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of Modern Science
Development**

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SECTION I. Physical sciences

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APPROXIMATE ANALYTICAL SOLUTIONS OF NONLINEAR STATIONARY PROBLEM OF THERMAL CONDUCTIVITY IN HEATING WITH INTERNAL SOURCES DEPENDING ON THE TEMPERATURE

Abstract: The material medium of heat propagation is always associated with the thermal signal of the structural units. If the heat transfer process is complex, then for its research will be used the methods generalizing the results of various simple methods. One of these methods is the phase plane method. Therefore, it is proposed a stationary distribution of the heat flux as a function of temperature in condensed media. Such analysis is necessary at the stages of algorithmization of nonlinear boundary value problems and verification of models.

Key words: heat equation, stationary state, phase plane, critical conditions, heat flow, temperature.

At present, for the purpose of thermal protection, it is increasingly being used materials with low coefficients of the thermal conductivity, which, as a rule, increase with increasing temperature. The problems associated with nonlinear heating of condensed structural media construction from the action of internal sources of heat have an important scientific and practical interest [1-4]. In solving these problems, the most important task is to determine the dependence of the heat flux from the temperature at which the amount of heat received from a source cannot be completely removed from the structure for given boundary conditions of heat exchange. Such heating regimes lead to an unlimited increase of temperature in the structure and, ultimately, to its thermal destruction. To determine the dependence of the heat flux from the temperature, it is necessary to have an approximate solution of the corresponding boundary-value problem [5, 6].

An effective method of solving the heat conduction problems for nonlinear heating of condensed media of structures is a method based on the application of some test mathematical parameters (regularization, relaxation of heat flux) [7, 8].

Consider a condensed medium which has on the surface $x = x_0 = 0$ it is given a zero temperature velocity and heat flux density, as well as on the surface $x = x_n = h$ value it is given a temperature velocity and heat flux density. The process of heat propagation into the positive half of the condensed medium of variable (q, T) , since the parameters of surface are the same. Therefore, the boundary conditions for the temperature and density of the heat flux can be written in the form:

$$\begin{aligned} \left. \frac{dT}{dx} \right|_{x=0} &= 0 \quad u \quad q|_{x=0} = 0; \\ -\lambda \left. \frac{dT}{dx} \right|_{x=h} &= \alpha(T_1 - T_2) \quad u \quad q|_{x=h} = \alpha(T_1 - T_2), \end{aligned} \quad (1)$$

where T_1 and T_2 respectively, the temperature at the beginning and end of the sample, and α – coefficient of heat transfer $\left(\frac{\text{Вт}}{\text{м}^2 \cdot \text{с}} \right)$; h – sample length (m).

Mathematical modeling of thermal conductivity for determining the steady-state temperature of condensed media in a construction with nonlinear internal heat sources, taking into account (1) in this case will

have the form [7, 8]:

$$\begin{cases} \frac{dT}{dx} = -\frac{q}{\lambda} - \eta_1 T, \\ \frac{dq}{dx} = \varphi(T) - \eta_2 q, \end{cases} \quad (2)$$

where $T = T(x)$ – temperature in point x , (K), $q = q(x)$ – the density of the heat flux at the point x $\left(\frac{\text{Вт}}{\text{м}^2} \right)$; $\eta_1 = \frac{\mu - 1}{x + \varepsilon - (\mu - 1)(x + \varepsilon)^\mu}$, $\left(\frac{1}{\text{м}} \right)$, and

$\eta_2 = \frac{1 - \mu(\mu - 1)(x + \varepsilon)^{\mu-1}}{x + \varepsilon - (\mu - 1)(x + \varepsilon)^\mu}$, $\left(\frac{1}{\text{м}} \right)$, number of components, characterizing the

coefficients of the heat equation in a condensed medium. At $\eta_1 + \eta_2 = 0$, that is, when $\mu = 0$, the medium has the shape of a flat vessel, and when

$\eta_1 + \eta_2 = \frac{1}{x + \varepsilon}$, that is $\mu = 1$ vessel has cylindrical shape, and at

$\eta_1 + \eta_2 = \frac{2}{x + \varepsilon}$, that is $\mu = 2$ the vessel assumes a spherical shape, and ε

small parameter ($0 \leq \varepsilon < 1$). Function $\varphi(T)$ describes the nonlinear heat exchange between the body and the environment.

We will consider the state of equilibrium and stability of the system. Equating the left-hand sides of equation (2) to zero, we obtain:

$$\begin{cases} -\frac{q}{\lambda} - \eta_1 T = 0, \\ \varphi(T) - \eta_2 q = 0. \end{cases} \quad (3)$$

The solution of the system of equations (3) makes it possible to determine a singular point in the phase plane (T, q) . Depending on the value of the function $\varphi(T)$, it is possible to have an infinite number of equilibrium states, that is, equation (3) can have an infinite set of solutions that can be stable or unstable. Thus, the state of equilibrium is a singular point in which the heat flux density merges with the energy flow, that is $T(x_*) = q(x_*)$.

The nature of the equilibrium state is determined by the roots of the characteristic equation (2). Depending on the direction of heat exchange between the body and the environment, we will have one of the cases of the equilibrium state. Steepness of function $\varphi(T)$ determines the state of equilibrium.

However, it is often impossible to find an analytical solution of the system of equations (3). In this case, we apply known methods from the theory of differential equations that allow not solving explicitly the equations (2) to determine the nature of the steady state, the stability or the instability of its solution. In doing so, we use some properties of the right-hand sides of equation (2), as well as features of transient processes near the stationary state $\varphi(T)$. We emphasize that such general characteristics of complex systems of equations are, as a rule, of greatest interest.

A complex system can have several stationary states, which correspond to the presence of several roots in the algebraic equations (3) to determine the coordinates of the stationary point. In the case of one variable, the curve intersects the abscissa axis at several points, in each of which the function $\varphi(T)$ vanishes.

Any of these points $(\bar{T}_1, \bar{T}_2, \dots)$, in which the function $\varphi(T)$ vanishes, is an equilibrium state. Depending on the values of various parameters of the system or constants, as well as the heat flux, the equilibrium state changes and, in addition, in the system it can be realized different stationary structures. With further heating of the substance, the density of the heat flux varies in space. Therefore, in order to investigate the nature of the change in the value of q in space with a change in temperature, we determine, using equations (2) ratio $\frac{dq}{dT}$. As a result, we obtain the following equation:

$$\frac{dq}{dT} = \frac{-\lambda\varphi(T) + \lambda\eta_2 q}{q + \lambda\eta_1 T} = F_1(T, q) . \quad (4)$$

Here the right-hand side of equation (4) is denoted by $F_1(T, q)$. This means that we will be interested in the nature and number of equilibrium states in the system as a function of the quantity q . Stationary points $T = \bar{T}$ are determined from equation

$$F_1(T, q) = 0 \text{ or } \varphi(\bar{T}) - \eta_2 q = 0 . \quad (5)$$

Using equation (5), we investigate how the image point moves along the integral curves on the phase plane. As q represents the heat flux density $q > \eta_1 T$, in this case in the upper phase half-plane, the point representing the point moves so that the temperature T increases, and at $q < \eta_1 T$, in the lower half-plane, T decreases. In this way, it is determined the direction of temperature motion along the phase trajectories.

From the equation (5) immediately it is followed the circumstance already noted by us that at any point of the phase plane the representing point has a finite and nonzero velocity, with the exception of equilibrium states in which

$$q = -\lambda\eta_1 T \text{ и } \varphi(T) = \eta_2 q .$$

Due to these conditions, all equilibrium states are located in the phase plane, on the axis T , and their abscissas satisfy the equation $\varphi(T) = \eta_2 q$.

Now we study the curves in the phase plane (q, T) , in which the tangents to the phase trajectories have the same slope. If the dynamical system is described by equations (4), the tangents to the phase trajectories are given by

$$\frac{\lambda(\eta_2 q - \varphi(T))}{q + \lambda\eta_1 T} = k , \quad (6)$$

where k – is the coefficient of heat transfer $\left(\frac{\text{Вт}}{\text{м}^2 \cdot \text{К}} \right)$.

Giving to k – different values, we obtain a family of tangents to the phase trajectory. On the phase plane we construct a certain number of tangents necessary for constructing a phase trajectory. The closer the tangents are to each other, the more precise it will be possible to draw a phase trajectory.

The equation of the tangent to the phase trajectory can be obtained from expression (6): $q = \frac{\lambda(\eta_1 k T + \varphi(T))}{\lambda\eta_2 - k}$, at $\lambda\eta_2 \neq k$. (7)

For a clear interpretation of the obtained results, using the expression (7), let us perform a numerical calculation of the dependence

of the heat flux density on the temperature change. During the performing of the numerical calculations, the function $\varphi(T)$, we take in the following form: $\varphi(T) = \alpha_1 T - \alpha_2 T^3$, where α_1, α_2 - coefficients of proportionality, coefficient values α_1 and α_2 , λ and x taken from the work [9, 10].

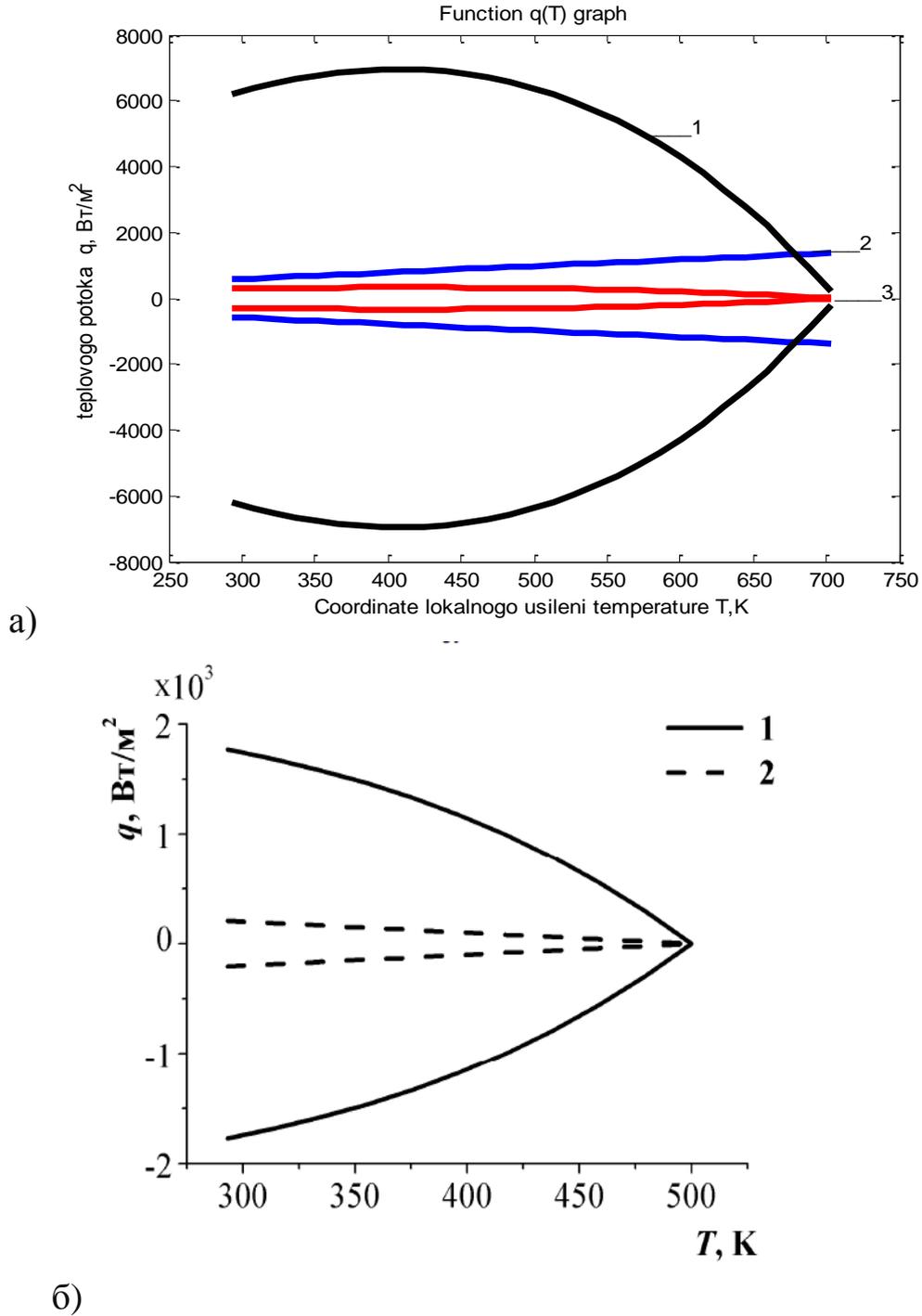


Fig. 1. The dependence of the heat flux on the temperature change on the phase plane ($\mu = 0; 1; 2$): a) the curve 1 represent separatrices $q(T)$ of T ; 2 border conditions; 3 source heat exchange; b) results of work [9].

