法的選擇應盡可能環保，並且不會導致有毒副產品的形成。這對於保護脆弱的北極生態系統尤其重要。

總之，對硫進行改質以製造適合北極條件的具有成本效益且環保的建築材料是一個重要且多方面的過程。只有這樣，我們才能創造出能夠承受極端氣候條件的材料，同時保持北極建築的耐用性和環境安全。

改質硫磺在硫磺瀝青混凝土生產上的應用

在北極條件下使用改質硫生產硫磺瀝青混凝土代表了改善道路環境和營運特性的創新方法。傳統的建築材料並不總是能提供必要的耐用性和抵抗北極惡劣條件的能力。將改質硫引入瀝青混凝土混合物中，為改善路面品質開闢了新的機會。

當暴露在北極氣候的寒冷溫度下時，傳統的瀝青路面會變脆並容易開裂。在此類混合物中引入改性硫可以提高其彈性和耐低溫性，這有助於減少塗層破裂和隨後破壞的可能性。

此外，硫磺瀝青混凝土混合物表現出高耐水性。硫的疏水特性可防止水分滲透到塗層結構中。這種防潮性正成為北極道路壽命的關鍵因素。

使用硫磺瀝青混凝土的環境因素同樣重要。傳統瀝青在生產和安裝過程中二氧化碳排放量較高。在瀝青混凝土中使用改質硫可以顯著減少與路面生產和施工相關的碳足跡。

此外，在運行過程中，硫瀝青混凝土混合物表現出對侵蝕性化學影響的高抵抗力，這在可能與用於對抗結冰的試劑接觸的條件下變得尤為重要。

硫磺瀝青混凝土的經濟效益也值得關注。降低瀝青混凝土混合物的鋪設溫度可以減少加熱的能源成本並降低營運成本。這些因素的結合使得硫磺瀝青混凝土混合物在道路建設中具有經濟競爭力。

總之，改性硫對於生產硫磺瀝青混凝土的好處使其成為在北極使用的絕佳選擇，確保路面的耐用性、可持續性和環境友善性。

改性硫磺在硫磺混凝土生產上的應用

使用改性硫來生產硫混凝土開闢了建築前景，特別是在北極條件下。硫磺混凝土由於其獨特的性能，可以成為確保這些條件下結構強度和耐久性的最佳解決方案。

硫磺混凝土的主要優點之一是它能抵抗侵蝕性化學影響。北極氣候意味著大氣中存在鹽和酸，這會對傳統建築材料造成重大損害。用於生產硫混凝土的改質硫對這種侵蝕具有很強的抵抗力，使得該材料非常適合在暴露於侵蝕性環境的區域使用。

使用硫磺混凝土也有助於減輕環境負荷。傳統水泥混凝土的生產是二氧化碳排放的重要來源。相較之下，基於改性硫磺的硫磺混凝土的生產需要較少的能源和原材料，這有助於減少碳足跡。因此，使用硫磺混凝土是一種環境永續的解決方案，這對於生態系統容易受到干擾的北極地區尤其重要。

硫磺混凝土的另一個重要特性是其優異的隔熱性能。硫磺混凝土因其結構而具有較低的導熱性，可以將熱量保留在室內，從而降低加熱的能源成本。這不僅提高了建築物的能源效率，也節省了資源，這對北極偏遠地區尤其重要。

此外，硫磺混凝土的特徵是強度增加速度快。在北極條件下，施工季節受到短暫暖期的嚴重限制，快速架設結構的能力使得優化施工流程並在短時間內完成專案成為可能，這在北極條件下是不可否認的優勢。

總之，使用改質硫來生產硫混凝土為北極條件下的建築帶來了巨大的機會。耐侵蝕性化學環境、低溫下的機械強度、環境安全、優異的隔熱性能和快速的強度發展使硫磺混凝土成為北極地區使用的理想材料。

在北極條件下使用改質硫作為黏合劑的效率

使用改性硫作為北極條件下建築黏合劑的研究顯示出巨大的前景。

首先值得注意的是，改性硫磺具有很高的抗凍性。用這種聚合物製成的材料在低於 -50° C 的溫度下仍能保持其性能，這對於北極的建築項目尤其重要。傳統建築材料在這些溫度下可能會遇到嚴重問題，包括凍融循環導致的開裂和結構變化。改性硫由於其化學性質，保留了穩定的物理和機械性能，這使得建築項目能夠持續更長時間並且需要最少的維護。

其次，改質硫的一個重要特性是其疏水性。高耐濕性使得硫基材料非常適合高濕度和持續接觸水的條件，這在北極是典型的情況。水分是低溫下破壞建築材料的主要因素之一，因為材料孔隙中的水凍結會導致膨脹和開裂。改質硫的疏水特性最大限度地減少了這種風險，從而顯著延長了結構的使用壽命。

第三個重要面向是耐化學性。北極條件通常伴隨著暴露於腐蝕性化學環境。改性硫表現出高電阻，因此基於它的結構可以長期保持其性能特徵。

改質硫的環境效益也不容忽視。與傳統混合物相比，此類材料的生產和使用二氧化碳排放量較低。此外，副產品硫磺的利用有助於解決工業廢棄物處理問題。因此，這對環境的影響最小，有助於北極地區的永續發展。

綜合以上因素，改質硫是一種高性能、環保的創新材料。它在北極條件下的使用為建築開闢了新的前景。

使用改質硫建造永凍土條件下的道路路面隔熱層

使用改質硫建造永凍土條件下的道路路面隔熱層是北極建設的一個有前途的方向。

改性硫的主要優點是其高耐熱性和低導熱性。低導熱係數使其成為優異的隔熱材料，可顯著減少道路結構的凍結。這在永久凍土條件下尤其重要。透過添加各種聚合物雜質進行改性的硫，提高了彈性和抗機械應力，使其即使在高負載和動態衝擊下也能保持其性能。

使用改性硫來建造隔熱層既可以在傳統路面上使用，也可以與其他材料結合使用。它可以作為瀝青混凝土層下的基材，提供可靠的隔熱塗層，防止凍結和隆起。

此外，硫的使用降低了與材料熱膨脹和收縮相關的裂縫和其他缺陷的風險。這可以延長道路的使用壽命並降低其維修和保養成本。

在北極建設中使用含硫材料的一個特別有前途的方向是創建多功能道路結構，其中改性硫不僅用作隔熱層，還用作加固和保護塗層。此類結構的特徵是對負面環境影響具有高度的綜合抵抗力，包括腐蝕性化學物質、機械負荷和紫外線輻射。

因此，在北極條件下使用改質硫建造道路路面的隔熱層具有巨大的潛力。正確使用這種材料可以顯著提高路面的可靠性和耐久性。

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锂电池二阶RC模型参数辨识

摘要：本文简述了锂离子电池二阶RC模型参数辨识的基本方法，并在此基础上以超级电容放电数据为基础，提出了一种以指数函数拟合放电曲线的方法。

关键词：锂电池，电池管理系统，二阶rc模型

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PARAMETER IDENTIFICATION OF A SECOND-ORDER RC MODEL FOR LITHIUM-ION BATTERIES

Abstract: This article briefly outlines the basic method for identifying parameters of the second-order RC model of lithium-ion batteries, and proposes a method for fitting discharge curves using exponential functions based on supercapacitor discharge data.

Keywords: lithium battery, battery management system, second-order RC model.

锂离子电池因其高能量密度、自放电小、寿命长的优点备受关注。[1]然而，锂电池故障所引发的事故也日益增多，给设备及人员安全问题带来了新的挑战。这主要由于电池的复杂的化学和制造技术特性以及电池管理系统（Battery Management System,BMS）在不同工况下的健康评估不完善导致的。准确的电池健康评估和剩余寿命预测对于延长电池寿命、降低维护成本和确保系统安全至关重要。

对于BMS系统而言，SOC (State of Charge) 是其最重要的测算参数之一。等效电路模型拟合是测算SOC最常用的方法之一。其将电化学系统视为一个由各种电子元件和离子元件组成的电路系统，用电路元件的电学特性模拟电池内部的电阻、充放电延迟等电化学特性。一些最常见的等效电路模型包括Rint模型、Thevenin模型、PNGV模型和多阶RC模型。[2]

1.锂电池二阶RC模型

随着BMS算力日益增强，二阶RC模型得到了更广泛的应用。该模型使用一个串联电阻R_C模拟电池的欧姆电阻，一个RC回路（R_S、C_S）模拟电池极化内阻，另一个RC回路（R_L、C_L）模拟电池扩散内阻（Warburg电阻），二阶RC模型通过这两个RC回路和一个串联电阻的组合，可以较为精确地模拟锂离子电池的动态电化学行为，包括瞬态响应和稳态特性。[3]

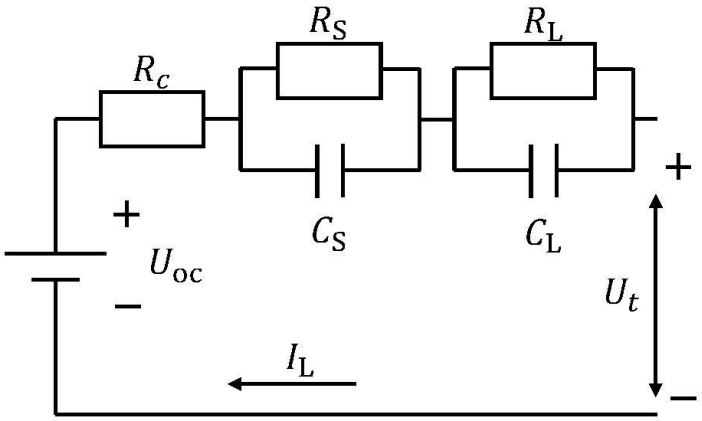

图 1.锂电池的等效二阶 RC 电路模型

2.二阶RC模型参数辨识

能否建立高仿真度等效二阶RC电路模型主要取决于模型参数的识别。下面我们将以一组锂电池放电数据为例，探讨模型参数识别方法。

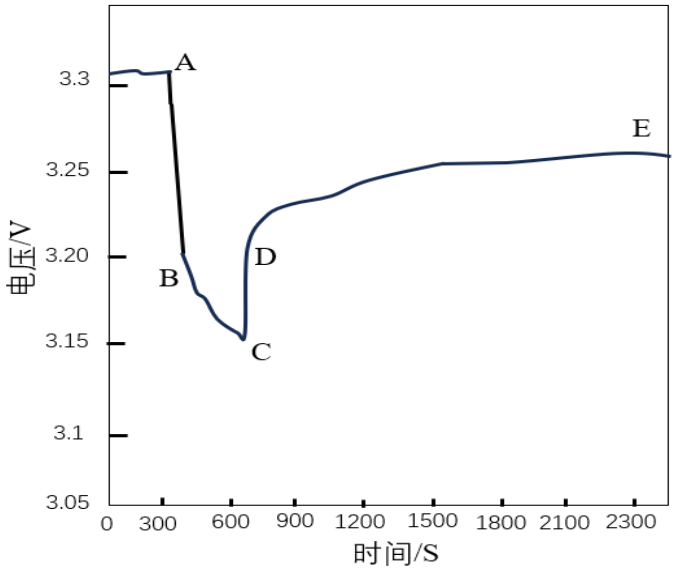

图2.锂电池放电曲线图

从图中可以看出，锂电池放电曲线由四个阶段组成。AB 段中电池电压从空载过渡到负载放电的瞬间开始急剧下降。此时两个RC回路的电压不会突然变化，因此可以认为A点到B点的压降是因为电池欧姆内阻R_C引起的。BC段中电阻R_C两端电压保持不变，两个RC回路电压逐渐升高。CD段电池处于无负载状态，此时R_C两端电压为0，电池电压瞬间回升。DE段两个RC回路电压缓慢降低，电池电压持续回升。

我们可以使用AB和CD段数据进行电阻R_C数值计算，计算方法如下：

$$R_C = \frac{(U_A - U_B - U_C + U_D)}{2I_L} \quad (1)$$

其中U_A、U_B、U_C、U_D分别为A、B、C、D点电压值。

DE段，脉冲电流消失，RC回路失去激励，此时为零状态响应。如果以D点为初始时间点，则两个 RC 电路的零输入响应为

$$\begin{cases} U_S(t) = U_S(0)e^{-\frac{t}{\tau_1}} \\ U_L(t) = U_L(0)e^{-\frac{t}{\tau_2}} \end{cases} \quad (2)$$

此时电池输出方程为：

$$U_t = U_{oc} - U_S(0)e^{-\frac{t}{\tau_1}} - U_L(0)e^{-\frac{t}{\tau_2}} \quad (3)$$

使用 Matlab 的cftool拟合图形上的 DE变化曲线。拟合函数表达式如下：

$$y = \mathrm{a} - \mathrm{b}e^{-\lambda_1 t} - ce^{-\lambda_2 t} \quad (4)$$

其中，$\mathrm{U_{oc}} = a$，$\mathrm{R_s} = \frac{b}{I}$，$\mathrm{R_L} = \frac{c}{I}$，$\tau_1 = \frac{1}{\lambda_1}$，$\tau_2 = \frac{1}{\lambda_2}$，$C_s = \frac{\tau_1}{\mathrm{R_s}}$，$C_L = \frac{\tau_2}{\mathrm{R_L}}$。将电流值带入上述公式即可得出该二阶RC模型全部参数。

3.超级电容放电数据指数函数拟合

由公式（4）可以看出，二阶RC模型参数拟合所使用公式为二阶指数函数。因此，即使实验中缺失零状态响应阶段数据，采用指数函数拟合依然能获得较高的拟合度。

以四组超级电容（C_1、C_2、C_3、C_4）放电数据拟合过程为例。在数据采集过程不可避免地会引入噪声，因此可以使用移动平行滤波法进行滤波。滤波后放电曲线更符合电池实际放电曲线，方便后续拟合。如下图所示：

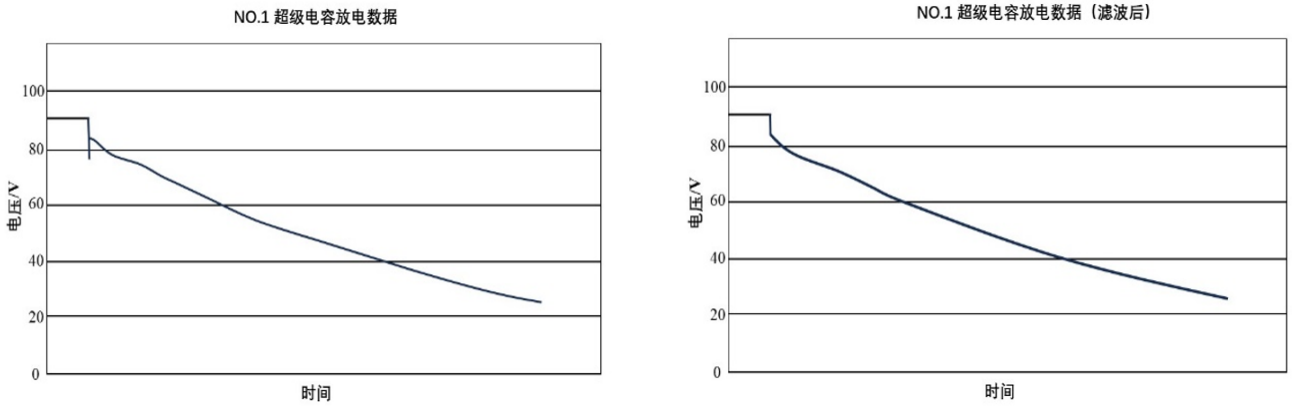

图3.超级电容放电数据滤波处理

如前文所述，对于电池欧姆内阻可以使用AB段数据进行计算。计算公式如下：

$$\mathrm{R_C} = \frac{\mathrm{U_A} - \mathrm{U}_B}{\mathrm{I_L}} \quad (5)$$

对余下数据进行二阶指数函数拟合，拟合方程为：

$$y = a - be^{ct} - de^{ft} \quad (6)$$

其中$a = U_{OC} - IR_C$,拟合结果如下:

$$\begin{cases} U_{C_1} = 83.858 - 89.6665 * e^{0.0026*t} + 97.6874 * e^{-0.1826*t} \\ U_{C_2} = 87.071 - 90.2889 * e^{0.0047*t} + 98.5275 * e^{-0.1843*t} \\ U_{C_3} = 82.764 - 48.2607 * e^{0.0473*t} + 54.0272 * e^{-0.2085*t} \\ U_{C_4} = 82.464 - 47.2704 * e^{0.0487*t} + 53.1603 * e^{-0.2126*t} \end{cases} \quad (7)$$

使用matlab对拟合方程和原始数据进行对比，四组超级电容数据拟合方程拟合度皆大于98.75%。该拟合方法操作简单，计算量较小，但缺点是只能针对负载放电时电池状态进行拟合，因此目前无法直接运用于BMS系统中。

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PHYSICAL AND MATHEMATICAL SCIENCES

物理和數學科學

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基於金屬氧化物奈米粒子簇試劑的成冰性能研究

摘要：取得具有成冰特性的奈米材料，將其用於消除自然緊急情況（冰雹控制、乾旱控制等）是一個緊迫的問題。本文介紹了一套設備、進行實驗的方法以及評估氧化鋅（ZnO）和氧化鋁（Al_2O_3）奈米粒子簇的成冰性能的結果。這些星團是在接近自然的條件下、在零下溫度的人造雲環境中獲得和研究的。起始原料為鋅粉和鋁粉。根據研究結果，氧化鋅和氧化鋁奈米顆粒團簇根據其結冰特性，是對雲過程產生正面影響的新試劑。

关键词：冰晶、冰形成核、濁度室、結晶溫度、含水量、簇、奈米顆粒、碘化銀、氧化鋅、氧化鋁。

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INVESTIGATION OF ICE-FORMING PROPERTIES OF REAGENTS BASED ON CLUSTERS OF METAL OXIDE NANOPARTICLES

Abstract: Obtaining nanomaterials with ice-forming properties, their use for the elimination of natural emergencies (hail control, drought control, etc.) is an urgent problem. The article describes a set of equipment, methods of conducting experiments and the results of evaluating the ice-forming properties of clusters of zinc oxide (ZnO) and aluminum oxide (Al_2O_3) nanoparticles. These clusters are obtained and studied under conditions close to natural, in an artificial cloud environment at subzero temperatures. The starting material is zinc powder and aluminum powder. According to the results of the research, clusters of zinc oxide and aluminum oxide nanoparticles are new reagents for active effects on cloud processes according to their ice-forming characteristics.

Keywords: ice crystals, ice-forming nuclei, turbidity chamber, crystallization temperature, water content, clusters, nanoparticles, silver iodide, zinc oxide, aluminum oxide.

Introduction

The growth of climate instability causes serious weather anomalies and catastrophic situations, among which floods, droughts, hail storms, etc. can be noted. The scale of such processes increases from year to year. For example, according to the forecasts of the Goddard Institute for Space Research (NASA, GISS, USA), by 2050 almost the entire territory of Africa, the Arabian Peninsula, China, Australia, Mexico, Argentina will be in the drought zone [1].

One of the ways to influence such negative weather processes is to carry out weather modification on them. The most widespread are anti-hail works and regulation of precipitation. The work on the weather modification is expanding, increasing the amount of funds used. So, only in China plans to expand the program of active impacts on causing precipitation on the territory of more than 5.5 million square kilometers and on anti-hail measures on the territory of 580,000 square kilometers [2].

In the practice of weather modification on cloud processes associated with the management of sedimentation processes, reagents with hygroscopic and ice-forming properties are used. Silver iodide is the most effective and widespread ice-forming agent. With a 10% concentration of silver iodide in the formulation of the Russian standard pyrotechnic composition AD-1, about 10 tons of silver are consumed for active actions only in the Russian Federation. At the same time, there is an increase in prices for mineral resources in the world. Thus, silver, the main component of weather modification funds, is a rather expensive metal [3].

The issue of reducing the silver content in the formulations of existing pyrotechnic compositions or the use of other effective ice-forming agents becomes quite relevant.

It should be noted that during thermal sublimation of ice-forming reagents, nanoscale particles are formed. Some substances, when sublimated in a cloudy environment, form clusters that consist of nanotubes. According to [4], nanotubes are instantly filled with water. Nanotubes obtained in the presence of water vapor are predominantly open and low-defect [5]. Preliminary studies of the specific yield of ice-forming nuclei of clusters of zinc oxide and aluminum oxide nanoparticles have shown that they can be a new class of reagents and have good ice-forming properties. In this regard, the study of the mechanism of ice formation on clusters of metal oxides and their ice-forming efficiency seems to be an urgent task.