In the algorithm for solving the problem, we construct on the phase plane the structures that determine the behavior of the solution of the boundary value problem. Setting the temperature T and solving equation (6) regarding to the variable q , we obtain the coordinates of the separatrix branches. On the Pic. 1 it is shown the images of non-linear problems on the planes (T, q) . Analysis on the Pic.1 a), shows that the nonlinearity of the heat source leads to an increase in the heat flux by an order of magnitude, practically over the entire temperature range 293-700 K in the phase plane.

On the phase plane (T, q) the temperature distribution in the medium will be a small segment of the vertical straight line, located near the abscissa axis. Numerical solution of the problem of temperature distribution in a medium [9] allows us to calculate the temperature gradient in the shell. It is approximately equal to $10^3 K/m$ (Look at Fig.1 b)). In fact, the solution of the problem on the plane (T, q) is on the abscissa axis. On the Fig.1. a) this solution will be continuous, representing a practically vertical line passing through a point on the abscissa axis with the temperature coordinate between 300 K and 350 K.

Thus, in the phase plane (T, q) has only one stationary state: $T = -\frac{1}{\eta k} \varphi(T)$. This is the steady state of the uniform temperature field of the reacting mass upon heating. Moreover, the stationary state is achieved by the release of thermal spontaneous combustion in the system when the substance is heated.

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SECTION II. Chemical sciences

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CHARACTERISTICS OF OXIDIZING PROCESSES IN WHEAT GRAINS DURING STORAGE

Abstract: Oxidizing processes in lipids of winter wheat varieties were studied during storage during the year. The degree of oxidation of lipids was determined by the stage of oxidation using two methods: classical and Hara-Totani. It was established that the oxidation of lipids in wheat grains occurs in two stages: - during the first 16 weeks, the peroxide number slowly increases; - after 16 weeks of storage, the peroxide number increases rapidly. Changes in wheat moisture due to the breathing process during storage are an important factor in the oxidation of lipids.

Introduction

Grain crops are of particular importance not only for human nutrition but also as the main raw material for many of areas of food processing industry. Grain crops are plants with common physiological parameters. Grain varieties can be divided into two groups: a. natural crops such as wheat, rye, barley, oat; b. miliary crops such as millet, sorghum, corn.

Wheat (*Triticum* sp.) is the species of grass family and numbers about 16 varieties which differ in head, flower and grain structure and some other peculiarities (colour, etc.). A grain of natural cereals has an elongated form with apparent hairiness (brush) on the top of the grain and a long crease going along the center of caryopsis. In our country there is spring (annual) and winter (perennial) wheat cultivation. Sale of cereals all over the world is carried out according to the classification and international measures of weight where there are the following classes of wheat: class 1-5 – food wheat, and class 6 – feed wheat.

Anatomy structure and composition of a wheat grain

In the longitudinal and cross section of a wheat grain the well discerned are the brush (hairiness), fruit and seed coat, aleurone layer, endosperm and a germ. The fruit coat consists of several semitransparent cells which contain fiber, mineral salts and vitamins. The seed coat contains less fiber but more minerals. The fruit and seed coat are not of any nutritive value. Under the coats there is an

endosperm. The outer layer of an endosperm – the aleurone layer – is enriched in lipids, proteins, mineral salts and vitamins. These substances are hardly assimilated since they have coarse coatings consisting of fiber. During the grain processing the coatings and the aleurone layer are removed.

Endosperm is a valuable nutritive component of a grain which compounds 80%-82% of its weight. It contains proteins, carbohydrates, lipids and is used for preparation of groats and flour.

The germ compounds an average of 3% of the grain weight. It contains a lot of lipids, protein, carbohydrates, vitamins and enzymes. The germ is of high nutritive value, but during production of groats and flour it is removed. Lipids contained in the germ easily become rancid during storage causing food spoilage.

The chemical composition of a wheat grain includes the following components: water – 12%-16%, proteins – 8%-25%, carbohydrates – 50%-70%, lipids – 2%-8%, mineral substances – 1%-2,5%. The chemical composition depends on the variety of wheat and growing conditions; it changes during the storage of grain and determines the quality of wheat.

The wheat grain growing conditions constitute a set of technical measures applied for the purpose of exercising effect on the physical and biochemical processes occurring in the grain weight. These measures are aimed at preservation of grain in certain conditions. The main goal of the technical measures is preservation of quality and quantity of grain at the optimal level of energy consumption.

Freshly harvested wheat grains have a range of peculiarities both physiological and technological. These peculiarities may be explained by the fact that during harvesting the wheat does not reach its full ripeness and the resynthesis processes are not completed yet. At the first stage of storing wheat (postharvest ripening) in favourable conditions the germination index increases and the technological parameters of grains improve.

Material and methods of research

The subject of research is presented by winter varieties of wheat such as Sorrel and Natalka, harvest of 2016. The wheat was harvested in July after which it was stored for period of 12 months.

Extraction of lipids was performed every week by the application of the Soxhlet method during 6 hours using petroleum ether as a solvent.

For the lipids produced peroxide number was determined, it was expressed as moles of active oxygen (peroxide) per 1000 grams of lipids.

During the storage of grain the lipid composition changes on the chemical level when exposed to the chemical processes – nonenzymic and enzymic. According to Bach and Engler’s peroxide theory and the theory of academician Semenov oxidation of lipids occurs in 3 stages: - *induction* – no oxidizing transformations chemically-defined can be found; - *primary products* – formation of primary products of oxidation, in particular peroxide compounds, takes place. The reaction starts with formation of free radicals coupling with oxygen thus forming peroxide; - *end products* – dehydrogenation of the new fatty acid molecule by the peroxide radical and formation of hydroperoxide and a new radical, and then the chain continues. As a result radicals, peroxides and hydroperoxides accumulate producing off-odour and off-flavour.

Peroxide number may be expressed as the following:

- number of ml of 0.1N sodium thiosulfate solution used for titration of free iodine as a result of interaction of peroxides of 1 gram of lipids with KI;
- number of grams of iodine isolated from potassium iodide using peroxides, in 100 grams of lipids;
- equivalent parts of active oxygen per 1 gram of lipids.

The study of peroxide number was carried out using two methods:

- classical method – GOST (national standard) 26593-85;
- method of Hara-Totani – potentiometric determination.

Determination of peroxide number of vegetable oil extracted from the wheat samples using the classical method was carried out pursuant to the requirements of GOST 26593-85 – Vegetable oils. Peroxide number determination method.

Determination of peroxide number of vegetable oil extracted from wheat seeds using the method of Hara-Totani. Equipment – microburets, potentiometer with platinum electrode, magnetic stir bar; reagents – chloroform, glacial acetic acid, saturated potassium iodide solution, 0.1N sodium thiosulfate solution and analyzed samples.

Calculation of peroxide number

Peroxide number of oil under study was calculated using the formula:

$$I.P. = \frac{(V - V_m) \times F \times N \times 1000}{m} \text{ (mEO}_2\text{/kg)}$$

where:

V – volume of 0.001N sodium thiosulfate solution used for titration of the analyzed substance, in ml;

V_m – volume of 0.001N sodium thiosulfate solution used for titration in the control test, in ml;

m – sample weight of a substance under study, in grams;

F – correction factor for 0.001N sodium thiosulfate solution;

N – normality of 0.001N sodium thiosulfate solution.

Results and discussion

The advantage of method of Hara-Totani comparing to the classical method.

The results obtained using the potentiometric titration method are more precise than the results obtained based on the classical method since determination of equivalence point is more sensitive due to sudden modification of electrode potential at the equivalence point.

The equivalence point calculation was carried out using the least square method on the potentiometric titration curve within the range of greatest modification of electrode potential. Special software was used for calculation.

The experiment involved using small amounts of oil which may vary depending on the peroxide number (20 mg of oil if the peroxide number is greater than $1\text{mEO}_2/\text{kg}$ of lipids and 100 mg of oil if the peroxide number is less than $1\text{mEO}_2/\text{kg}$ of lipids).

The experimental data confirm that this method is more precise (the sensitivity threshold is approximately 90-100 times greater) than the classical method. Potentiometric titration method involves using far less saturated potassium iodide solution than in the classical method.

Proceeding with cooling the titration vessel we obtained more precise data than applying the classical method since the solubility of potassium iodide is affected by temperature.

The results are represented by a diagram in Figure 1.

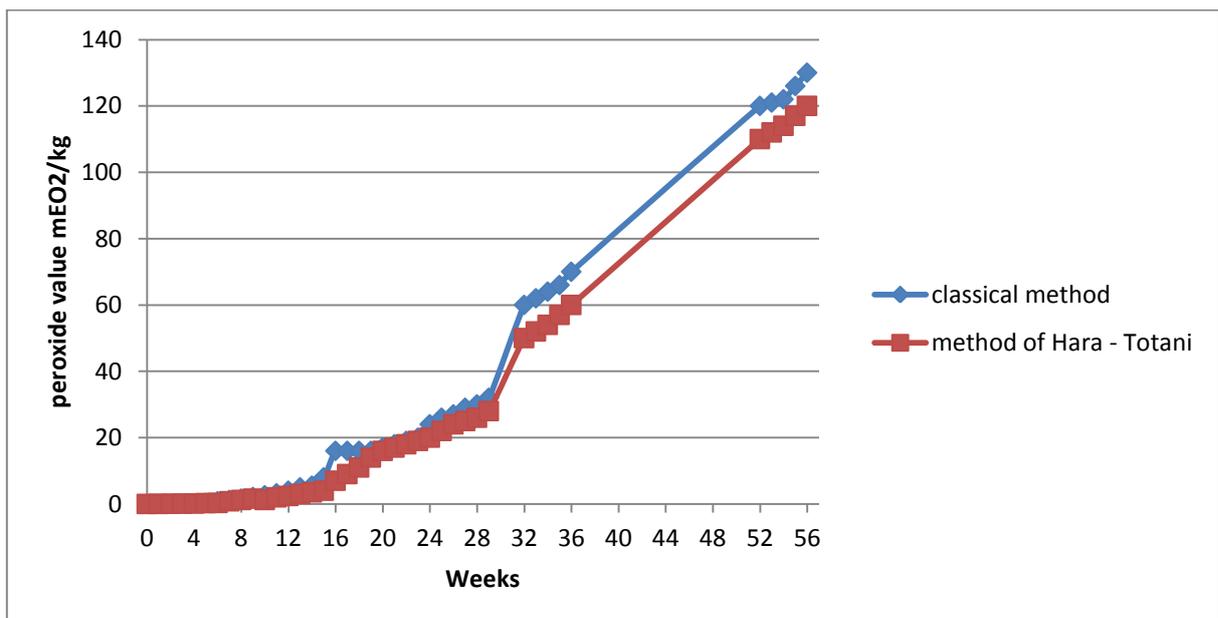


Figure 1. Peroxide number for the oil samples extracted from wheat

The experimental data indicate the oxidation of lipids during two storage periods. During the first week of grains storage the peroxide number increases very slowly reaching the mark 19mEO₂/kg of oil (the value is permitted by GOST) after 16 weeks of storage. Since that moment the oxidation rate increases and on the 12th month of storage the peroxide number of wheat grain lipids grows.

The classical auto-oxidation scheme is used for the explanation of lipids oxidation which occurs in 3 stages: the induction stage, primary oxidation products formation, and end oxidation products formation. Also a couple of kinetic models were proposed for oxidation of lipids in foods based on first and second-order chemical reactions.

The peroxide number for unimolecular decomposition was determined by the following expression:

$$PV^{1/2} = PV_0^{1/2} + \frac{1}{2} K_a t; a \leq t < t_b$$

In case of bimolecular decomposition:

$$PV^{\frac{1}{2}} = PV_b \times e^{kb(t-tb)}; tb \leq t$$

where:

PV- peroxide number, mE/kg;

PV₀ – peroxide number in the control test mE/kg;

Vb – peroxide number at the moment of tb, mE/kg;

Ka – constant [mE/kg]t⁻¹;

kb – constant, t⁻¹;

tb – time for reaching the point (19 mE/kg of oil), on the lipids oxidation degree curve.

During the first months of storage low concentrations of hydroperoxides were due to lipids oxidation – unimolecular initiation. Having reached the critical value the bimolecular mechanism becomes the main factor controlling the oxidation process. It was experimentally proved that the values of Ka obtained during unimolecular reaction depend on the storage conditions registering increasing values as the temperature grows.

Conclusion

Insignificant increase of peroxide number registered within 1-16 weeks was caused by the process of grain breathing and consequently the rise in temperature. The main processes providing a cell with energy are photosynthesis, chemosynthesis, breathing, fermentation and glycolysis as the stage of breathing. By the breathing process the grain crops receive energy due to nutrition of organic matters, first of all – by means of carbohydrates assimilation. Carbohydrates catabolism may occur in two ways: aerobic and anaerobic. In aerobic breathing

conditions the carbohydrates end products are CO₂ and H₂O. Oxygen demand necessary for this process together with presence of CO₂ in the systems lead to delay of lipids oxidation reaction. In order to avoid acceleration of lipids oxidation processes occurring in the wheat grains during storage the aeration control is required. Moreover, the intergranular air moisture must not exceed 7.5%, and the concentration of CO₂ must not go above 16%.

Findings

Thus, for determination of oxidizing processes degree (peroxide number) in wheat grain lipids during storage expressive and sensitive method of Hara-Totani was applied. It was established that this method is more sensitive and precise in determination of peroxide number of oils.

Summary

Oxidizing processes in lipids of winter wheat varieties during storage during one year were studied. The lipids oxidation degree was determined by the stage of peroxide oxidation using two methods: classical method and method of Hara-Totani. It was established that oxidation of lipids in wheat grains occurs in two stages: - during the first 16 weeks the peroxide number slowly increases; - after 16 weeks of storage the peroxide number increases rapidly. Changes in wheat moisture due to the breathing process during storage are an important factor in the oxidation of lipids.

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BREAKING TENSION ANALYSIS OF MODERN UNINSULATED STEEL REINFORCED ALUMINUM CONDUCTORS IN DEPENDENCE TO ITS ARRANGEMENT

For the last decade a lot of Russian and foreign innovative conductors entered the modern 35-750 kV power supply lines market [1, 2]. Modern non-insulated steel reinforced aluminum ASHS type cables have 7 different arrangements with variable number and diameter of steel core strands and aluminum part [4].

The I - 1x35(K(1+6)+K(14+14)) ASHS type arrangement is shown in the Fig. 1. K stands for plastic cable embossing (ratio of cable external diameter to internal).

The paper presents the AS 240/56 and ASHS 277/79 types cables breaking tension analysis and benchmarks. The cables specifications are listed in the table 1.

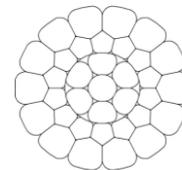


Fig. 1. I-arrangement ASHS type wire

Table 1 - AS 240/56 and ASHS 277/79 types specifications

Wire type	Nominal cross-section area, mm ²	Unembossed cable diameter, mm	Embossed cable diameter, mm	Steel core diameter, mm	Core steel strand diameter, mm	1 st core layer diameter, mm	2 nd aluminum strand layer diameter, mm	3 rd aluminum strand layer diameter, mm
AS 240/56	241/56,3	22,4	22,4	9,6	3,20	3,20	3,20	3,20
ASHS 277/79	277,3/78,8	25,5	22,4	10,75	4,0	3,75	2,90	4,10

We will find the cross-section area for each layer by formula:

$$S = \frac{\pi \cdot d^2}{4} \quad (1)$$

For ASHS 277/79 type wire:

- cross-section area of core steel strand:

$$S_{core\ steel\ strand} = \frac{3,14 \cdot 4,0^2}{4} = 12,566\ mm^2 \quad (2)$$

Same as previous we can find the cross-section areas of the 1st core layer, 2nd and 3rd aluminum strand layers:

$$\begin{aligned} S_{core\ layer\ 1} &= 11,045\ mm^2; \\ S_{aluminum\ layer\ 2} &= 6,605\ mm^2; \\ S_{3\ aluminum\ layer\ 3} &= 13,203\ mm^2. \end{aligned}$$

For AS 240/56 wire consists of same diameter strands, then the cross-section area of each layer is equal to $S_{AS\ strand} = 8,038\ mm^2$.

According to GOST 839-80 “Uninsulated wires for aerial power lines. Specifications”, breaking tension of multistrand wire can be found by formula [5]:

$$P = \sum_{i=1}^{n_a} Pa_i + \sum_{i=1}^{n_s} Ps_i \quad (3)$$

Where Pa_i is for breaking tension of one aluminum strand,

n_a - number of aluminum strands,

Ps_i - breaking tension of one aluminum strand,

n_s - number of aluminum strands.

According to the table “Appendix 4” of GOST 839-80, ultimate tensile strength for 2.9, 3.2 and 4.1 mm strands equal to:

$$\sigma_{2,9} = 170\ \frac{MN}{m^2}; \quad \sigma_{3,20} = 165\ \frac{MN}{m^2}; \quad \sigma_{4,10} = 160\ \frac{MN}{m^2}.$$

Breaking force P_{max} can be defined by the following formula:

$$P_m = \sigma_i \cdot S \quad (4)$$

For ASHS 277/29 wire:

-breaking force of 2.9 mm strand:

$$P_{m(2,9)} = \sigma_{2,9} \cdot S = 170 \cdot 10^6 \cdot 6,605 \cdot 10^{-6} = 1122,85\ N \quad (5)$$

- breaking force of 4.1 mm strand:

$$P_{m(4,10)} = \sigma_{4,10} \cdot S = 160 \cdot 10^6 \cdot 13,203 \cdot 10^{-6} = 2112,48\ N \quad (6)$$

Fore AS 240/56 wire:

- breaking force of 3.2 mm strand:

$$P_{m(2,9)} = \sigma_{2,9} \cdot S = 165 \cdot 10^6 \cdot 8,038 \cdot 10^{-6} = 1326,27\ N \quad (7)$$

In accordance with GOST 830-80 breaking force of steel strand should be determined at 1% elongation strain. For this purpose we will use the unit elongation formula:

$$\varepsilon_{elongation} = \frac{\Delta l}{l} \quad (8)$$

Where Δl stands for elongation,

l - initial strand length.

Elastic modulus formula:

$$E = \frac{\sigma}{\varepsilon} = \frac{\frac{P_{max}}{S}}{\frac{\Delta l}{l}} = \frac{P_m \cdot l}{\Delta l \cdot S} \quad (9)$$

From this we can define:

$$P_m = \frac{E \cdot \Delta l \cdot S}{l} \quad (10)$$

Elastic modulus for steel equals to $E = 206 \cdot 10^9 \frac{N}{m^2}$;

According to GOST 9850 the sample strand length is $l = 0,2 m$
[3].

For ASHS 277/79 wire:

-breaking force of 4.0 mm diameter core steel strand:

$$P_{m(4,0)} = \frac{206 \cdot 10^9 \cdot 0,002 \cdot 12,566 \cdot 10^{-6}}{0,2} = 25885,9 N \quad (11)$$

-breaking force of 3.75 mm diameter core steel strand:

$$P_{m(3,75)} = \frac{206 \cdot 10^9 \cdot 0,002 \cdot 11,045 \cdot 10^{-6}}{0,2} = 22752,7 N \quad (12)$$

For AS 240/56:

$$P_{m(3,20)} = \frac{206 \cdot 10^9 \cdot 0,002 \cdot 8,038 \cdot 10^{-6}}{0,2} = 16558,3 N \quad (13)$$

After we substitute the values in formula 3 we will find the breaking tension of:

- ASHS 277/79:

$$P_{ASVP} = 207696,9 N$$

-AS 240/56:

$$P_{AS} = 155696,2 N$$

Thus, according to the calculations it should be noted that higher breaking tension of a conductor can be reached by increasing the cross-section area with constant external diameter by steel and aluminum strands embossing, providing an opportunity for increasing conductor capacity and decreasing amount of deflections.

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EXPORT AND IMPORT OF ELECTRICITY BY THE UNITED ENERGY SYSTEM OF RUSSIA IN 2016

At present, the world has a difficult political and economic situation. States are trying to find allies, to make friends among other countries, to establish economic cooperation. One of the points of economic cooperation in the energy sphere is the export and import of electricity. Therefore, the establishment of exports and imports with the countries of near and far abroad is an urgent task for the Russian energy industry.

The unified energy system of Russia (UES of Russia) consists of seven Unified Energy Systems (UES). At the same time (synchronously) there are ECO of the Center, the North-West, the Middle Volga, the South, the Urals, and Siberia. At the same time, the energy systems operating in the ECO of the East form a separate synchronous zone, the points of separation of which for the 220 kV transit from the ECO of Siberia are established operatively, depending on the developing balance of both power networks (picture 1) [1].



Picture 1. Unified Energy System of the Russian Federation

The power complex of the UES of Russia includes about 700 power plants with a capacity of over 5 MW. On January 1, 2017, the total installed capacity of the UES power plants was 236,343.63 MW. The generation of electricity by the power plants of the UES of Russia for 2016 amounted to 1048,456.5 million kWh. Electricity consumption in 2016 was 1,026,855.9 million kWh [2].

The energy systems of many countries operate in parallel and together (unintentionally).

The UES of the Center works in parallel with the energy systems of the two CIS countries-Belarus and Ukraine. In 2016, Russia exported electricity to these countries in the amount of 2,542.0 million kWh and 1310.4 million kWh, respectively.

The UES of the North-West provides parallel operation of the UES of Russia with the power systems of the Baltic States (Lithuania, Latvia, Estonia) and Belarus. So through the North-West IPS in 2016, Russia imported electricity from Estonia in the amount of 1,472.9 million kWh, and to Lithuania, Latvia and Belarus, Russia exported electricity in the amount of 2,247.9 million kWh and 1088.3 million kWh and 488.0 million kWh, respectively [3].

Russia exports electricity through the UES of the North-West to the countries of Scandinavia (Norway, Finland). So, electricity is supplied in Norway by TGK-1 from Borisoglebskaya HPP-8, which is part of the Pasvsky cascade, working with UES of Russia in parallel. The maximum power of delivery can reach 56 MW, the transmission power is 28 MW in normal operation mode [4]. In 2016 the volume of electricity delivered to Norway was 59.3 million kWh [3].

The supply of electricity to Finland - this is a particularly interesting topic for the authors. It is realized both in alternating current and in direct current. In an alternating current, TGK-1 supplies electricity to Finland from the cascade of the Vuoksinsky HPPs (Lesogorskaya HPP-10 and Svetogorskaya HPP-11) in the Leningrad Region. The maximum power supply is 76 MW. Also, electricity from the company's capacities goes to Finland from the Paszsky cascade in the Murmansk region, from HPP-4 Kaitakoski. The maximum power of delivery reaches 70 MW in the flood [4]. The power system of Finland and Russia operate in parallel.

With regard to the transmission of electricity by direct current, it is carried out through the insert of the direct current Vyborg, which was built to export electricity from the USSR to Finland. The operation began in 1981. The transmission of electricity by direct current was chosen for economic reasons. If a conventional AC line were used, the

electrical systems of the USSR and Finland would need to be synchronized. Synchronization costs would exceed the economic effect of exports. Thus, the energy systems of Russia and Finland in this case work together. The power transmission line connects the Vyborgskaya substation (400 kV) with the substations of Yullikkal and Kumi (400 kV). From the Kamennogorskaya substation (Kamennogorsk), a 330 kV airline has been laid to the Vyborg substation (Perovo settlement), where an alternating current of 330 kV is converted into a direct current of a two-pole line-insert ± 85 kV (about 200 m long within the substation). At the other end of the insert, the direct current is inverted to an alternating voltage of 400 kV and goes to consumers in Finland [5]. The station consists of 4 independent thyristor converter units operating at a constant voltage of ± 85 kV; the capacity of each unit is 355 MW. Thus, the transmitted power is 1420 MW [6]. The total volume of electricity supplied to Finland in 2016 was 5,880.6 million kWh.

The UES of the Middle Volga operates with the energy system of Kazakhstan in parallel. In 2016, Russia exported electricity to Kazakhstan in the amount of 75.3 million kWh.

UES of the South operates with the energy systems of six countries in parallel. From Azerbaijan, Russia imported in 2016 electricity in the amount of 60.6 million kWh. In the rest of the world, Russia exported electricity in 2016 to the following extent: to Ukraine - 2799.9 million kWh; to Georgia - 125.3 million kWh; in South Ossetia - 151.6 million kWh; to Abkhazia - 139.0 million kWh; to Kazakhstan - 72.8 million kWh.

UES of Ural works with the energy system of Kazakhstan in parallel. In 2016 the export of electricity to this country amounted to 2,273.8 million kWh. UES of Siberia operates in parallel with the energy systems of the two countries-Kazakhstan and Mongolia. In 2016, Russia exported electricity to these countries in the amount of 544.7 million kWh and 265.3 million kWh, respectively [3].

The UES of the East operates in parallel and in conjunction with the power system of China. The supply of electricity to China is similar to the supply of electricity to Finland. According to the authors, the export of electricity to China is a promising direction of the Russian energy sector.

The first electricity supplies to China began in 1992 along the line 110 kV Blagoveshchenskaya-Heihe in the framework of cross-border trade. Then, since 2006, when Russia and China reached the first agreements in the field of electricity supply from Russia to China,

electricity supplies increased, which indicates the positive development of Russian-Chinese economic relations. Now, exports with China on alternating current are carried to the northern regions of China via two transmission lines: the two-circuit 220 kV Blagoveshchenskaya-Aigun airline and the 110 kV Blagoveshchenskaya-Heihe airline. Here, the energy systems of the two countries operate in parallel.