Experimental

The complex of equipment for the study of ice-forming properties of clusters of metal oxide nanoparticles

To study the ice-forming properties of clusters of zinc oxide and aluminum oxide nanoparticles under various thermodynamic conditions, a set of equipment was used: a large cloud chamber, a reagent sublimation device, an ultrasonic steam generator, electronic scales, thermostated substrates, an optical microscope, a computer (see Fig.1).

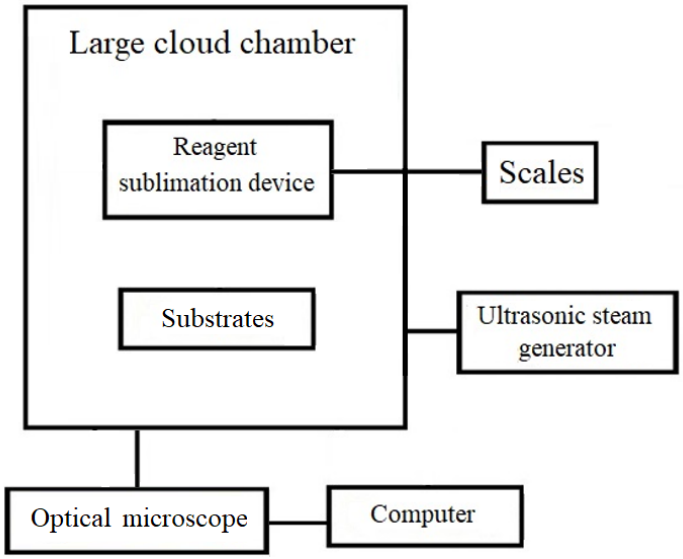

Figure 1. The complex of equipment for obtain and study of ice-forming properties of clusters of metal oxide nanoparticles

To collect crystals, special substrates are installed at the bottom of the chamber. The substrates are metal discs d = 4 cm, covered with clean glasses. The glasses are covered with lids that open at the moment of the appearance of crystals. Crystals settling at the bottom of the cloud chamber fall on the glass.

An optical microscope is used in the development of new reagents, to study the shape of reagent particles and to determine the specific yield of reagents. Also, for the study of the crystal structure of hailstones, in the study of the shape of crystals, the concentration of droplets formed when exposed to various reagents, in the study of the evaporation of droplets.

A technique for studying the ice-forming properties of clusters of metal oxide nanoparticles

A predetermined amount of metal powder (zinc, aluminum) is laid on the graphite substrate of the reagent sublimation device. The large chamber is cooled to a preset temperature, steam is introduced with the help of an ultrasonic steam generator and an artificial cloud environment is created in the chamber. A current of about 100 A is applied to the contacts of the graphite substrate, metal evaporation occurs. After thermal sublimation of the metal in a water vapor medium, the thermostated substrates are opened. The resulting ice crystals are deposited on the substrates. Each substrate is removed from the camera and examined in the field of an optical microscope. Next, the specific yield of ice-forming nuclei is calculated.

Specific yield (quantity) the active particles from the unit mass of the reagent (hereinafter referred to as the «yield») converted into an aerosol is a measure of the effectiveness of the ice-forming reagent. The principle of measuring the effectiveness of an ice-forming reagent is to determine the number of ice crystals formed when a known amount of the reagent under study is introduced in the form of an aerosol into a supercooled fog.

The specific yield of crystals formed in a large cloud chamber after starting the reagent is determined by the formula:

$$N = \frac{\frac{S_{ch}}{S_{fr}} \cdot n_{sub}}{m_{reag}}.$$

where m_{reag} is the mass of the introduced reagent, g;

S_{cham} is the area of the reagent application chamber, mm^2;

S_{fr} – the surface area of the substrate in the field of view of the microscope, mm^2;

$n_{sub.}$ – the number of crystals on the substrate, m^{-2}.

Results and discussion

During the thermal sublimation of metals in a water vapor environment at temperatures of 600-800 °C, metal interacts with water:

$$xMe + yH_2O \Leftrightarrow Me_xO_y + yH_2\uparrow.$$

As a result of thermal sublimation of zinc and aluminum in a water vapor medium, clusters of zinc oxide (Fig. 2,A) and aluminum oxide nanoparticles (Fig. 2,B) were obtained.

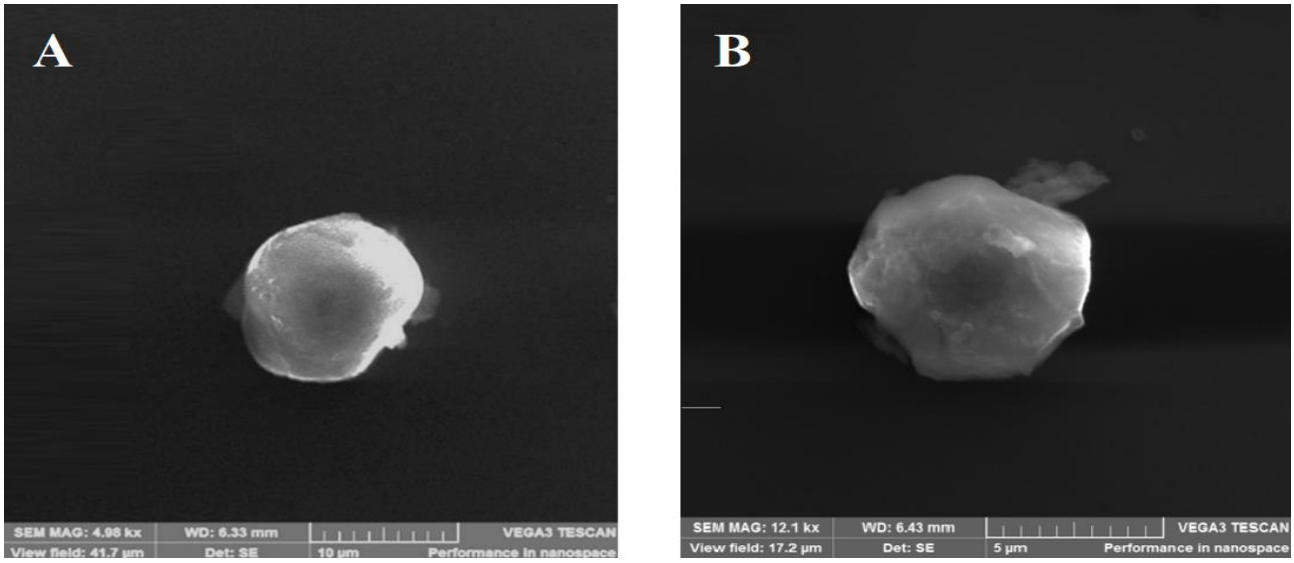

Figure 2. SEM images of the original cluster of ZnO (A) and Al_2O_3 (B) nanoparticles

A series of experiments were carried out to study the ice-forming properties of clusters formed during the sublimation of zinc and aluminum in a water vapor medium. The results of the zinc oxide experiments are shown in the Figure 3. The results of experiments on aluminum oxide are shown in the Figure 4.

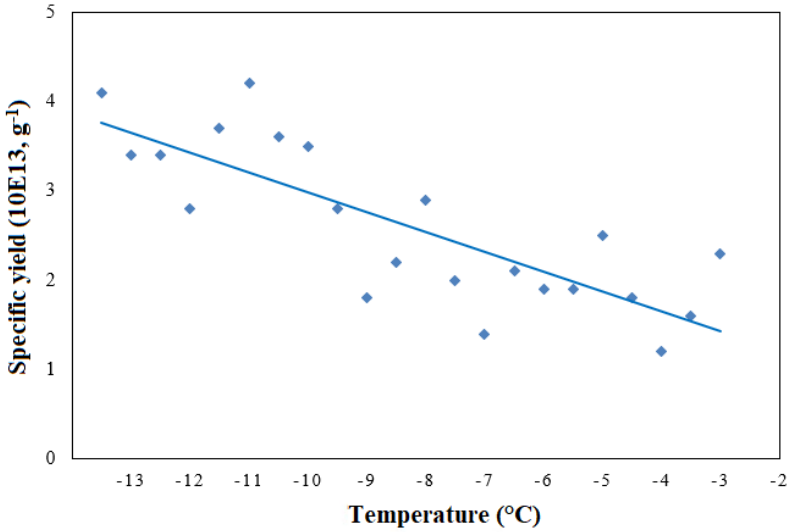

Figure 3. Dependence of the specific yield of ZnO nanotube clusters on temperature

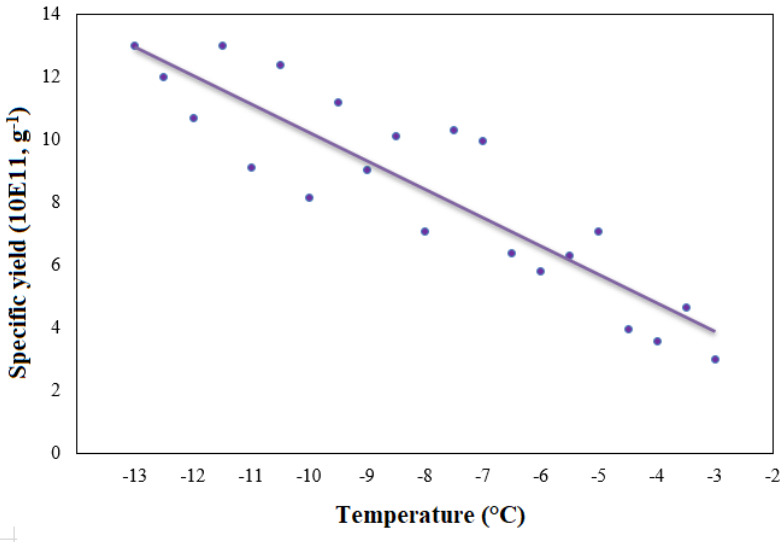

Figure 4. Dependence of the specific yield of clusters from Al_2O_3 nanotubes on temperature

For zinc oxide, a specific yield of ice-forming nuclei was obtained in the temperature range -3...-13 °C from $1,4 \cdot 10^{13}$ to $3,8 \cdot 10^{13}$ g^{-1}. For aluminum oxide, a specific yield of ice-forming nuclei was obtained in the temperature range -3...-13 °C from $4,0 \cdot 10^{11}$ to $1,3 \cdot 10^{12}$ g^{-1}.