As for DC transmission, in 2011, JSC "FGC UES", JSC "Inter RAO UES" and GEC of China built an airline 500 kV Amurskaya-Heihe with a direct current insert at the 500 kV Heihe substation. The new airline made it possible to export electricity from Russia to China without providing synchronous operation of the energy systems of the two states. The construction of a new 500 kV Amur-Heiheinter-state transmission line with DC insert is one of the main components of the "large export" project implemented by JSC "Inter RAO UES", which provides for a significant increase in the supply of electricity and power to China. The new 500 kV air-line allowed increasing the volume of export of capacity by 750 MW [7]. The total volume of electricity supplies to China in 2016 was 3319.9 million kWh [3]. Data on exports and imports are summarized in the diagrams in Fig. 2 and Fig. 3.

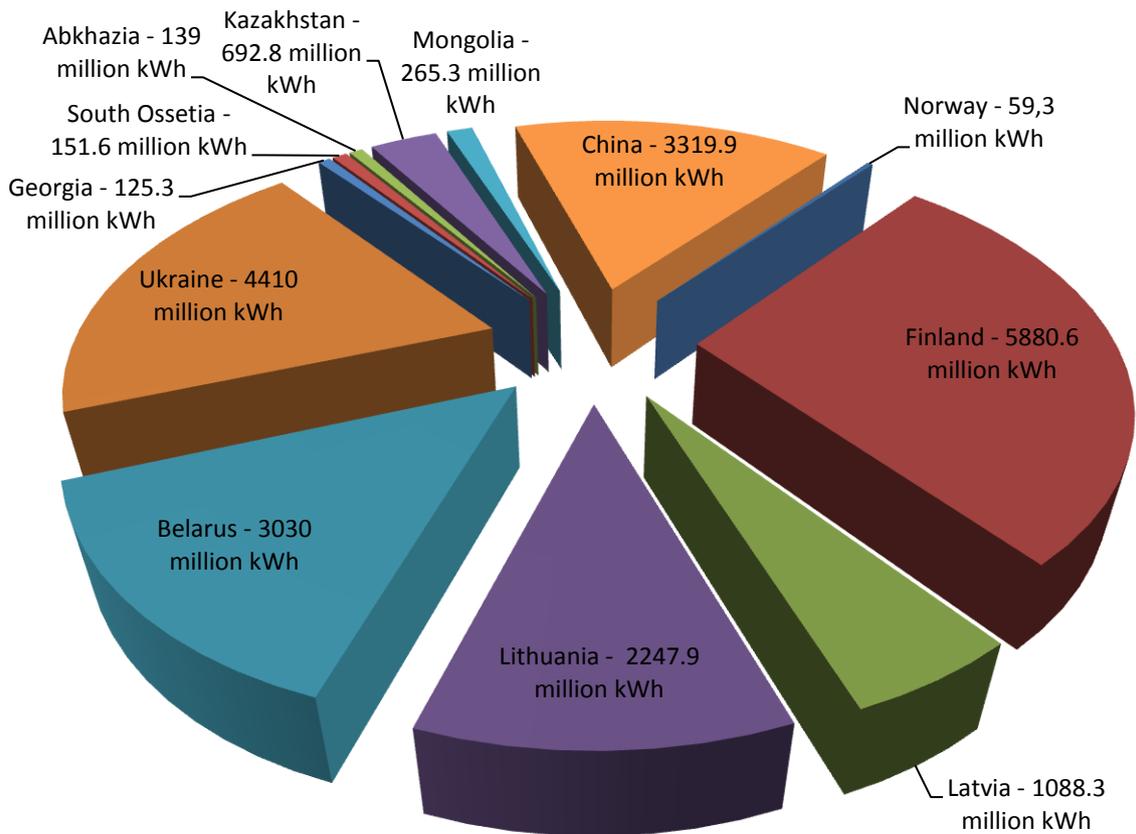


Fig.2. Export of electricity to UES of Russia for 2016

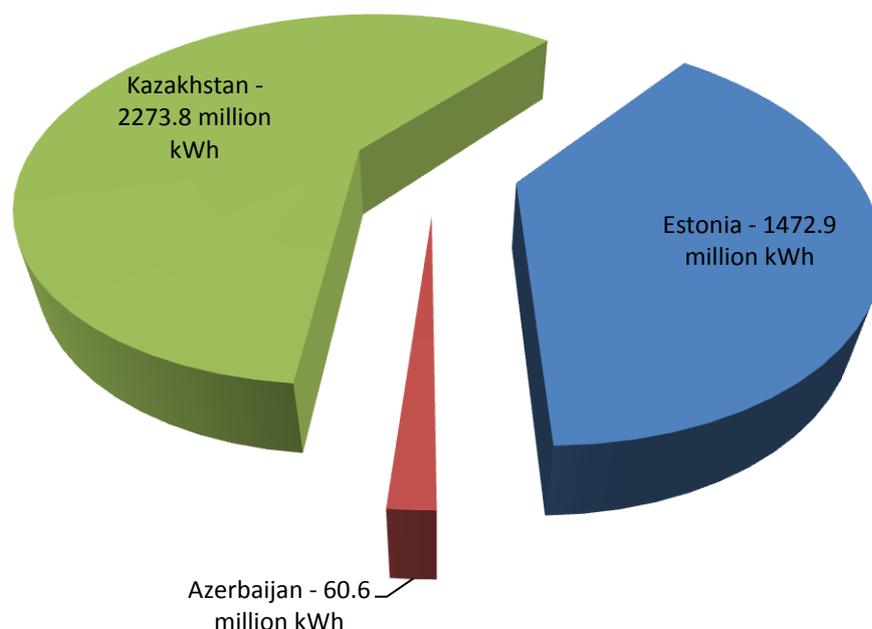


Fig.3. Import of electricity of UES of Russia for 2016

The total volume of exports and imports of electricity for 2016 amounted to 21110.3 million kWh and 3807.3 million kWh, respectively. Among other countries, Russia in 2012 with the value of exports in 19140 million kWh [8] took 11th place. Given the difficult political and economic situation in Russia, as well as the geography of the country, the volume of exports for 2016 indicates the enormous potential of the Russian energy sector.

According to the authors, China, Belorussia and Kazakhstan are promising countries for the development of electricity exports and imports in the future. The development of export and import of electricity and, as a consequence, the strengthening of friendly relations with these countries is important, as:

- China is a possible valuable ally of Russia;
- Belarus and Russia are close economic, political and military partners;
- important inter-system power transmission lines linking Kazakhstan and the UES of the European part are passing through Kazakhstan. In addition, Russia and Kazakhstan have joint energy assets.

In conclusion, it should be noted that the development of exports and imports of electricity, as well as other energy carriers is one of the factors strengthening the Russian Federation.

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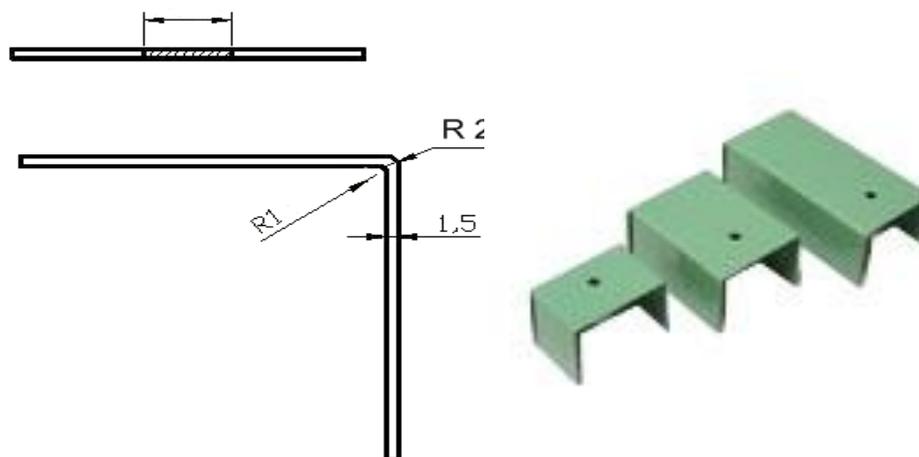
THE DEPENDENCE OF THE PROBABILITIES OF LOCAL OVERLOADS OF THE MICROSTRUCTURE ON THE VALUE OF THE RELATIVE INTERNAL RADIUS OF THE BEND OF THE BOX-TYPE ANCHOR ARM

Abstract: The probability of occurrence and propagation of critical microdeformations during the manufacture and operation of products made of aluminum alloy D16AT is estimated, if the clad layer is broken, which can contribute to the appearance of micro-pores and microcracks that reduce structural strength.

Key words: aluminum alloy, probability of occurrence of microdeformations, radius of bending, building bracket.

В процессе эксплуатации изделий при нагружении в коррозионной среде и в процессе их изготовления в микроструктуре сплава, возникают перегрузки, обусловленные неоднородностью поля микродеформаций. В результате, задолго до появления первой макротрещины происходит образование и развитие необратимых микродефектов. Наличие таких микродефектов в значительной степени снижает качество и эксплуатационную надежность изделий.

Резкое увеличение требований к качеству эксплуатационной надежности конструкций делает необходимым в силу сказанного выше, уточнение величин допустимых степеней деформации. При этом предупреждение разрушения в условиях коррозионно-напряженного состояния должно предусматривать не только отсутствие макродефектов, но и минимальное количество микротрещин.



При изготовлении анкерного кронштейна коробчатого типа КО-50,100,150 и анкерного уголка выполняется операция формовки профиля в форме анкерного уголка из полосы прямоугольного поперечного сечения. В процессе холодной гибки, деформация наружного слоя заготовки монотонно возрастает от нуля до некоторого конечного значения, которое зависит от величины радиуса переходной поверхности углов в коробчатом кронштейне и в крепеже в виде уголка. При деформации выше предельной величины в этом слое возникают микротрещины, что приводит к снижению несущей способности металлообрешетки.

Минимальное значение относительного внутреннего радиуса, при котором микротрещины не возникают для данного алюминиевого сплава Д16АТ рассчитанного для эксплуатации, где нет воздействия коррозионной среды равно $r = 1,92$ для кронштейна. Могут возникать, но не распространяться на зерна соседи – $r = 1,75$ для кронштейна.

Таблица

Зависимость вероятностей локальных перегрузок
микроструктуры от величины относительного внутреннего радиуса
гиба анкерного кронштейна коробчатого типа

r	1,49	1,55	1,68	1,72	1,79	1,87	1,92
P ($\varepsilon_u > \delta$), %	2,26	1,19	0,057	0,005	$3,7 \cdot 10^{-4}$	$5,1 \cdot 10^{-5}$	0
P ($\varepsilon_u, \dot{\varepsilon}_u > \delta$), %	1,1	1,03	0,023	0	0	0	0

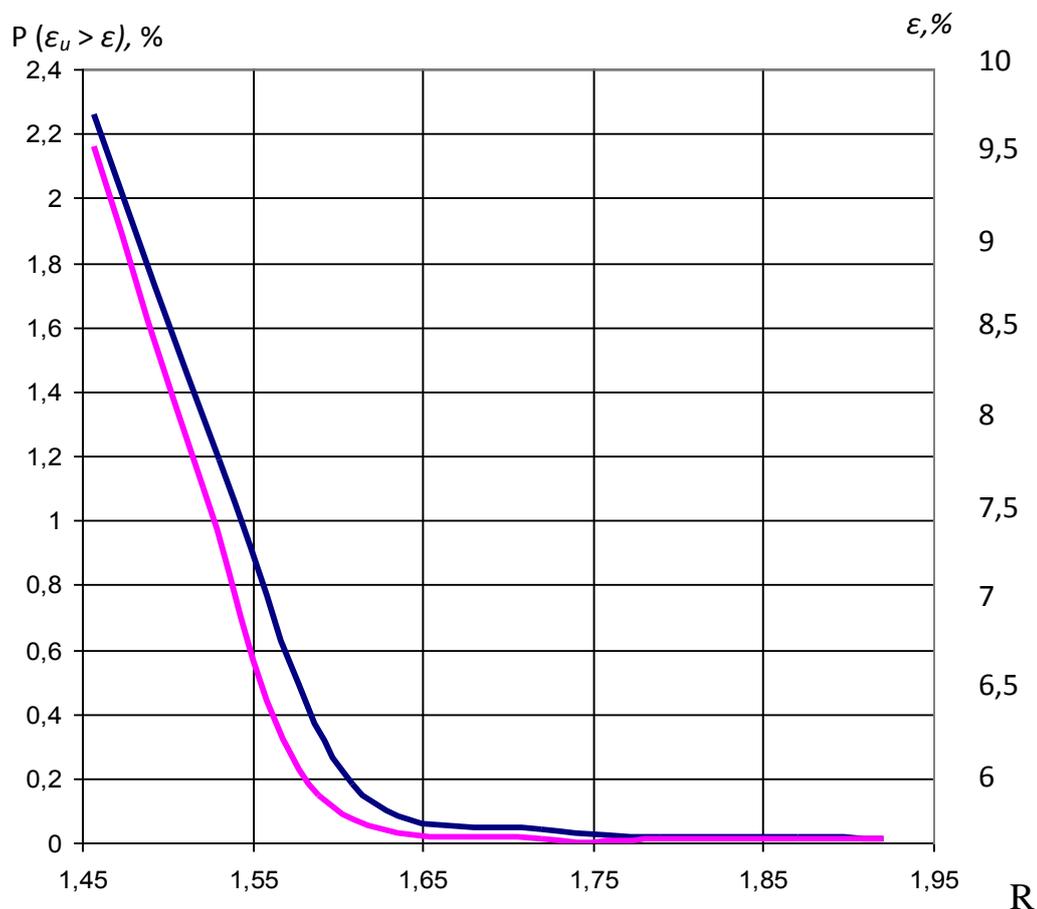


Рис. Зависимость минимально допустимого приведенного радиуса при холодной гибки анкерного крепителя от величины предельного относительного удлинения и вероятности возникновения и распределения критических деформаций. 1 – испытание на воздухе, 2 – испытание в условиях коррозионной среды

Вывод: Результаты по определению вероятностей появления и распространения локальных перегрузок в микроструктуре сплава Д16АТ на воздухе и в условиях коррозионной среды позволили скорректировать технологию изготовления металлообрешетки за счет уточнения радиусагиба, а также за счет доработки прокатного стана (настройка прокатных роликов) и штампов и получить экономический эффект.