The specific yield of ice-forming nuclei from aluminum oxide clusters is 1-2 orders of magnitude less than the specific yield of silver iodide and clusters of zinc oxide nanoparticles. Most likely, this is due to the fact that the nanofibers that make up the aluminum oxide clusters are closed and the effect of water absorption and the formation of an ice-like structure does not work in them. At the same time, a reagent based on clusters of aluminum oxide nanotubes can also be used in the practice of weather modification. Firstly, it has ice-forming activity at temperatures above -6 °C, unlike reagents based on silver iodide. Secondly, aluminum is widespread in nature. Thirdly, zinc and aluminum are much cheaper than silver, almost 300 times.

Conclusion

A technique of conducting experiments has been developed and the results of studying the ice-forming properties of clusters of zinc oxide and aluminum oxide nanoparticles have been obtained. In the temperature range -3...-13 °C, clusters of zinc oxide nanoparticles have a specific yield of ice-forming nuclei from $1,4 \cdot 10^{13}$ to $3,8 \cdot 10^{13}$ g^{-1}. Clusters of aluminum oxide nanoparticles have a specific yield from $4,0 \cdot 10^{11}$ to $1,3 \cdot 10^{12}$ g^{-1}. This is 1-2 orders of magnitude less than the specific yield of silver iodide and clusters of zinc oxide nanoparticles. Nevertheless, studies of the specific yield of ice-forming nuclei of clusters of zinc oxide and aluminum oxide nanoparticles have shown that they have good ice-forming properties and can be a new class of reagents.

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上海合作組織國家經濟整合政策有前景模式形成的金融載體

摘要：文章探討了上合組織成員國一體化聯盟創建和發展的國家經濟政策的生產模式。它的目的是在落實國家一體化經濟政策的所有基本原則的基礎上，確保國家之間建立平等互利的新型經濟關係。作者證實了這一立場，即現階段最相關的是上合組織成員國國家經濟整合政策模式的金融載體的形成，因為在全球動盪和製裁戰爭的條件下，有必要上合組織成員國經濟關係去美元化，向以本國貨幣相互結算的新金融機制過渡。國家經濟整合政策生產模式的金融載體為上合組織向一體化經濟體轉型奠定了堅實的基礎。

关键词：一體化經濟政策，生產模式，金融載體，去美元化，上海合作組織。

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FINANCIAL VECTOR OF FORMATION OF A PROMISING MODEL OF STATE ECONOMIC INTEGRATION POLICY OF THE SHANGHAI COOPERATION ORGANIZATION

Abstract: The article examines a productive model of state economic policy for the creation and development of an integration association of SCO member countries, which is aimed at ensuring a new type of equal, mutually beneficial economic relations between countries based on the implementation of all groups of basic principles of state integration economic policy. The author substantiates the position according to which at the present stage the most relevant is the formation of the financial vector of this model of state economic integration policy of the SCO member countries, since in the conditions of global turbulence and sanctions wars it is necessary to de-dollarize the economic relations of the SCO family countries and transition to a new financial mechanism for mutual settlements in national currencies. The financial vector of the productive model of the state economic integration policy creates a solid basis for the transformation of the SCO into an integration economic association.

Keywords: integration economic policy, productive model, financial vector, de-dollarization, Shanghai Cooperation Organization.

The prospects for the transformation of the Shanghai Cooperation Organization (SCO), as a proto-integration economic structure with the participation of China and Russia, into an integration economic association of countries with developing markets of the "new format" largely depend on the formation of a promising model of the state economic integration policy of the SCO member countries [1].

The productive model as a promising model of state economic policy for the creation and development of the integration association of the SCO countries is characterized by features unique to the modern economic space. These include the following features:

firstly, this is a combination of modern conditions and emerging future trends in the development of the international economy in the "new reality" and new formats of integration associations of countries with emerging markets; secondly, these are favorable grounds for economic growth and innovative development of the SCO countries based on the use of the competitive advantages of having a large economic space and obtaining long-term integration effects of regional economic integration based on institutional mechanisms and forms of interaction; thirdly, this is the

presence of synergistic effects from the addition of the resource potentials of the participating countries in all spheres of the economic space; fourthly, the axiological basis of the state economic policy of creating and developing the integration association of the countries of the SCO family, which forms a new format of regional integration associations ("Shanghai Spirit").

In connection with the 20th anniversary of the creation of the SCO, the "demand for initiatives to promote interaction in building a new type of international relations in the spirit of mutual respect, justice, equality and mutually beneficial cooperation" was emphasized. However, despite optimistic assessments of the path traveled by the SCO, the potential of intercountry relations at the regional level remains untapped in the economic sphere, many competitive advantages of the economies of each country have not been realized, synergy from cooperation in the economic sphere of primary links - small, medium and large businesses - has not been achieved, and Also, financial barriers in trade, economic and investment flows in the SCO economic space have not been overcome. At the same time, at the Samarkand SCO summit (2022) a proposal was made to "transform the SCO into a global economic platform" [2].

A productive model of state economic policy for the creation and development of an integration association of SCO member countries is aimed at ensuring a new type of equal, mutually beneficial economic relations between countries based on the implementation of all groups of basic principles of state integration economic policy [3]. This presupposes a rejection of its focus on recreating a linear (linear-stage) integration model and an "accounting" understanding of the integration good outside its value component – the "Shanghai Spirit".

The innovative content of the productive model of state economic policy for the creation and development of the integration association of the SCO family countries reflects the inclusion of a sociocultural and value element - the "Shanghai Spirit" in the strategic interaction of all SCO countries, including in the most difficult to harmonize and contradictory economic sphere.

At the present stage, the most relevant is the formation of the financial vector of a productive model of the state economic integration policy of the SCO member countries. Since the creation of the SCO, the members of this organization have been tasked with "encouraging effective regional cooperation in credit, financial and other areas of common interest."

The financial vector of this economic policy model is formed primarily on the basis of:

– firstly, the functioning of common financial, investment and banking institutions with the participation of public and private capital of member countries that wished to invest them in the authorized funds of these organizations and created effective mechanisms to support the integration policy of the SCO member states and all entities operating in this economic space.

– secondly, the implementation of a coordinated policy of the central banks and financial authorities of the SCO member states.

Directions and specific proposals for solving the ambitious tasks of creating the financial foundations of the SCO were at the center of discussion at almost all 23 SCO Summits, the last of which took place in July 2023 in New Delhi (India). However, the financial and economic war waged by the collective West against the majority of SCO member countries since 2014, and its acute phase, which began in 2022, especially clearly highlighted the achievements and problems, without solving which a productive model of economic integration policy of the SCO member countries would not be possible. can be formed in practice [4].

One of the practical steps in forming the financial vector of a productive model of economic policy for the creation and development of an integration association of SCO member countries was the creation in 2005 of a flexible organizational structure - the SCO Interbank Association (Interbank Association within the framework of the Shanghai Cooperation Organization), which operates on the basis of the "Agreement on interbank cooperation (association) within the framework of the Shanghai Cooperation Organization)".

The goal of the members and partners of the Interbank Association within the framework of the Shanghai Cooperation Organization, as the leading banks of their countries, is to organize a mechanism for financing and banking services for investment projects supported by the governments of the SCO member states in the field of gas pipeline construction, transport, agriculture, small and medium-sized development business.

In 2023, within the framework of the Interbank Association, landmark documents were signed aimed at accelerating the formation of the financial vector of a productive model of economic integration policy of the SCO member countries. These are, first of all, the “Plan of joint actions of banks - members of the Interbank Association within the framework of the Shanghai Organization for the support and development of intra-regional economic cooperation of the SCO for the medium term (2022-2027)” and “Framework principles for the interaction and cooperation of banks - members of the Interbank Association in within the Shanghai Financial Organization." One of the tools for implementing the provisions of previously adopted and these documents are two credit lines from the State Development Bank of China (SDB) for development banks of SCO member countries in the amount of 30 billion yuan each.

Certain achievements include awareness (or “value cognition”) by the ruling elites, the scientific and business community of the SCO family countries of the need for financial sovereignty and accelerating the transition to payments in national currencies without the participation of the American dollar, which involves practical steps to timely provide financial resources to all investment projects within the framework of investment cooperation and structural restructuring of the SCO economies.

The transition to direct settlements in national currencies between the main economic agents operating within the economic boundaries of the SCO in accordance with the provisions of the “Road Map of the SCO Member States to Gradually Increase the Share of National Currencies in Mutual Settlements” (Samarkand, 2022) can be considered a financial innovation that undermines the role of the American dollar as a global means of payment reduces the need for this currency on the part of economic entities. This is where we should look for the roots of the American authorities’ dissatisfaction with the development of integration relations between countries with emerging markets with the participation of Russia and China and the active use by countries of the collective West of restrictive instruments of financial and economic war, such as disconnecting leading Russian banks from the international interbank system for transmitting information and making payments SWIFT , a ban on any transactions with the Central Bank of the Russian Federation, freezing of banking assets, restricting access to Western capital markets, blocking of Russian cards abroad by Visa and Mastercard payment systems, threats to introduce secondary sanctions against business partners of Russia and China.

In practice for 2022-2023. no less, if not more, was done than during the previous period of formation of the financial vector of a joint productive model of economic policy of the SCO member countries in the field of creating and developing an integration association based on the transformation of this proto-integration formation. According to data announced at the Delhi SCO Summit, over 80% of commercial transactions between Russia and China are carried out in rubles and yuan, and the share of the Russian currency in export transactions with all SCO countries in 2022 exceeded 40%. At the same time, President V.V. Putin noted that it is necessary to “take coordinated measures to remove regulatory barriers, establish the necessary payment infrastructure, and create an independent financial system” [5].

On the Chinese side, on the financial and economic “field” of the SCO member countries, in addition to the Interbank Association, active participants investing in long-term integration projects are Chinese development and support institutions, which include the Investment Promotion Agency of the Ministry of Commerce of the People's Republic of China (Investment Promotion Agency of Ministry of Commerce of the PRC); Department of Foreign Capital and Overseas Investment of National Development and Reform Commission of the PRC; China Council for International Investment Promotion; China Association of Enterprises with Foreign Investment; Beijing Investment Promotion Bureau; Regional investment promotion agencies under local commerce departments (in 30 cities in China) [6].