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ABOUT SOME TRADITIONAL AND PROMISING MEANS OF INCREASING THE PRODUCTIVITY OF INFOCOMMUNICATION SYSTEMS AND NETWORKS

The problem of increasing performance info-communications networks is now substantially exacerbated, which is due to a number of reasons, for example: the ever increasing structural complexity and dimension of modern telecommunications networks characterized by multiple time-varying information links; constantly increasing requirements to the level of information security. To solve this problem, it is required, particularly, to find the most effective method of increasing the capacity and to select the telecommunication technology within which the transmission system will operate.

Research aimed at developing models of increasing the performance telecommunications networks are relevant and has a theoretical and practical significance in the modeling, design and efficient operation of telecommunications networks.

The performance of an infocommunication system (ICS), serving users, should be evaluated by the total amount of information-computing works which perform all devices, that are part of it. The performance of devices, performing processing in the ICS is determined by technical and software tools. The parameters that characterize the performance of software are usually: number of operations, speed of program execution, frequency of program use. The parameters, characterizing the performance of communication channels include the data rate.

Over time, systems and networks of info telecommunications are improving, which leads to an increase in their productivity. One of the classic methods for increasing the performance is increasing the bit capacity of the digital transmitter by switching from using one alphabet of transmitted messages (for example, binary) to an alphabet with a wider base (the base of the number system). In this case, the number of digits is actually decreasing and more information is transmitted per time unit. The methods of multiplexing and combining channels make it

possible to provide a high information transfer rate for a given allowable error probability.

In particular, the increase in the bandwidth of channels due to the updating of the hardware part consists, for example, in using of more productive equipment, replacing Fast Ethernet with Gigabit Ethernet, increase the number of connection ports, replacement of networks of type 802.11a/b by 802.11g/n; etc.

The bandwidth of the Internet influences the speed of access to network resources from the outside, and also affects the speed of the VPN (Virtual Private Network) network. Load balancing (distribution, or equalization of loads per multiple servers) solves the problem of vertical scaling (increasing server resources such as memory, disk speed, etc.) and providing backup resources. Load balancing systems can be divided into categories: hardware devices, network switches and software solutions. With increasing load, vertical scaling reaches the limit and does not give a significant increase. In this case, the course is horizontally scaled - adding new servers with the redistribution of the load between them.

The most important factors determining performance, in terms of hardware limitations, are: the structure of the hierarchical organization of multi-level memory; bandwidth of communication channels [1].

The trends in the evolution of modern technologies for the manufacture of microprocessors and their application are gaining momentum every year. New nanotechnologies and new sets of instructions are used, the number of cores on one crystal is increased, the number of processors is increased, and much more.

Silicon photonics (technological development of the company Cisco) integrates electronic and optical components on a single silicon chip, which allows one chip to concentrate more logical elements, and also reduces power consumption thousands / hundreds of thousands times, because the signal passes through the optical fiber. This also greatly increases the amount of information transferred from the chip to the chip [2].

The development of ever subtler standards for the production of chips allows to reduce the supply voltage, power consumption and heat dissipation. Heat dissipation and leakage currents are the main obstacles for the further development of the semiconductor industry and the use of modern transistor materials and structures. Progress in the field of microelectronic components faces limitations related to the fundamental laws of nature (for example, the dielectric polarization time constant is

10^{-13} s, which sets the upper limit to the clock frequency of any operations at $\sim 10^{13}$ Hz (THz) [3].

The performance of systems is manifested in the speed of processing tasks and in the degree of utilization of system resources. The more resources are loaded, the higher the productivity of the system performance and underloading of resources indicates the availability of reserves to improve productivity. Therefore, when system performance is analyzing, indicators that characterize the use of resources are also evaluated. An effective way to improve system performance is multiprogramming, which allows to combine the operation of many devices in time, resulting in increased loading of each device, and, consequently, system performance [3].

At this stage, chip manufacturers have shifted their focus to a multi-core architecture that allows increasing performance while maintaining acceptable energy consumption and heat dissipation. Multi-core processors are well suited for demanding multimedia tasks, such as video recording, working with large databases, simultaneous execution of several resource-intensive tasks, for example, computer games, DVD burning and downloading files from the Internet.

Most of the existing software was created without calculation for use in multi-core and multi-processor configurations. Progress in hardware has outstripped progress in software for some time. The efficiency of multi-core processors is largely determined by the memory bandwidth of the system.

For the nanometer range of element sizes, quantum effects begin to manifest themselves fully, which requires the development of fundamentally new models and design methods. An obligatory condition for newly created systems is flexibility, adaptability, the possibility of incorporating new features [4].

Optimal algorithms and data structures allow solving for a fraction of seconds a problem that would be solved without them for years. The effectiveness of the program (code) has two components: memory (or space) and time. Spatial efficiency is the amount of memory required to execute a program. The time efficiency of the program is the time it takes to execute it. The order of complexity of the algorithm expresses its effectiveness, usually through the amount of data processed. The algorithm has the complexity $O(f(n))$ if, as the dimension of the input data N increases, the execution time of the algorithm increases with the same speed as the function $f(N)$. The complexity theory considers the minimum time and amount of memory required to solve the most

complicated version of the problem on a theoretical computer known as the Turing machine.

If in a wireless network, network routers have sufficient power resources, the main focus can be on increasing the network bandwidth. The network capacity increases with a higher overall transmit power with optimal channel scheduling, using unified routing and connection scheduling algorithms. It is shown in [5] that the problem of power control can be effectively solved by carefully designed connection planning and routing protocols.

A small LTE-FDD (Long Term Evolution-Frequency Division Duplexing) cell is one of the promising solutions for improving the quality of service and the data rate, both in the uplink and downlink. A small cell (for example, a femtocell, picocell, microcell) is an inexpensive and low-power base station installed by internal users. However, interference protection is still a problem that needs to be solved for the successful deployment of small base stations (SBS), within the existing networks of macrocells, mainly in the joint deployment of channels. [6] proposed a fully distributed algorithm based on shared access in time and performed by small LTE-FDD cells to reduce the impact of interference, improve user QoS (Quality of Service) and maximize the overall throughput of the downlink and uplink in a two-tier LTE network when cells are deployed randomly.

Network traffic is the density of data present on the network. The network combines a system of different sizes. Resources are shared between network users. If traffic exceeds network bandwidth, network performance will be reduced. Without effective traffic management, network operators cannot effectively use available resources. [7] presents effective bandwidth management and routing for optimizing network using. This is achieved by simulating a network in the form of a graph and distributing traffic based on the network capacity. The graph has nodes and edges. Nodes represent nodes in a network. Bandwidth in the network is considered the bandwidth of the edges, the streams of packets are considered to be edges. Traffic distribution is performed using the proposed algorithms. In this paper, the traffic estimation algorithm is first evaluated, then the bandwidth of each edge is estimated using the Capacity Estimation Algorithm and, finally, using the Mapping Traffic to Capacity Algorithm, the traffic is correlated with the capacity in the optimal way. Thanks to this, the available network is used effectively.

Conclusions: Technologies will continue their development towards higher productivity and an increasing number of opportunities.

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MEANS TO IMPROVE THE PERFORMANCE OF INFORMATION AND COMMUNICATION SYSTEMS AND NETWORKS

One of the actual tasks in the provision of modern infocommunication services is the increase in the performance of infocommunication systems (IKS) and networks, while respecting QoS (Quality of Service) requirements and high reliability. Therefore, modern principles of building infocommunication networks are focused on providing high-speed access.

In particular, IoT (Internet of Things) requires changing the stereotypes of wireless access networks, since there is an explosive growth of active wireless transceivers that are connected to one global network. The use of LTE (Long Term Evolution) networks and other devices by Internet of Things is growing.

Traffic grows exponentially, and the capabilities of systems are limited by Shannon's law. The degree of approach to the limiting value of the line capacity depends on the specific methods of physical coding. The spectral resource is limited, as well as the theoretical limit of bits/s/Hz. New speeds and new data volumes require scarce limited frequency resources. The frequency resource in the centimeter range, where the current network of subscriber wireless access operates, is close to exhaustion.

Using a frequency range from 30 to 300 GHz allows the use of small-size antennas. Millimeter waves have strong attenuation, which does not allow propagating the signal over long distances. AT&T company in the AirGig project combined in one millimeter waves technology and transmission lines, thanks to the realization of which within several years it is expected that each communication will be accessible by LTE and 5G standards. [1]. While using the AirGig network, a software-oriented approach is used - it gives possibility to refuse the wide use of routers, switches, firewalls.

Modern software can use all the system resources of the computer and at the same time require an even greater increase in these resources.

The performance of infocommunication systems (ICS) is manifested in the speed of processing tasks and in the degree of utilization of system resources. The costs of time and memory for the implementation of tasks determine the effectiveness of the ICS [2].

In particular, wireless systems, optical atmospheric and fiber-optic systems are used to solve problems of creating high-speed communication channels. To develop common principles for assessing the effectiveness of telecommunication systems, taking into account their reliability, methods for designing and evaluating the performance of hybrid telecommunications systems based on laser and radio technologies have been developed.

Today, the growth in the productivity of information processing processes is achieved by new approaches (methods of molecular electronics, quantum computing, etc.). New technologies based on quantum effects, nanoheterostructural and molecular electronics, are radically embedded in telecommunications. The old CMOS (Complimentary Metal Oxide Semiconductors) technologies are used at the limit of their capabilities, and the technologies of the post-Moor's era (one-electron nanotransistors (SET, Single-Electron Transistor) (including also transistors with polarized electrons (spintron transistors)), fast superconducting single-quantum logic, quantum cellular automata, etc.) are only being developing [2]. The achievements of electronics, digital processing give a win in times, but need to order. The achievements of nanoelectronics approach the quantum limits established by nature itself. All the limit parameters, determined by the boundaries of the technological capabilities of semiconductor production, cannot be realized in a single chip. This is hampered by a system of constructive and technological constraints. As the size of the elements decreases, the number of restrictions grows, as the negative influence of physical effects that previously were not taken into account increases [2].

According to experts, post-Moor technology will be based on superconducting logic and cryogenic memory [3]. In Japan, it is proposed to create a computational module, which is an optical-magnetic superconducting system, on the basis of which it will be possible to build energy-efficient data centers. In conditions of the growing popularity of automation of all types of enterprises, the digital transformation puts high demands on their networks and the exchange of business information. The network turns into an office platform. More network functions are being virtualized. The appearance of hundreds of thousands of new servers in the transition to SDN/NFV

(Software Defined Networking/Network Function Virtualization) increases the bandwidth of the channels.

Improved computer memory technologies become a decisive factor in the creation of high-performance systems [4]. So far, for the stable storage of 1 bit, 100,000 atoms are required, and today it has been experimentally shown that only 1 atom can be used to store 1 bit.

For example, the main components of Memory Driven Computing systems (the Hewlett Packard Enterprise and "Krok" companies) are: high-speed permanent memory; high-performance switching fabric (structure), guaranteeing the transfer of data between nodes of computer systems using photon communications; task-oriented computing; a new software that allows you to radically simplify programming and create applications that cannot be started today.

The increase in performance depends largely on the configuration of devices that are present on the network.

Communication should be transformed to promote digital transformation of various sectors of the economy. To increase the productivity of ICS, one should use the latest promising results of fundamental research in the field of building microprocessors, communication networks, software, microelectronic and optical technologies, etc.

The speed of penetration of innovative technologies is still constrained by the characteristics of the communication environment, and the management of the network infrastructure becomes programmatic. The role of the problem of bridging the gap between hardware and the programming methods used is growing. Building networks with a software-oriented approach is the future of telecommunications.

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APPLICATIONS OF BIG SOLAR FURNACE

Introduction

The progress in astrophysical research is dependent upon the availability of instruments of high sensitivity required for the studies of the sources and composition of cosmic radiation. The goal of the present proposal is to transform the double mirror multi heliostat Big Solar Furnace (BSF) into an astrophysical tool for studies of the cosmic rays (CR) and sources of the ultrahigh energy γ -radiation. The BSF has been designed for concentration of solar energy, to get a power of about 1000 kW during most part of the day. The Big Solar Furnace (BSF) is located in Central Asia in spurs of the Tien-Shan mountains 50 km from Tashkent (Uzbekistan) at the height of 1100 m above sea level (41°20' N , 69°45' E). The BSF is located at a place with good astronomic climate (200 clear nights in one year).

The main units of the BSF optical system are:

- The parabolic concentrator is installed permanently, with its optical axis parallel to the north-south direction. The focal length of the concentrator is 18m, and its aperture area 1840 m²;
- 62 heliostats are located in the north of the parabolic concentrator. Their total surfaces 200x60 m. The mirror size of each heliostat is 6.5x7.5 m, total area of heliostats 3022,5 m²;
- The technological tower is located at the focal plane of the concentrator [1];
- The automatic control system for orientation and tracking of heliostats has been designed to follow Sun during the day. During operation each of the heliostats reflects the incident solar rays toward the optic axis of the parabolic reflector on a particular zone.

The total reflection factor of system of flat heliostats and concentrator is around - 0.6. The mean error of the optical system is 5'. The rotary biaxial mechanisms of the heliostats allow motion of a

reflecting surface $\pm 60^\circ$ in azimuth and $0-45^\circ$ in elevation. Moving of a field of view to the required point in the sky is possible in less than 1-minute time.

The BSF was constructed in Uzbekistan in 1987 for conducting research in the field of material science, manufacture of refractory and super pure materials and also for testing of the various devices. Located in place with a good astroclimate the BSF can be used at nighttime as a multifunctional ground based Cherenkov telescope with the following facilities:

1. To register Cherenkov flashes from the Extensive Air Shower (EAS) formed by a proton and nuclear components of the Primary Cosmic Rays (PCR) with energy $E=10^{13}-10^{15}$ eV;
2. To perform the observations of Galactic and Extragalactic sources of γ -radiation.

The determination of the mass composition of ultrahigh energy PCR is of great interest for the studies of their origin and propagation and for understanding of mechanisms of their acceleration up to the very high energy. For understanding of processes occurring in powerful sources of a γ -radiation, it is very important to investigate their intensity and temporal characteristics in a wide energy region. It is necessary to note, that at present data regarding composition and energy spectrum of the cosmic rays at the energies $E=10^{13}$ eV and gamma sources above 10^{11} eV is practically not available and it is needed for satellite experiments.

Instrumentation

2.1. Available Facilities

- Big Solar Furnace generating 1000 kW power was installed in Uzbekistan during 1987. It is intended for research in the field of material science, manufacture of refractory and super pure materials, and also for testing of various devices and designs on light influences of the nuclear explosion. The goal of the present paper is transformation of the BSF in to an astrophysical tool with a high sensitivity and angular resolution for research of the ultrahigh energy PCR ($E > 10^{14}$ eV), and Galactic and Extragalactic sources of γ -radiation.

2.2. Modification in the BSF

- The following stages of works need to be executed to detect faint light impulses generated in the sky:

1. The optical characteristics of the heliostat mirrors and concentrator of the BSF will be improved;

▪2. The Multi element Light receiver Camera (MLC) with a field of view 3° and angular resolution of 0.3° will be installed at the focal plane of mirror system;

▪3. The electronic system for detection of nanosecond pulses generated in MLC would be designed;

▪4. As the data has to be collected during night time, automatic control system of the heliostat would be redesigned to work in programmed mode, so as to point toward desired direction in the sky;

▪5. The programs for processing results of measurements of Cherenkov flashes initiated by a primary γ -quants, protons and nucleus will be produced;

▪6. The observation PCR and measurement of their energy spectrum in energy region $E > 10^{13}$ eV would be taken up next. It will allow demonstration of capabilities of the created set-up [2].

▪2.3. Scientific studies

▪The ground based Cherenkov telescope on the basis of the BSF will be an effective tool for studying γ -sources at energies higher than 10^n eV, and nuclear composition, spectrum of the PCR at the region $E = 10^{13} - 10^{15}$ eV. These results are very important in the field of fundamental problems of the astrophysics and

elementary particle physics. The estimation of the spectrum of the PCR will enable us to get more specific information about structure of magnetic fields in a Galaxy. Such information received (from cosmic ray researches) can be of interest for problems in astronautics too.

▪As against already available and projected set-ups of similar type the present one does not demand large capital investments, as the major cost element, the mirror system is available for other applications.

▪2.4. Experimental Set up

▪ Heliostats of the BSF are placed on the large area (200x60m). It gives an opportunity to use two groups of heliostats to create the stereoscopic system for registration of the EAS. It is supposed to use two compactly located groups of heliostats (5 in each group), with the total area of mirrors $\sim 500 \text{ m}^2$ located at a distance ~ 100 m. The MLC should register the Cherenkov light pulses from the each group of heliostats.

▪ The large focal length (18 m) of the BSF concentrator decrease the luminosity and, accordingly, aberration, but, on the other hand, is required to maintain in a focal plane a significant area of the MLC. So for a field of view of 3° an area of $\sim 0.9 \times 0.9$ m is required.

▪ Since 1993 in the Material Sciences Institute (MSI) Scientific Association "Physics-Sun" Academy of Sciences Uzbekistan, the work

devoted to realization of research of physical and chemical processes for heat treatment of various materials by a concentrated light flux and realizations of synthesis of high-temperature materials with the help of the BSF has been carried out. During these years, the significant experience using of the BSF was made. The complex of the equipment and new methods for realization of high-temperature research on the BSF has been used to carry out studies on metastable phases. The necessary equipment for formation of light pulses, measurements of their fronts, spectral structure and density of a flux had been created. Also in a MSI the investigation of the technical questions related to control of heliostat field at night time had been carried out.

- Together with experts from Physical-technical institute (PTI), several works devoted to application of new methods of measurement of a condition of an optical surface of BSF mirrors and adjustment as well as positioning of the facet of the concentrator already has been executed. At present MSI is finishing the mounting of optoelectronic goniometric sensors on rotary axes of heliostats. It will enable operation with high accuracy in a program-controlled mode to execute the positioning of a heliostat optical surface.

- Participants have already been involved in similar projects devoted to the application of new methods of control, quality of an optical surface of BSF mirrors, adjustment positioning of the facet of the concentrator and development of an automatic control system of heliostat field.

Conclusion

Therefore it is proposed to develop a set-up for astrophysical studies at night time, using the optical system of BSF. The system would be designed to record Cherenkov radiations from EAS initiated by PCR and γ -rays.

Special properties BSF define the basic perspective directions scientific and applied researches. From them it is possible to allocate the most important areas of researches:

- High-temperature chemical processes and reactions in conditions of influence of the concentrated sunlight.
- Complex reception of hydrogen, electric and thermal energy.
- Concentrated solar energy transform to laser (Solar pumping of laser).

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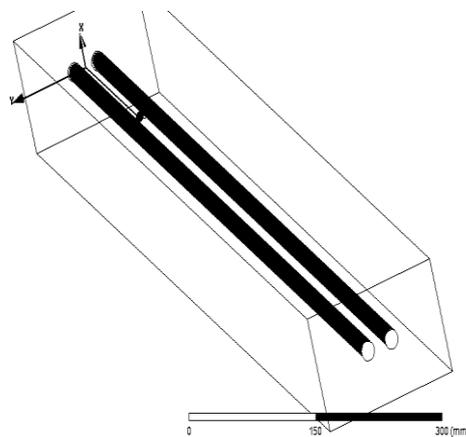
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RESEARCH OF THE ELECTROMAGNETIC FIELDS IN THE ELECTRIC BUS

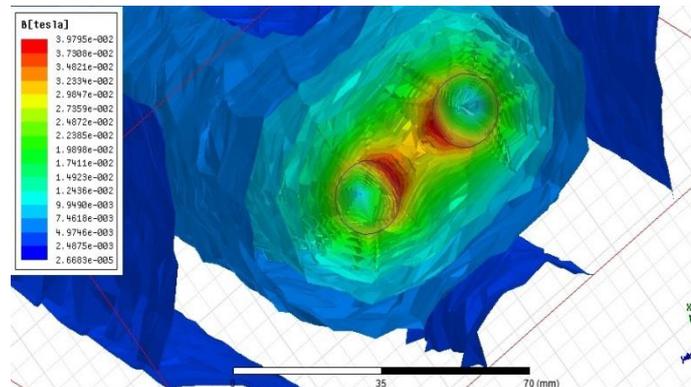
The authors of this article describes the research of electromagnetic fields in the electric bus based on the law of the total current and the principal of superposition in the software package *Ansys Maxwell 2D/3D*. Electromagnetic fields of conductive conductors in the partition between driver's cab and passenger cabin were explored with the aim of their impact on people. The next assumptions were introduced: current is distributed along the wire cross-section and goes through strictly the wire axis. There is a three-dimensional model of conductive wires in the partition between driver's cab and passenger cabin (Pic.1).



Picture 1

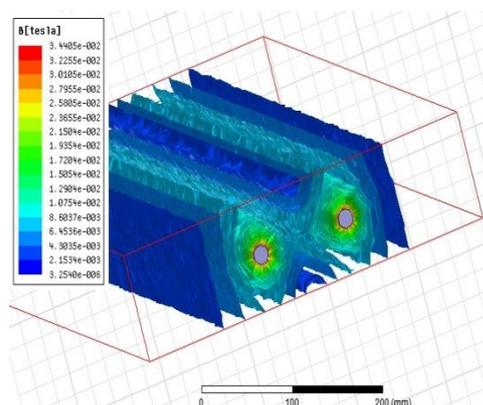
While computer modelling of electromagnetic fields of conductive wires in the partition between driver's cab and passenger cabin in accordance with the dimensions the geometry of wires was constructed, the external factors and the currents in wires were set.

One can see on the Picture 2 the distribution of electromagnetic field of two conductive wires on the distance of 0,03m from each other on starting mode of operation.



Picture 2

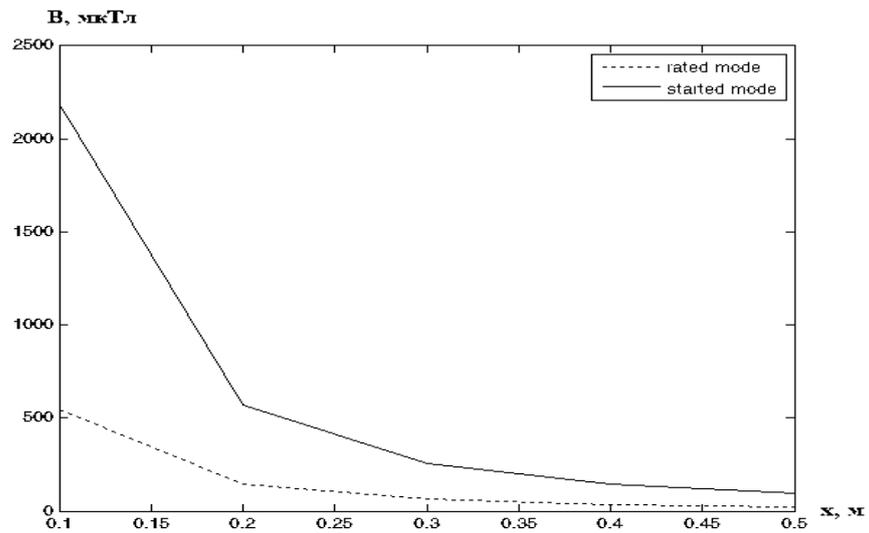
The distribution of electromagnetic field of two conductive wires on the distance of 0,01m from each other on starting mode of operation is on Picture 3.



Picture 3

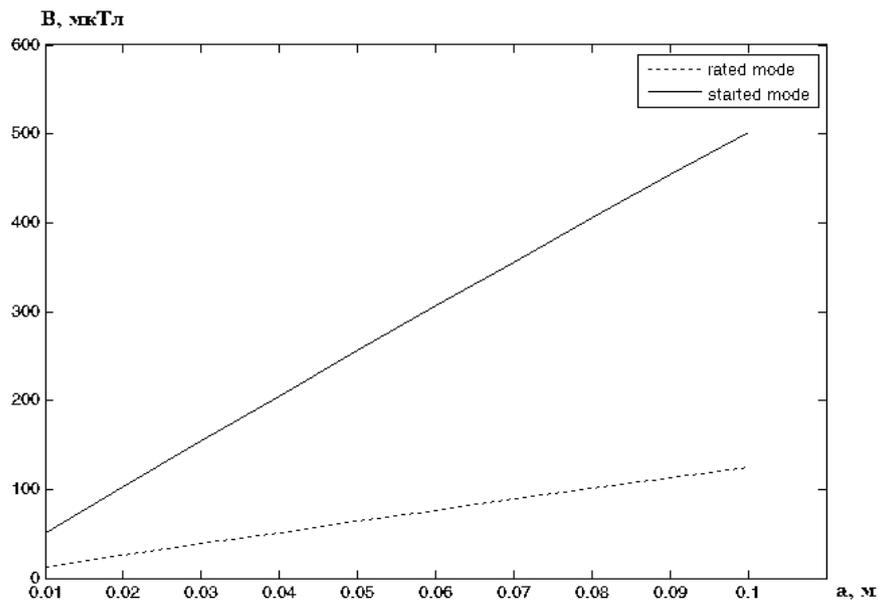
The results of computer modelling are the curve dependance of induction of electromagnetic field from some factors: the power of current in conductive wires in the partition between driver's cab and passenger cabin; the distance between wires when two conductive wires are placed in the partition between driver's cab and passenger cabin of the electric bus.