An essential point that determines the prospects for the formation of the financial vector of a productive model of integration economic policy is the creation of the SCO Development Bank and the SCO Development Fund (Special Account), the need for which has been condemned

intermittently since 2005. These financial institutions would provide not only “acceleration of the creation of an independent regional system settlements and payments by increasing transactions in national currencies"[7], but also neutralized the negative impact of Western institutions on the financing of large infrastructure investment projects (construction of roads and railways, pipelines, energy sector and power grids) along with other financial institutions operating in Asia-Pacific region (Asian Development Bank, Asian Infrastructure Investment Bank, Eurasian Development Bank, New Development Bank and others).

In the context of the constant threat of expanding the use of primary and secondary sanctions from the United States and a number of countries dependent on US policy, as well as the US trade war with China, started by US President D. Trump, the financial block of the state economic policy of countries of integration associations of countries with emerging markets is subject to strength tests. Restrictions on the entry of Russian corporations and banks into international long-term borrowing markets require a certain revision of the relations of the SCO family countries in the financial sector and strengthening the financial block of the state economic policy of creating and developing integration associations of countries with emerging markets with the participation of Russia and China.

Development institutions in the Russian economy under the management of VEB RF (Russian Export Center, SME Corporation, Skolkovo Foundation, Industrial Development Fund, Investment Promotion Fund, Russian Information Technology Development Fund, etc.), Russian Venture Company, Trade and Development Bank of the Economic Organization cooperation, the Astana International Financial Center and other international and national development institutions operating in the Eurasian space have shown their resilience and ability to respond to the challenges of the global financial system, which is at the stage of its reformatting due to the destructive policies of the collective West. In this regard, the potential of all subjects of the financial sphere of the economic integration space of countries with emerging markets should be involved [8].

A certain place in solving the problem of forming the financial vector of a productive model of the economic integration policy of the SCO member countries belongs to such institutions as the Meeting of Ministers of Economy and Trade of the SCO countries and the meeting of the ministers of finance and chairmen of the central (national) banks of the member states and other participants of the SCO family, at which decisions of the Council of Heads of State and the Council of Heads of Government are implemented on specific steps in the formation of a common space for financial cooperation, countering unilateral restrictive measures in international financial relations and the development of settlement and clearing systems, including taking into account the experience of the Asian Clearing Union . Despite the brevity of official reports on the work of these institutions to accelerate steps in the financial sphere of the SCO, one can judge their significant role as highly professional institutions in the economic space of the SCO family countries.

Thus, the financial vector provides resource conditions for the formation and functioning of a productive model of state economic policy for the creation and development of integration associations of countries with developing markets, and its formation creates a solid basis for the implementation of integration projects of the SCO family countries, strengthening vertical and horizontal mechanisms for financial support of two- and multilateral project activities with a “strong integration effect” in the context of global financial turbulence.

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商品供應：要求、原則、影響因素

摘要：產品的採購和配送過程對於整個企業的活動具有重要意義, 因此正確有效地組織零售企業的產品配送和供貨過程顯得尤為重要。

关键词：零售貿易、商品、競爭、商品供應。

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COMMODITY SUPPLY: REQUIREMENTS, PRINCIPLES, INFLUENCE FACTORS
OFERTA DE PRODUCTOS BÁSICOS: REQUISITOS, PRINCIPIOS, FACTORES DE INFLUENCIA

Abstract: The process of purchasing and distributing products is of great importance for the activities of the enterprise as a whole, which is why it is extremely important to correctly and effectively organize the process of product distribution and supply of goods to a retail enterprise.

Anotación. El proceso de compra y distribución de productos es de gran importancia para las actividades de la empresa en su conjunto, por lo que es de suma importancia organizar correcta y eficazmente el proceso de distribución de productos y suministro de bienes a una empresa minorista.

Keywords: retail trade, goods, competition, goods supply.

Palabras clave: comercio minorista, bienes, competencia, oferta de bienes, cadena de distribución de productos.

En el camino del movimiento de bienes de los productores a los consumidores, el eslabón final es el comercio minorista, donde los recursos materiales pasan a la esfera del consumo personal y pasan a ser propiedad del comprador. La entrega de bienes del productor al consumidor es la función principal del comercio y, en consecuencia, de las empresas comerciales.

Hoy en día, para cualquier fabricante e intermediario son importantes las tecnologías racionalmente pensadas, que brindan un canal de promoción de un producto que reduce costos, aumenta la posibilidad de ofrecer servicios adicionales y, como resultado, crea nuevas oportunidades en la competencia para el comprador.

Cada día crece más la lucha por el consumidor; las empresas comerciales se esfuerzan por satisfacer todas las necesidades del consumidor moderno y fidelizarlo a su organización. La satisfacción de las necesidades se logra, entre otras cosas, mediante la ampliación de la gama de productos, porque cada año los consumidores quieren tener productos que sean prácticos, bellos y duraderos y, por lo tanto, imponen exigencias más altas y claramente definidas a los productos.

La posibilidad de satisfacer integralmente la demanda de los consumidores está determinada por la necesidad de asegurar la disponibilidad constante de bienes, creando las condiciones para reducir el tiempo que los compradores dedican a buscar bienes. Garantizar la amplitud, profundidad y sostenibilidad adecuadas de la gama de productos es un requisito previo para mantener la competitividad de una empresa en un determinado segmento del mercado de consumo.

Los principios de suministro de bienes a una red comercial minorista son [1]:

1. Programación: los productos se entregan a las tiendas según programas que prescriben el tamaño de lote óptimo y la frecuencia de entrega requerida.

2. Ritmo: la entrega de productos a las tiendas se realiza a intervalos de tiempo relativamente iguales, lo que ayuda a prevenir la aparición de exceso de existencias y a crear condiciones de trabajo favorables para los participantes en el sistema de suministro de productos básicos.

3. Eficiencia: entrega sistemática de bienes en la cantidad y surtido requeridos de acuerdo con la demanda.

4. Rentabilidad: implica un mínimo de costos para la compra, almacenamiento y entrega de bienes. Esto se puede lograr mecanizando el almacén y las operaciones de carga y descarga, el uso racional de los vehículos y estableciendo una cadena de suministro eficaz.

5. Centralización: la entrega de mercancías a las tiendas está garantizada por los esfuerzos y medios del proveedor.

6. Fabricabilidad: implica una modernización constante de las soluciones tecnológicas de la cadena de suministro de productos básicos. Esto incluye la contenedorización, el embalaje de mercancías y el uso de equipos de embalaje.

Existen dos formas de suministro de mercancías: tránsito y almacén. Ambas formas pueden tener sus pros y sus contras dependiendo de los bienes suministrados y de ciertas condiciones tales como: volumen de facturación, tamaño del inventario, equipo de almacén, etc.

La forma de tránsito de suministro de bienes se refiere a la recepción de bienes comprados en las tiendas directamente de los proveedores fabricantes.

Permite eliminar operaciones comerciales y tecnológicas en el almacén de intermediarios, como la aceptación, almacenamiento y despacho de mercancías, por lo que se reduce la necesidad de almacenes; reducir las pérdidas de productos básicos y acelerar la rotación, así como reducir los costos de transporte y el número de transbordos de mercancías. Pero, lamentablemente, esta forma sólo es aplicable cuando el mercado de consumo está muy concentrado, para productos de gama simple, perecederos, producidos en empresas locales y en situaciones en las que el volumen del lote suministrado es suficiente para llenar un paquete de carga.

En una situación en la que es necesario desagregar lotes de bienes recibidos de proveedores, subclasificar bienes de un surtido complejo y crear existencias remanentes estables que aseguren un suministro constante e ininterrumpido de la red de distribución minorista, existe la necesidad para crear enlaces de almacén intermedios. En este caso, es más racional utilizar una forma de suministro de mercancías en almacén.

Podemos hablar de la eficacia del uso de las formas de suministro de bienes anteriores en el caso de que los consumidores reciban una amplia gama de bienes, haya un aumento en la facturación y se minimicen los costos de llevar los bienes a los consumidores.

La elección de la forma de suministro de bienes está influenciada por muchos factores. Los factores principales son [1]:

– especialización y volúmenes de empresas manufactureras;
– tamaño del lote de pedido óptimo;
– tamaño de las empresas comerciales;
– estado y ubicación de los almacenes;
– formación y equipamiento técnico de procesos comerciales y tecnológicos;
– desarrollo de infraestructura de transporte y otros.

Todos ellos deben cumplir los requisitos de una organización racional del suministro de bienes:

– tipo de producto y nivel de preparación para la venta al por menor;
– propiedades físicas y químicas de los bienes;
– discrepancia entre la producción y el consumo de bienes en el espacio y el tiempo (estacionalidad);
– profundidad de surtido.

El suministro racional de una red de comercio minorista está significativamente influenciado por la elección del método de entrega de los bienes. Sólo hay dos de ellos.

El primer método se llama descentralizado. Se supone que los empleados de la tienda recogen de forma independiente los productos del almacén del proveedor. Al mismo tiempo, los empleados de la tienda tienen la oportunidad de familiarizarse con el surtido de mercancías en el sitio, así como, durante la carga, realizar la aceptación por cantidad.

Este método de entrega de mercancías distrae a los empleados de las tiendas de realizar el trabajo principal de organizar los servicios para la población, conduce a un aumento en los costos de transporte debido al hecho de que las tiendas utilizan con mayor frecuencia los servicios de empresas de transporte que mantener su propia flota de vehículos y, como resultado, un aumento en los costos de distribución.

El método centralizado permite a los empleados de la empresa concentrarse en las responsabilidades principales, lo que requiere menos personal y agiliza el uso de los vehículos.

La base para la entrega centralizada de bienes son las solicitudes de la tienda para la entrega de bienes. Por ello, las partes deben definir un procedimiento y tiempos claros para su preparación y presentación a los proveedores. La entrega centralizada de mercancías implica la entrega de mercancías a la tienda estrictamente de acuerdo con los cronogramas establecidos [3].

El cronograma es el cronograma de entrega de mercancías a la tienda. Los cronogramas compilados y acordados disciplinan a los proveedores y destinatarios de bienes y contribuyen a un mejor uso del transporte y el espacio minorista. En este caso, primero se trazan rutas lineales y luego se forman rutas circulares.

Un lugar importante en el sistema de suministro de productos básicos lo ocupa el transporte, ya que es el eslabón de conexión entre todos los participantes de la cadena. La velocidad de circulación de las mercancías, su seguridad, así como el suministro ininterrumpido de mercancías a las tiendas minoristas depende de la elección correcta y el uso racional del vehículo, lo que en última instancia ayuda a reducir los costos de distribución y aumentar la eficiencia de la organización en su conjunto [3].

Existe transporte terrestre, marítimo y aéreo. En el comercio, se utilizan con mayor frecuencia dos tipos de transporte terrestre:

1. Transporte por carretera, que suele utilizarse para transportar mercancías en distancias cortas y medias "de puerta a puerta". Pero a veces su uso se justifica para el transporte de mercancías perecederas a larga distancia. Una gran parte de las mercancías se entrega a la red del comercio minorista mediante transporte por carretera, que, a su vez, se divide en vehículos de uso general y especializados (furgonetas, frigoríficos, etc.). Estos últimos se utilizan para el transporte de mercancías que requieren condiciones especiales de transporte.

2. Transporte ferroviario. Con su ayuda se transportan grandes cantidades de mercancías a largas distancias, mientras que su coste es menor que en el transporte por carretera. El transporte de mercancías por ferrocarril se realiza mediante vagones universales y especializados, cisternas y material rodante aislado [3].

Las mercancías que no requieren mantenimiento ni cuidados especiales se transportan en vagones universales y determinados tipos de carga (camiones harineros, portacoches, etc.) se transportan en vagones especializados. La carga líquida se transporta en cisternas y las mercancías perecederas que requieren protección del medio ambiente se transportan en material rodante isotérmico (vagones termo, vagones frigoríficos, etc.).

El transporte de mercancías por vías navegables se realiza mediante transporte marítimo y fluvial. El coste del transporte es mucho menor que el de la carretera y el ferrocarril. El transporte por aguas interiores transporta mercancías a zonas remotas donde otros modos de transporte están poco desarrollados.

Cuando uno de los criterios importantes para el transporte es la rapidez de entrega, conviene utilizar el transporte aéreo. Pero debido al alto costo del transporte, este tipo de transporte se utiliza para entregar mercancías a largas distancias a regiones de difícil acceso o para transportar mercancías urgentes.

Como proceso separado en el sistema de suministro de mercancías, se distingue la circulación de mercancías, que se entiende como el proceso de movimiento físico de bienes desde el fabricante hasta los lugares de venta o consumo [2].

Este proceso se puede ver desde dos lados:

– desde el lado organizativo y económico, cuya base son las actividades comerciales de todos los participantes en la cadena de distribución. Aquí estudiamos las condiciones del mercado, determinamos la variedad y necesidad de los productos adquiridos, analizamos el mercado de productos y los competidores, monitoreamos a los proveedores y construimos asociaciones con los más rentables, así como otras operaciones no relacionadas con el movimiento físico de mercancías.

– desde el punto de vista tecnológico, que es como una continuación del proceso productivo e incluye una serie de operaciones. Estos incluyen: transporte de mercancías desde el fabricante a través de mayoristas hasta la cadena minorista, operaciones de carga y descarga y el proceso comercial y tecnológico en almacenes, montaje del surtido comercial, operaciones en la propia tienda, venta de mercancías a los clientes y prestación de servicios adicionales.

Los bienes, que pasan de las empresas manufactureras a los consumidores finales, pasan a través de un cierto número de eslabones, que se entienden como almacenes de empresas mayoristas y minoristas. Si hay demasiados enlaces, la empresa pierde el contacto directo con los fabricantes e incurre en costes adicionales. Por lo tanto, cuantos menos eslabones intermedios haya en el camino de los bienes, más eficientemente se organizará el proceso de distribución de bienes.

El coeficiente de vinculación de la distribución es la división de la suma del volumen de negocios minorista y mayorista por el volumen de negocios minorista. Muestra cuántas veces se vende un producto en el ámbito de la circulación de mercancías.

Los siguientes factores influyen en la distribución de bienes:

– ubicación y características específicas de las empresas que producen bienes;

– las características específicas y el volumen de actividades de las empresas mayoristas;

– tamaño del lote que se envía al mismo tiempo;

– ubicación del fabricante o proveedor desde el lugar de consumo;

– desarrollo de enlaces de transporte;

– el número de empresas comerciales y la escala de sus actividades [1].

Un sistema de suministro de productos básicos bien construido garantiza un nivel óptimo de inventario, la máxima satisfacción de la demanda de los consumidores y también es la base para el funcionamiento exitoso de la empresa y para garantizar su competitividad en el mercado.

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主動預算作為公共財政發展的一種形式

摘要：該工作總結了實施各種主動預算實踐的主要方面。在準備過程中，採用了比較分析方法、系統方法、分析科學文獻的其他一般邏輯方法，以及社交媒體和品牌分析媒體監測分析系統的分析報告數據，致力於解決主動性問題。

关键词：金融、公共财政、主动預算、品牌分析。

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PROACTIVE BUDGETING AS A FORM OF PUBLIC FINANCE DEVELOPMENT

Abstract: The paper summarises the main aspects of implementation of various practices of proactive budgeting. In the process of preparation the methods of comparative analysis, system approach, other general logical methods of analysing scientific literature were used, as well as data from analytical reports of the system of monitoring and analysis of social media and mass media Brand Analytics, dedicated to the problem of proactive budgeting.

Keywords: finance, public finance, proactive budgeting, Brand Analytics.

The current stage of development of public finance in the Russian Federation is characterised by an increase in the openness, transparency and accessibility of the budget process, as well as an increase in the level of involvement of citizens in decision-making regarding the directions of budgetary funds use. One of the key tools used to involve citizens in the management of budgets of public-law entities is initiative budgeting.

The Ministry of Finance of the Russian Federation considers initiative budgeting as a general name used to designate a set of practices involving citizens in the budgetary process in the Russian Federation, united by the ideology of civic participation, as well as the sphere of state and municipal regulation of public participation in identifying and selecting projects to be financed from the funds of the respective budgets and subsequent control over the implementation of selected projects by citizens.

Participatory budgeting is one of the most actively developing forms of public finance. The practices of proactive budgeting that are implemented in the Russian Federation are widely covered by the media in social media, while the issues of choosing types of sources, loyalty and involvement of the audience, handling negativity and misunderstanding remain unexplored, which suggests the need for additional detailed study with the help of modern systems of monitoring and analysis of social media and mass media.

The relevance of research on proactive budgeting as a form of public finance development is a significant problem in the scientific sphere, as it highlights important aspects of the organisation and functioning of the financial system of the state, including the processes of formation, distribution and use of budgetary funds [1; 2]. Conducting research in this area contributes not only to an in-depth understanding of the principles and tools of public finance management, but also has significant importance for the development of effective strategies of financial development, ensuring the sustainability of state finances, as well as for balancing the distribution of resources between social needs and the stimulation of economic growth.

The development of the theory of economic mechanisms and financial categories is closely related to classical scientific approaches in economics, management and business practice, such as system and process approaches. The works of researchers such as L. Gurvits, R. Myerson, E. Maskin, L.I. Abalkin, A.Yu. Chalenko and others, serve as a basis for the development of this area.

It should be noted that Russia has had a Unified Budget System Portal since 2013, which publishes information on the budget system and budgetary structure, forms, amounts and directions of state support to legal entities and individuals, the structure of the public sector, etc. The majority of regions of the Russian Federation and their municipalities have implemented the practice of creating web platforms that provide access to open data on regional and municipal budgets. Most regions of the Russian Federation and their municipalities have implemented the practice of creating web platforms that provide access to open data related to regional and municipal budgets [3, p. 58].

The main objective of the research is to study in detail all aspects of the development of initiative budgeting as a form of public finance development in the Russian Federation with the help of Brand Analytics social media and mass media monitoring and analysis system, in accordance with which the following tasks were set:

1) assessment of the general receptivity of the population of the Russian Federation to the topic of budget investment

2) assessment of the most popular and discussed budget investment practices in mass media and social media

3) monitoring of interest to the topic of initiative budgeting of different age groups of the population from different Russian regions depending on the day of the week.

The relevance and the need for further study of the peculiarities of development of initiative budgeting is confirmed by the annual launch of new practices, the emergence of original mechanisms, the adoption of legal acts that enshrine the basis for the functioning of initiative budgeting [4, p. 123].

Using Brand Analytics we analysed the attitude of social media users to participatory budgeting in general and to the application of participatory budgeting practices in the Russian socio-economic space.

We analysed the receptivity of the population of the Russian Federation to the topic of budget investment during a week (22 – 28 August 2023). During this period, 3634 authors of social media expressed their opinions on the topic of proactive budgeting, the total number of messages was 6848, engagement (the sum of comments, likes and reposts of messages) -50900, loyalty (the ratio of positive messages to negative messages) – 9,1.

Table 1

Susceptibility of the population
of the Russian Federation to the topic of budget investment

Messages	Authors	Involvement	Loyalty
6 848	3 634	50 900	9,1

The dynamics of messages on the topic of initiative budgeting for the analysed period shows that on average 1077 to 1421 messages are published per day on weekdays, on weekends there is a decrease to 329-409 messages.

The distribution by tone and its dynamics repeat the trend of the dynamics of messages on the topic of proactive budgeting, while it should be noted that on weekends the negative tone is noticeably reduced, while the positive tone remains stable.

Analysis of the distribution of messages by sources and their types allows us to conclude that messages are mainly published in social networks and news forums of Vkontakte, Odnoklassniki, Telegram and Yandex.Zen.