There are the dependances of induction of electromagnetic field from the distance x from the wires in the partition to the driver's head on two modes of operation – rated and starting (Pic.4: dotted line – starting mode).



Picture 4

One can see the dependences of induction of electromagnetic field from the distance from the wires when two conductive wires are placed in the partition between driver's cab and passenger cabin on two modes of operation – rated and starting (Pic. 5).



Picture 5

In the result of computer modelling it was carried out that:

- while increasing the distance x from the wires in the partition between driver's cab and passenger cabin to the driver's head the induction of electromagnetic field is reduced, i.e. the far a driver is from the wires, the less harmful impact is from the electromagnetic field;
- On the distance of 0,2m from the wires to the driver's head the induction of electromagnetic field is reduced on 50%, but on the

distance of 0,3-0,5m – on 70-80%;

- while increasing the distance between the wires the induction of electromagnetic field is increased, consequently the impact of electromagnetic field is increased either. On the distance of 0,08m the induction of electromagnetic field is reduced on 20%, on the distance of 0,05m the induction of electromagnetic field is reduced on 50%, on the distance of 0,03-0,01m the induction of electromagnetic field is reduced on 70-90%.

The recommendation is that the driver's seat should be installed not less than 0,3m from the wires. Conductive wires have to be placed and fixed on the distance of not less than 0,5m from each other.

SECTION IV. Historical Sciences

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HISTORY OF RUSSIA AND RUSSIANS

Abstract: The conducted research allowed us to determine that Russia and Russian are the lineal descendants of the Dacians – Div-Dacians and Geto-Dacians (Thracians).

Keywords: Russia, Russian, history, nominal, names, origin, kingdoms.

The conducted research allowed us to determine that Russia, Russians and Slavs are the lineal descendants of protoslavs Div-Dacians and Geto-Dacians (Thracians). The first Indo-Europeans were called Dai-Dacians, not Aryans, after god Div. The origin of Slavs and Russians, a part of Slavs, dates back to ancient god Div and protoslavs Div-Dacians (Diaokhis in Diauehi, Zygii (Zeus-Div)). The direct connection of the Dai-Dacians and Slavs can be seen in the supposed ancient name of Slavs. "...Slavs were first mentioned in the first centuries A.D. in the texts of Roman and Greek authors. It can be assumed that "Venedi(s), Veneti" in Cornelius Tacitus's *Germania* (A.D. 98) refer to ... Venedai, ... (about A.D. 160) ... For instance, the

medieval Germans called Lusatian Sorbs and Baltic Slavs Wenden and Winden... and two Slavic “peoples” – Antes (Avtai, Avteo). Thus, we may conclude that the root *tai/teo* originates from the name of god Div and Sclaveni or Sclavenoi (*Saqaliba* according to the Middle-Eastern authors, after the name of god Soma – Homa, sok, sochivo, kin – saki, Su, people) ..., that is Slovenes; ... Goth Jordan, who grew up in Byzantium, in the history of his ancestors (A.D. 551) names three Slavic groups: Antes, Sclaveni and Venethae, so once again we can see this root dating back to god Div – *teo, feo, Zyx*... Jordan highlights their kinship, the fact that they originate from one tribe ...” [3, p. 12-14]. (Venedis Veneti Venedai Wenden Winden Venat venatta Antes Sclaveni Venethae Avtai Avteo). Therefore, all Slavic tribes and Lusatian Sorbs originated from Div-Dac-Zeus, which is reflected in their names, for instance, Dai-Dacians, Zygii, the Zyx-Rus. The Vedas mention god Vena (Vene-dai), as well as goddess Danu (DN). Thus, the names were given not after common nouns – DN (“water”), but after the names of Indo-European gods. There are people called “Russians”, and it is a fact, in contrast to other assumptions. RUS, Russian is DIV, DAC (DEN, DEN’), Nowruz-Nogais. Nowruz is an Indo-European holiday. ‘Nowruz’ literally means “new Russian”, “new Ruses”. The most ancient names of Nowruz holiday (Maslenitsa – Pancake week) are Int Diy Dikhu and Kolodiy. These names originate from god Div-Dac. This name, like the Russian “Maslenitsa” emerged later. The word “Nowruz” appeared in the 2nd century. Laks preserved the ancient version of Nowruz holiday – Int Diy Dikhu (Kolodiy for the ancient Slavs). In the 6th century, after Persians changed the name of the holiday from Int Diy Dikhu to Nowrus – the “New Div Day” in the 2nd century (Zoroastrianism forbade to mention Divs and Divs worshipers), the state of Rus emerged in the Caucasus. The name of the people ‘Rus’ also appears in the 6th century in the Caucasus. In the same century, the ancient Slavic (Zyx-Div-Czech) eparchy was also registered there. This correlates with the seals of the Russian Knyaz and his wife dating back to 1067 discovered in the Kuban-Caucasus. The wife’s seal read “The Mistress of Rusia”, and the husband’s – “the Ruler of Zikia, Khazaria and Tametarkhi”, that is, Rus is the same as Zikia and Divia. A direct link between the names ‘Rus’ and ‘Div’ (DN - day) allows explaining the names of the rivers. “... the names of the South Russian rivers containing the root ‘DN’ could receive the letter ‘R’ at the beginning by the analogy. In some cases, Middle-Eastern scholars first called the river ‘Dun’ and then corrected its name for ‘Ruta’. Thus, there is confusion ‘Duna-Ruta’...” [2, p. 586-587]. This occurred not due to the Arabic

alphabet as B.A. Rybakov believed, but because the religion of these authors changed. Zoroastrianism fought with the old gods, while the rivers carried the names of the gods from the Div pantheon. However, 'Div' means a "day" – DN, while 'ruz' is 'rus' (Pers.). So, the Middle-Eastern authors changed the name of the holiday to Nowruz and the names of the rivers from –DN- to Rus and preserved practically the same name – 'rus' as 'day'. "... It is hard to believe in the coincidence of the names of Taman Sinds and the Sindi tribe in Thrace, as well as the city of Sindoman in the lower course of the Indus; ..." [1, p. 36-41]. Therefore, some researchers define the toponymy of the regions as Indo-European. In the Sindh Kingdom, there was King Pharnak – Thracian (Geto-Dacians, Dais were Thracian tribes). Thus, the inhabitants of Sindika were Geto-Dacians (Thracians) – Russians in future. A number of researchers note that by observing the life of tribes and peoples that are at a certain stage of development, one can trace the development of languages. For example, the transition to the collective numeral (Nivkhs have different numerals for long objects and short ones, and again different ones for round objects). Saying 'Agni', our ancestors imagined god Agni, and not the common noun 'fire'.

Conclusion

The names of RIVERS (and mountains) in the pre-literate period in the Indo-European language family are denoted using the NAMES of gods (12,000-11,000 B.C.).

In the ancient time, there were no nominal collective nouns.

Russians and Slavs are the direct descendants of the protoslavs of Diaokhis-Zygii, Div-Dacians and Geto-Dacians (Thracians).

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SECTION V. Economics

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THE COMPETITIVE POSITIONS OF THE HOTELS FOCUSED ON CONSUMER-ORIENTED EVENTS

Today, the competitiveness of hotels is the main factor of survival in conditions of economic and political uncertainty. In the sphere of hotel industry, maintaining of competitive positions mainly depends on rapidly changing of consumer needs, which are focused on new approaches to the service organization, and the quality and quantity of services.

The development of event tourism can be consider as a means of hotels promoting and other means of accommodation, hospitality and attractions, which at the same time becomes an incentive for competition among enterprises for the accommodation and tourist services. The organization of events is always accompanied by advertising campaigns, so the area where it takes place to become a commercial growing-point. The percent of event tourism in the world annually increases by 1.5%, in comparison with other types [Grushin, 2016]. The authors is considered, that event tourism is as an important economic sector contributing to the development of the territory, increase the number of enterprises, as well as increasing the flow of tourists.[Werner, 2016]. The advantage of event tourism is that, it includes a number of activities of different functional orientation: business, sports, cultural and historical, festive, etc., which is especially important for hotels competition and other accommodation facilities. The events tourism activities have an important socio-economic significance: during this period the activity of all objects of the tourism industry is sped up, the is observed the revival of local cultural customs and traditions is significantly increased the consumer demand, including the hotels demands and other accommodation facilities. One of the main

advantages of event events – is all–season nature – which has a huge impact for the hotel business. In Russia, the number of hotels and similar accommodation facilities increases every year, so the determination of the hotels competitive position focused on customer-oriented events, as a new direction in the territory development becomes a particularly relevant research topic.

In recent years, the events take place in many regions of the Russian Federation – include festivals, fairs that attract thousands of Russian and foreign tourists. With growing technologies and advertising scenario, events also include media coverage. This is how the event and destination are two different entities but yet serving each other in a manner. Destination gets a wide media coverage as well as advertising. The participants of the events and the attendees of events visit the destination to take part in the event which brings lots of foreign currency to the particular destination to entire nation of the event is huge. However, only the high-quality service and customer satisfaction can contribute regular holding events on the same territory, which will make it more recognizable [Jago L,at al., 2003]. D. Getz defines the organization and running-event as a space-time phenomenon with clear boundaries, a target audience for which the concrete surrounding situation is necessary [Getz, 2008]

In recent years, the target audience age of event tourism has significantly changed. It was complemented both with travelers up to 30 years and of older persons, for whom the events are very popular, which associated with the visit of some specific activities, nostalgic, ecological, and some other (religious, missionary, etc.). Despite the different age of the event participants, generally it is the wealthy people with income above an average, having the opportunity to stay in deluxe rooms, thereby creating additional profit for the hotel. This consumer-portrait shows the increased requirements for the comfort accommodation, quality of service, transport, catering, the level of the tourism industry. The standards of service of such guests contain the following indicators: speed of service, accuracy, anticipation of guest desires, friendliness and courtesy, attentiveness, appearance, confidentiality of information, knowledge by personnel work, responsibility.

For the areas where the events are becoming a constant phenomenon, the development of measures to improve the competitiveness of the hotel business becomes a necessity. Select the basic competitive position of the hotels focused on consumer-oriented events

1. The consumer's interest and demand. One of the first directions that may interest consumers to stay in this hotel, and not in another – is the creation of an interesting history of the enterprise, which will create a new mythical space for customers. In such conditions, the guest becomes not only guests, but also involved to the event.

Positioning of the hotel as a center of tourist activity can continue the list of competitive of the accommodation positions. The offer to familiarize tourists with the monuments of history, architecture, art, natural and ethnic characteristics of the territory, visit the proposed tour of the hotel staff. The knowledge of the hotel staff about cultural and historical sites and the ability to transfer them to residents is a perspective directions of long-term cooperation between staff and guests.

In this case, the emphasis is not only on comfortable living conditions, but also attentive and benevolent service.

2. The ideology of management. The staff of hotels and other types accommodation must take into account their preferences and wishes that affect the quality of service. In order to create a comfortable environment for foreign tourists– it is necessary to comply with the specific requirements for accommodation and food, characteristic of different nationalities and religions, as well as to provide tourists with information in their language and in their usual form. A global research conducted in 2013 by InterContinental Hotels Group (IHG) to determine the basic needs and preferences of tourists, which was attended by 7,000 tourists from various countries, showed that the main priority is to take into account the individual needs of each traveler. The concept of «personal approach» is defined by tourists in different ways, depending on the country-residence and age.

3. Function of the hotel business. The function of the hotel-staff should be based on the balance sheet of the hotel and the client interests. The quality of service and customer satisfaction in the hotel business, to understand the need of the guests is not necessary to anticipate their expectations in advance. For this purpose, the enterprises need to constantly improve the level of staff service, directing to training and retraining. According United States Department of Labor (BLS), employers prefer that employees had special training in planning events and meetings in the field of tourism and hospitality.

The events began to develop dynamically in all countries, moving from one-time to regular. Annually changing programs and adding a new forms and content, they attract even more tourists wishing not only to visit, but also to be participants. An important role is played the

competitive position of hotels focused on consumers of events. Forming at visitors favorable perception in the course of service and rendering services, the enterprise creates a platform for repeated guest. Thereby strengthening the competitive advantages in the hotel industry market.

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SHARED SERVICE CENTER: ADVANTAGES AND DISADVANTAGES ON THE EXAMPLE OF THE SVERDLOVSK RAILWAY-BRANCH OF RUSSIAN RAILWAY COMPANY

The process of establishing Shared Service Centers (SSCs) began in the Russian Federation in the early 2000s. Nowadays there are more than 1000 centers in Russia. The main objective of this article is to determine the advantages and disadvantages of introducing the SSC on the example of the Sverdlovsk Railways-branch of Russian Railways company.