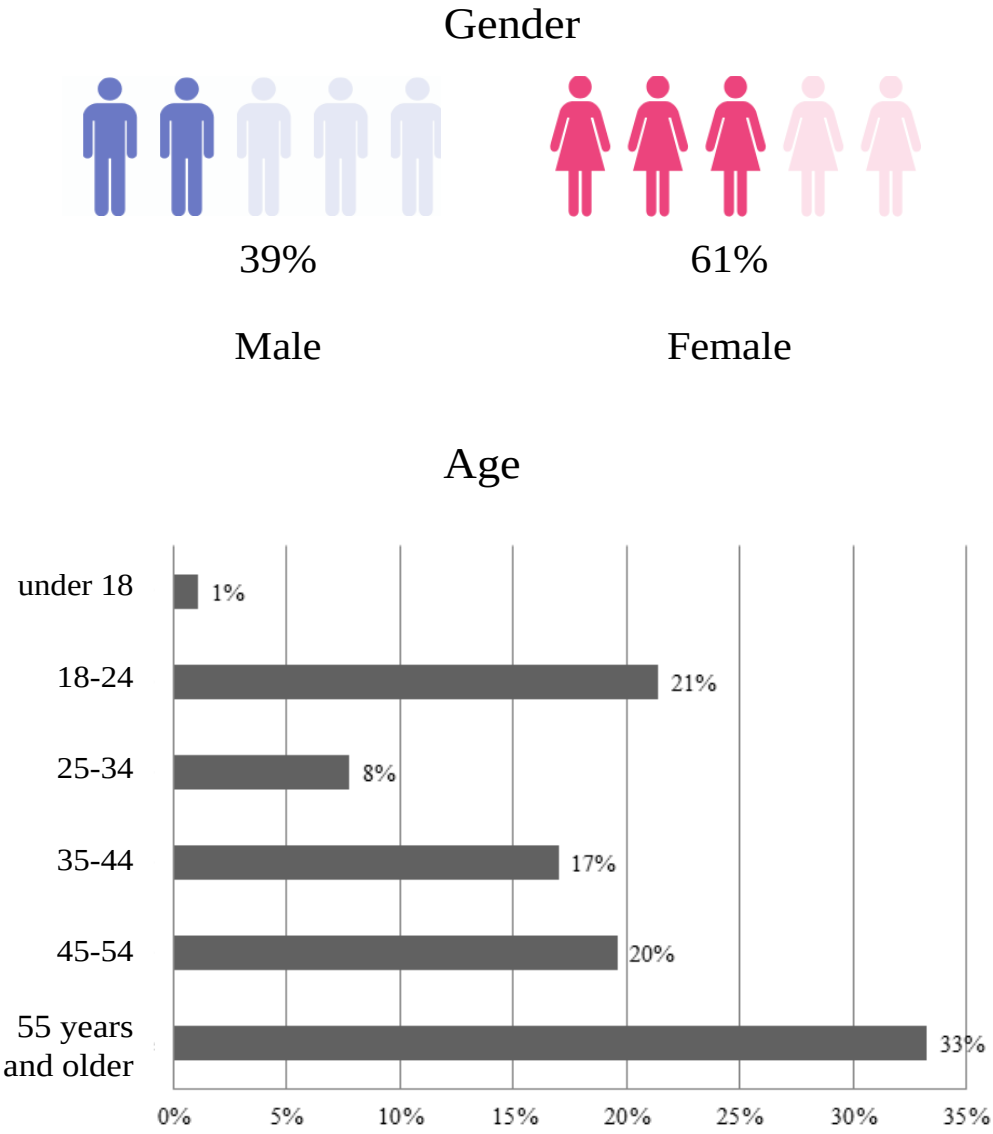

Figure 1 – Estimation of gender and age
of authors of the topic of proactive budgeting

The audience of authors includes mainly women (61%) and men (39%). This indicates that the interest in the topic of proactive budgeting on the part of both genders is comparable, and both groups are engaged in the study, discussion and publication of materials related to this topic.

Analysing the sources of reports the audience of authors on the topic of proactive budgeting is represented by both men and women, with different age composition. All ages mainly use social networks Vkontakte and Odnoklassniki, it is characteristic that with age the authors begin to take a critical approach to the practice of implementation of proactive budgeting, as evidenced by the increase in the proportion of messages with a negative tone.

The participation of more experienced authors and experts together with the interest of young people indicates a wide range of people engaged in studying and discussing the topic of initiative budgeting. This allows the creation of diverse and promising materials, enriching the discussion and contributing to the development of practices and ideas in this area.

Table 2

Top 10 Russian regions on the topic of initiative budgeting presented in mass media and social networks

Regions	Messages	%
Perm Territory	261	8,8%
Khanty-Mansiysk Autonomous Okrug – Yugra	201	6,8%
Chelyabinsk region	132	4,5%
Krasnodar region	129	4,4%
Ulyanovsk region	124	4,2%
Udmurt Republic	118	4,0%
Sverdlovsk region	111	3,8%
Novgorod Oblast	109	3,7%
Chuvash Republic – Chuvashia	105	3,5%
Primorsky Krai	102	3,4%
Others	1567	53,0%

All regions of the Russian Federation participate in the topic of initiative budgeting, the ten most active are presented in the table.

Next, we will focus separately on a new region of the Russian Federation – the Donetsk People's Republic, where the topic of participatory budgeting only started to be implemented from 01.07.2023, i.e. less than two months ago.

Table 2

Main aspects of messages on the topic of participatory budgeting in the DPR presented in the media and social networks

Tag	Messages	Audience	Involvement	Tonality	Loyalty
DPR	66	55 236	305	20	20,0

Based on the analysis of the general receptivity of the Russian Federation population to the topic of budget investment using the Brand Analytics monitoring system, the following conclusions can be drawn:

The assessment of the general receptivity of the population of the Russian Federation to the topic of budget investment using the Brand Analytics monitoring system allows us to conclude that proactive budgeting is the dominant form of public finance development, as it has more than 6848 mentions per week (the number of messages containing a mention of the monitored object), 3634 unique authors, the sum of comments, likes and reposts of messages is 50900 (engagement) and the tone is 9.1 (the ratio of the number of positive messages to negative ones), which indicates that the number of comments, likes and reposts.

The assessment of the most popular and discussed practices of budget investment in mass media and social media using the Brand Analytics monitoring system made it possible to identify potential areas for improved communication. Thus, the analysis allowed us to conclude that the topic of proactive budgeting is of interest primarily to authors aged 55 and older, with Vkontakte and Odnoklassniki being the traditional sources of social media for them. The largest share of authors falls on the age groups of 45-54 years (20%) and 55 years and older (33%). It is interesting to note that young people aged 18-24 make up 21% of the authors' audience. This indicates that even among young people there is interest in the topic of proactive budgeting, possibly related to their awareness of the role of financial decisions in society and the desire to contribute to public affairs.

A comparative analysis of references to budget investment on weekdays and weekends, including an assessment of the number of publications, number of unique users, distribution by tone and other indicators, led to the following conclusion: this decrease may be due to a combination of factors, including changes in public activity, media schedule, editorial priorities and the presence of

significant events on certain days. On weekends, people usually have more free time and tend to spend it on leisure, family life, entertainment or other interests, leading to a decrease in interest in political and social topics, including initiative budgeting. Consequently, the demand for such news and publications may be lower on weekends, which is reflected in the publication statistics.

The topic of proactive budgeting is actively discussed and engaged in all regions of the Russian Federation, in the Donetsk People's Republic, where the introduction of proactive budgeting has just begun to be implemented during the analysed period, 66 messages were published with a total audience of 55,236 people. The presence of discussions on the topic of proactive budgeting in all regions of Russia indicates that this topic is relevant and is of interest to various communities and authors throughout the country, which indicates the importance of this topic in the context of public management and financial planning [5, p. 39]. Development of the practice of proactive budgeting in the Donetsk People's Republic: indicates the presence of positive colouring in 20% of reports, which indicates a good attitude and support for this initiative from the public in the Donetsk People's Republic.

Thus, analysis of the resulting data can help to better understand public reactions to budget investment, identify successful strategies and areas for improving implementation practices, and make informed decisions when planning and implementing budget programmes.

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遠東現代社會經濟進程的特殊性

摘要：本文致力於探討遠東地區現代社會經濟進程的具體情況，這是由該地區地緣政治地位的特殊性所決定的；考慮了解決遠東問題的方法，包括優先發展地區的發展

关键词：具體情況、社會經濟進程、地緣政治情勢、經濟問題、解決方案、優先發展領域。

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SPECIFICITY OF MODERN SOCIO-ECONOMIC PROCESSES IN THE FAR EAST

Abstract: the article is devoted to the specifics of modern socio-economic processes in the Far East region, determined by the peculiarities of the geopolitical position of the territory; ways to solve the problems of the Far East were considered, including the development of priority development areas.

Keywords: specifics, socio-economic processes, geopolitical situation, economic problems, solutions, priority development areas.

The importance of the chosen topic is explained by the fact that the center of geopolitical influence has moved from the countries of old Europe and the United States to the Asia-Pacific region. There is a fierce struggle for economic and political dominance between China, the United States, Japan and Russia, due to the specifics of each country's development. Russia has always had its interests in the East, it is one of the strongest militarily and resource–wise countries. In addition, countries are developing here, which in the recent past did not play any role in global economic and political development. Now the situation has changed radically. These countries are entering the world stage and, obviously, will soon be forced to reckon with themselves. Among these countries, Vietnam, showing high rates of economic growth, especially due to the development of the recreational sector, Korea, if united, will be a serious problem, because one part has advanced technologies and ranks 13th in global industrial production, and the other – the necessary resources for this production. The Russian Far East is located next to the Asia-Pacific region. Through this territory, Russia has free access to the seas and the Pacific Ocean from a geopolitical point of view. In addition, the Far East has always historically played the role of Russia's military and political outpost in the east, and the economic and political future of the country depends on how this region will develop.

The Russian Far East is a very specific and problematic territory from a socio-economic point of view. What makes it specific is: remoteness from the center of Russia, a huge territory (more than 40% of the entire territory of the country or more than 6 million sq. km.) and a very insignificant population density (less than 5% of the population or more than 6 million people); the presence of the richest reserves of mineral and biological resources in the world; free access to the seas and oceans; geographical proximity to the economically rapidly developing countries of Northeast Asia.

International transport corridors pass through the region, connecting two powerful centers: Europe and Asia, the European Community and the Asia-Pacific Region [Rossiyskaya Gazeta 2005: 21].

The wealth of the mineral resource base still determines the place of the Russian Far East in the territorial division of labor as a source of raw materials for the Russian economy and contributes to the priority development of raw materials-extracting industries and branches of the military-industrial complex. A narrow sectoral structure deprives the region of economic maneuver, which complicates the development of the territory and threatens economic and national security in the Far Eastern Federal District.

A serious economic problem in the Far East is the backward industrial, transport and social infrastructure. Therefore, one of the important tasks is the development of an innovative economy, based on new and emerging technologies, as a means of solving certain issues in the region. This includes updating the mineral resource complex, increasing the low competitiveness of Far Eastern products, and developing the transport complex, including its infrastructure. All this will help counter the loss of huge “real money” and labor, which jeopardizes the development of the region’s production base.

An important socio-economic problem is the problem of labor resources, which play a certain role in the development of pioneer regions and are characterized by increased migration and weak consolidation in the territory [Motrich 2013: 29 – 35].

Migration, while providing the regions with the missing labor force, simultaneously contributes to the outflow of the economically active population, which worsens its demographic structure and destroys the labor potential of the region. Problems: unequal replacement of indigenous Far Easterners, professional, well-trained, with unskilled labor from neighboring countries, with the exception of Ukraine and Belarus; a large influx of Chinese citizens, many of whom are staying in the Russian Far East illegally. Migration processes must be regulated using various forms and methods, levers and incentives, combining the interests of the state and the region. Such a specific method of securing the workforce is regional regulation of wages (meaning the budgetary sector), the components of which are regional coefficients and bonuses for length of service. It is their use that should become a priority in generating income for the Far Easterners, but this is a topic for another discussion.

Since the region’s economy is deformed due to narrow industry specialization and poor development of production and social infrastructure, a precedent is being created: highly qualified personnel in the conditions of the scientific and technological revolution become unemployed and socially vulnerable, which is absurd, while the raw materials industries use mainly unskilled labor . The solution is seen in the development of production, production infrastructure, the creation and placement of processing industries capable of creating a finished product from raw materials, which is always more expensive than raw materials, the exchange of which creates favorable conditions for the region’s transition to the market. These industries will involve skilled labor in the production process, which is capable of creating value greater than it costs itself, and this is a source of higher wages and financing of all types of programs, both industrial and social. In addition, in order to consolidate the population in the region of the Russian Far East, it is important to create and use social infrastructure, social incentives: to fully expand and strengthen opportunities for further education, prestigious professions that are in demand in the labor market, for which purpose expand the network of educational institutions at various levels. This is important for young people, whose share in migration flows is quite large and which in the future remains the main source of population reproduction as the economic basis of labor resources, and the main source of labor.

Thus, the Russian Far East is the most problematic territory with a low level of economic development, which must be taken into account when choosing regional policy and determining paths for the development of the region. This is the prerogative of the state, which must in every possible way support such a powerful region as the Russian Far East.

Solving important problems of a socio-economic nature, projects that implement geopolitical goals in the Far East, requires large financial expenditures on the part of the state and taking into account a new concept for the development of the region. The concept is based on the integration of Russia into the global world through real resources that can be effectively invested in the development of the region. The growth rate of the entire Russian economy, the country's political influence in the Asia-Pacific region, and the economic and political security of both the territory and Russia as a whole largely depend on the successful implementation of the industrial potential of the Far East. These same processes will contribute to the integration of the Far East into a single national economic space of Russia.

The goal of integrating the region into the Asia-Pacific economic space is a sharp increase in centralized investments for the normal functioning of the economy and business. The economy of the Far East should be integrated into a chain of integrated production serving the territory of Northeast Asia. It is important to direct state centralized investments not to the entire territory of the Far East, but to continuous development zones - the south of the Khabarovsk Territory, Primorye, the southern part of Sakhalin and to cities - socio-economic centers of development of the territory: Khabarovsk, Vladivostok, Yuzhno-Sakhalinsk. In these cities, the main emphasis should be on the development of production and infrastructure of all types, but especially social: a high-quality medical care system, cultural and educational system, etc. The main thing is the rapid formation and comprehensive development of infrastructure, deep processing of resources, which is attractive for domestic and foreign investors. The first steps in this direction are three basic transcontinental projects.

The first project is the reconstruction and modernization of the Trans-Siberian container bridge "APR - Europe", which, thanks to the high technical condition of the railways, will allow transporting 164 thousand containers per year (at the beginning of the 80s, favorable economically, there were 136 thousand containers in year). Transport communication "APR - Europe" is the development and modernization of the infrastructure of ports, railways, the development of road and transport transportation. The goal of the project is to organize seamless logistics chains while creating a single operator “sea - terminal - road. Projects such as the formation of the Vanino-Sovgavan transport hub, the reconstruction of the Oune – Vysokogornaya section, the international transport corridor “Harbin – Big Ussuriysky Island – Vanino”, etc. also deserve attention.

The second basic project is a transregional energy bridge. Since the consumption of electrical energy in Asian countries will, according to expert forecasts, increase, the Far East can offer significant reserves of electricity - from 2 to 5 billion kilowatt-hours annually.

The third basic project is the construction of the Taishet – Tynda – Skovorodino – Khabarovsk – Nakhodka oil pipeline. The branch of the oil pipeline from Tynda to Komsomolsk-on-Amur will give impetus to the development of the port of Vanino.

The main energy projects that can have a decisive impact on the economy of the Far East are: the Kovykta gas project, the Eastern Siberia - Pacific Ocean oil pipeline, the development of the Elginsky coal deposit in the South Yakut coal basin, the Eastern Siberia - China energy bridge, which is based on construction of 600 kV power lines with a length of up to 2800 km. The possible volume of electricity exports from existing hydroelectric power plants and thermal power plants in Eastern Siberia is 15-18 billion kWh; the Sakhalin-Japan energy bridge based on the construction of a natural gas thermal power plant on Sakhalin with a total capacity of 4 million kW; Electricity will be transmitted via a 500 kV line and undersea cable with transfer to Japan of up to 25.5 billion kWh per year.

All of the above projects are promising and cost-effective, and subject to their successful implementation, the Far East will strengthen its position in the market for trading fuel and energy products with Asia-Pacific countries. But there is one “but” here.

In recent years, many projects, despite their investment attractiveness, have not found their investors and remain frozen for a long time. The government is trying to solve this problem, including through the creation of new programs. Huge amounts of money were spent on the development of

the city of Vladivostok, about 65 projects were implemented and more than 500 investors were attracted. Attracting investment to the Far East and creating a more favorable investment climate in its regions have become one of the most important government tasks. Investment portals have already been created in the region and strategies have been adopted. Active work to improve it is underway in all regions of the Far Eastern District.

In the implementation of the economic, social, political and other tasks set for the Far East, a certain role is played by the use of new forms of management - territories of advanced development (TAD) as a continuation of the idea of using special economic zones [Marzekhanova 2019: 55 – 61]. In this regard, it is necessary: 1. to take into account the negative experience of creating special economic zones in the Far East; 2. create profitable business regimes that promote the influx of investment from domestic and foreign capital; 3. take into account both state support and support from authorities at various levels. In addition, it is necessary to work out a real mechanism for implementing the assigned tasks, which fits as much as possible into the natural environment of regional reproduction, and does not compete with or replace the created and functioning structure of regional production.

Of the modern TADs, these criteria are fully met by the potential growth poles “Komsomolsk” (innovative processing cluster), “Bolshoi Kamen” (ocean engineering), and “Priamurskaya” (oil refining). Thus, the Far East, due to its geopolitical significance for Russia, is constantly in the center of attention of the federal government. It is important to emphasize here that only the political will of the state can really help the Far East solve its problems. At the same time, it is important to remember that the creation of TAD is not the only way to accelerate the pace of socio-economic development of the Far East. The main thing is strategic economic thinking in relation to the Russian Far East, a systematic solution to its problems.

The basic principles of creating TAD are based on the application of the best practices of the Asia-Pacific countries and include tax incentives, low rates for payment of insurance premiums, special customs regime and land use procedures, and the creation of infrastructure at the expense of the state. The main thing is to develop the latest technologies, the latest methods and methods of management and obtain a result that will significantly improve the level and quality of life of the Far Eastern residents, that is, contribute to the implementation of the basic economic law. As of 2023, there were 17 TADs operating in the Far East, the most popular area being logistics and transport. In second place are construction and development, and in third place is tourism, including travel organization and development of tourism infrastructure. In terms of investment volume, the oil, gas and chemical industries take first place, where investors have invested about 1.5 trillion rubles. When creating and operating TAD, it is important to avoid inconsistency and competition of interests of various federal ministries in the territory, which is manifested in over-organization and the emergence of an excessive number of different instruments of federal support for entrepreneurship in local areas. In addition, excessive enthusiasm for the creation of territories with special regimes gives rise to inflated expectations from their implementation, treating them as a means that can solve all the problems in the region. However, in conditions of a shortage of investment and labor resources in the economically extensive and underdeveloped spaces of the Far East, TADs act as forms of management that will make it possible to intensify socio-economic processes in the territory of the Far East as a whole.

Considerable funds are allocated from the federal budget to the regions for the development of TAD infrastructure. This money is used to build roads, energy networks, public infrastructure facilities, and solve other problems.

The results of the policy of creating TAD in the regions are already visible: new production facilities are being launched in a variety of industries, new enterprises are being built; the number of jobs is increasing. The main strategic and tactical task of the authorities is to consolidate the population living in the Far East as the basis of the workforce and increase the level and quality of their life [Putin 2024].

Thus, the prospects for the development of the modern economy and the solution of important geopolitical and socio-economic problems of the Far East are not bad at all. Development continues and the TAD concept is greatly helping the development of the Far East.

A sign that the state has turned its face to the Far East is the holding of the first and second Far Eastern Economic Congresses and Far Eastern Economic Forums and Conferences (2005 - 2023).

An analysis of the most promising projects for 10 constituent entities of the Russian Federation included in the Far Eastern Federal District shows that the main efforts are focused on infrastructure development and deep processing of raw materials, which will make the region's economy more flexible in market conditions. The logical chain is as follows: development of industrial and social infrastructure – jobs – wages – taxes – investments. At the same time, the main emphasis is on the formation of a middle solvent class, the share of which should be 45-47%.

Thus, the basis of the state's new approach to the economy of the Russian Far East is its desire to keep the latter within the framework of Russia. The reason is the importance of the region in the light of the implementation of the country's national interests in the east. The concept of development of the territory of the Russian Far East must necessarily take into account its interests, determined by the specific geographical, economic and political situation. This is the key to the successful development of such a powerful and promising region as the Far East and ensuring Russia's national security.

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