Shared Service Centers (SSC) are the consolidation of business operations that are used by multiple parts of the same organization. Shared Service Centers are cost-efficient because they centralize back-

office operations that are used by multiple divisions of the same company and eliminate redundancy. Some companies use a chargeback system to bill divisions that use the service on a per-use, per-quarter or per-year basis. Other companies absorb the cost of shared services as part of the continuing cost of running the business.

Thus, "Russian Railways" issued Order No. 168 of August 10, 2009 On the Establishment of the Sverdlovsk Regional General Service Center, a structural subdivision of the Center for Corporate Accounting and Reporting "ZHELDORCHUCHET" in the branch of the Sverdlovsk region. The order was developed to implement the plan for the transition to a centralized system of accounting and tax accounting and the formation of accounting and tax reporting.

Until 2009, there was a chief accountant at each enterprise, leading its accounting department, and after the reform, Ekaterinburg, Perm, Nizhny Tagil, Tyumen and Surgut OCOG nodes were established. They were included as structural units in the Sverdlovsk OCE-region. The basis for the formation of SSCs is the transition from the principle of forming reports based on the summation of the balances of numerous structural divisions and branches to the principle of reporting by centralizing accounting processes in the context of company codes while preserving the ability to form the reporting of structural units. At the same time, the accounting and control functions (the formation of primary documentation) and the functions of direct accounting (the correspondence of accounts, the formation of turnover-balance sheets, the main book, the preparation of statements) and the implementation of internal accounting control should be divide.

Russian Railways has about 17 branches, each of which has more than 50 enterprises. That is why there were problems of multiple duplication of the same accounting processes, heterogeneity of the data generated, as a result of the use of heterogeneous accounting and management IT systems, also the principle of distinguishing between incompatible and non-conventional powers was violated. It was possible to eliminate the above problems after the reform, but the "depersonalization" of the system and a "blurring" of responsibility took place instead. Also, the service level agreement may extend the process of performing short operations, since the agreement fixes the deadlines for accomplishing the tasks. Therefore, the results of the reform are not unambiguous, they require a deeper analysis.

One of the main drawbacks of the regional SSC model is the increase of procedures that are associated with its creation, functioning and liquidation. At the same time, the number of procedures increases in

the direct proportion to the number of service centers entering the model. It should also be noted that creating such many SSC nodes in one region is not advisable. Therefore, it is necessary to unite the SSC in one place, without dispersing them in different cities. This will help reduce the company's internal transaction costs. For example, when signing a contract with a supplier, you need to contact the accountant. There is a common question: which of the SSC needs the company should send the information? When creating the Center's SSC in one place, the amount of time spent on coordinating the information of the branch with the supplier would be reduced.

We assume that the positive consequences of the creation of the SSC will be:

1. Reducing the cost of staff maintenance.
2. Increasing the Company's financial transparency as a result of creating a single information space and increasing the efficiency of accounting information.
3. Reduction in the timing of the preparation of financial statements under Russian law and consolidated financial statements in accordance with international standards;
4. The ability to quickly make management decisions that increase the efficiency of subsidiaries;
5. Reducing the time spent by the management of structural units on the management of non-core functions;
6. Strengthening analytical functions in preparing reports;
7. Increasing the flexibility of the accounting function in terms of its ability to respond quickly and adequately to changing accounting requirements, as well as the priorities and expectations of the Company's management;
8. Creation of an effective system of internal accounting control;
9. Timely detection and minimization of accounting risks;
10. Automation of the accounting process in all divisions of the Company.

One of the main results is the release of personnel in the branches from the control processes. Since the profit to the company comes at the expense of branches, and not at the expense of accounting after the reform, the branch can function as a real business unit. Because there is more time and opportunity to solve real business problems, for example, to increase the profitability of cargo transportation.

Summarizing the results of the study, we can say that the centralization of the accounting and tax accounting system allowed the management and shareholders of Russian Railways company to receive

standardized, reliable and promptly generated information on all branches and subsidiaries. Thus, the activities of the group of Russian Railways, which involve dozens of legal entities, are becoming more transparent, and the accounting and tax accounting system itself is more flexible, capable of quickly adapting to the ongoing organizational transformations without disrupting the integrity of the accounting process, which is especially important in the conditions reforming Russian Railways. At the same time, savings due to the centralization of the processing of large volumes of documentation enabled The Russian Railways to reduce the costs for maintaining accounting and tax records.

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THE PROBLEMS OF YOUTH IN THE LABOR MARKET AND THEIR SOLUTIONS

The Republic of Kazakhstan is the home for more than 880 thousand young people aged 16-29. About 13 per cent of them annually apply to the state employment service for vocational guidance, vocational training and employment. In 2016, 116652 citizens aged from 16 to 29 years applied to the Republican employment services. 88042 people are employed in various fields, including 1580 graduates of institutions of primary and secondary vocational education. During the first quarter of 2016 11,873 people applied to the bodies of the employment service, 1,241 of them are graduates of higher professional institutions, 722 of them are secondary professional institutions and 391 people are of primary professional education. The increase in the number of unemployed among young people, their lack of demand in the labor market is caused by a number of objective reasons:

- increase in the total number of unemployed due to bankruptcy of a significant part of enterprises;
- due to the fact that the activities of industrial enterprises are mainly aimed at self-preservation and survival, not the development and expansion of production.

- the lack of young people with sufficient professional experience, so they are the last in recruitment to vacant posts, and they get fired first in the decline in production;

- the increase in the number of unemployed young people is due to the fact that their vocational training does not always fully meet the requirements of the labor market;

- in some areas and cities, training does not always meet the objective needs for human resources and the availability of jobs;

- the mismatch between demand and supply of labor.

In Kazakhstan, youth unemployment remains one of the pressing problems in the labor market. The share of young people among the unemployed remains fairly stable; it is about one third of the total number of unemployed. So far, there is no mechanism regulating the employment of graduates.

The success of positioning in the socio-professional space depends on a number of objective conditions and subjective factors. These include both objective, formed independently of the subject (the situation in the labor market, channels of professional mobility) and subjective, depending on personal abilities, tendencies, capabilities of the subject.

The latter include various types of characteristics that the subject has: intellectual, professional, personal and motivational, moral and volitional, spiritual and creative, cultural and moral, physical, social and economic. Some of these types are conditional-subjective (socio-economic, physical, moral-volitional), because although they belong directly to the subject, they are rather objective and are formed, in some cases, regardless of the efforts of the subject and thus have a dual status.

In the process of professional employment, the subject sells a particular type of capital, or several of them, thereby programming the success/failure of their own employment.

According to experts, today the requirements of employers to specialists' qualifications are quite strict, often unreasonably high, which is due to the situation in the labor market, where there is a retraining of specialists with higher education of certain professional areas.

Flexibility, mobility of specialists, ability to think out of the box while solving professional problems - these are, perhaps, the main requirements of employers, in addition to the actual professional competence, in modern conditions. These requirements are put forward to a greater extent by employers of non-state forms of ownership, however, and government agencies pay serious attention to them.

Experts note that there is a subjective reason in the problem of professional employment of graduates.

Subjective factors of employment of graduates go back to the problem of motivation of students for the process of higher education and employment in the specialty. According to the data of sociological research conducted by the Academy Of Social Education - Science And Research Department, a significant part of students in choosing a profession determine their choice by the opportunity to earn and achieve a higher social position, as well as the prestige of the profession: the status component was noted by the fourth part of students, the same was pointed to the prestige of the profession in society, a fifth of the respondents noted the importance of high earnings.

Modern society translates the values of achievement in contrast to the paternalistic orientation of some graduates: it puts forward the requirements of personal activity, flexibility, active strategies of behavior in the labor market. Meanwhile, as practice shows, not all schools contribute to developing these skills in students, whereby the latter is then faced with the problem of professional employment. The ability to show your good skills and abilities to the employer is an important component of the success of employment.

The activity of graduates in employment and their ability to present themselves is due to the implementation of their active strategies in the period of education in high school. A modern student with the aim of further successful positioning itself in the labor market should not take a dependent position, especially since the employer is now ready to offer a fairly wide range of works for students. Researches of the Kazakhstan market of vacancies for students allow to conclude that today more and more companies see in students and graduates not just the cheap labor force suitable for closing of a non-popular vacancies, and perspective experts. Employers understand that the student who came to them in the first year, after four years will be not only a qualified specialist with practical experience, but also a loyal employee of the company, who grew up on its corporate values."

According to the study of Academy Of Social Education - Science And Research Department, at the time of the survey in December 2015 among full - time students a little more than a third of students combined work with training, 21% of which - worked from time to time, 11% worked constantly, but part-time work week, 3% of them worked full time. As it can be seen from these data, about two thirds of the students maintain a dependent position and do not try to finance their own education at the university. Dependent positions taken by

students do not contribute to their further professional mobility in the labor market.

Of course, to ensure high competitiveness in the labor market, a modern graduate needs not only to have a high level of professional competence, but also to have additional knowledge, skills, personal qualities that will allow him to be flexible in the conditions of rapid changes in society. The information society puts forward the necessary criterion for the selection of specialists by employers: knowledge of computers and specific software products.

Knowledge of a foreign language is the next important aspect of specialist training. For modern employers, as well as for graduates themselves today, it is important to have a high level of General erudition, the ability to understand legal and financial issues, due to the trend of almost universal expansion of the functions of employees of enterprises, firms. A modern employer wants the competence of its employees to go beyond their immediate sphere of activity, and, in fact, job responsibilities.

In addition, the development of the theory and practice of team management involves such important requirements for the graduate in terms of personal qualities as the ability to work in a team, the ability to adapt to stressful situations, the ability to quickly build communications.

Experts note that the modern specialist is far from the model that is set by the employer: it is, rather, the ideal to which you want to strive in order to meet the needs of society and its individual entities.

It should be noted that the society of market relations increases the value of the individual's own activity in the process of their own social positioning, including carried out in the process of job search. Meanwhile, the modern student, as studies show, does not yet fully accept active strategies, leaning, rather, to dependent positions.

The current labour market is not devoid of certain discriminatory practices by employers. The most frequent barriers to employment are restrictions on age and sex, health. In addition, experts noted the importance of social and financial capital in the employment of a number of prestigious specialties and positions. Research scientists, including ours, also confirm that in today's society to a large extent informal channels of employment.

To solve the problem of youth employment, the government of Kazakhstan has taken a number of measures. The program "Youth personnel reserve", which provides comprehensive measures to promote employment, employment and social protection of youth in need of support. To reduce the unemployment rate among young people in

Kazakhstan on behalf of the President N. Nazarbayev created a web portal "Youth labor exchange". The priorities of which are the availability of young Kazakhstani to apply electronically for participation in such programs as "with a diploma to the village", "Youth practice", "Zhasyl El" or to find out what vacancies in the country are necessary and the realization of the right of youth to work, promoting secondary employment of students and minors, including through the organization of student squads. Every year, together with institutions of higher and secondary vocational education, about 200 student squads are formed with a total coverage of about 7,000 people.

The measures proposed by the Government to create conditions for youth employment are insufficient. There is a need for more effective government action on youth employment. The main condition is to create jobs with decent wages.

In order to reduce unemployment among graduates of vocational schools, it would be advisable:

- to resume the institution of staff distribution;
- to open training centers on the basis of enterprises for training or retraining of specialists;
- to create youth enterprises (at least on an experimental basis), where only graduates of educational institutions can work;
- to organize internship practices in enterprises for young professionals to acquire initial work experience;
- in order to achieve success in this area, it is advisable to obligate business leaders to allocate quotas for the employment of young professionals and introduce preferential taxation for young start-up entrepreneurs.

SECTION VI. Educational Sciences

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THE IMPORTANCE OF ACTION RESEARCH

The introduction to the category of "Action Research" is connected with the name of Kurt Lewin (1946). Lewin described the stage of planning and evaluating the results as a gradual process of these studies.

School-based research is a process that enables special professionals to analyze, think, and solve school issues. This type of research is aimed at improving knowledge. In this regard, the school teacher strives to better understand and improve his experiences through action research. Participants in action research are involved in the modernization of curriculum activities such as defining, collecting, and analyzing information [1].

They grouped into technical action research, practical action research and critical action research. They called them "personal", "professional" and "political". Many prominent scientists have contributed to the development of theory and practice of action research. In the UK, Lorenz Stenhaus used this method to engage teachers in school studies. Elliot and Ruddick continued their work in this direction and developed a project of action research. Such projects have changed the classroom work, increased mobility of teachers [2].

Each type of research is characterized by different purposes, forms and methods. Research studies in the field of education are carried out by professional researchers in priority areas. A group of researchers study the methodological aspects of the teaching and learning process, while the second group explores the theoretical aspects of complex thematic programs. Authors of such programs can be scholars with gifted students from universities. Their main function is to systematize and analyze a wide range of theoretical and empirical data. As a result, a strategy and a policy are formed to understand a particular phenomenon on the basis of the theory of the above-mentioned scientific groups.

Action Research can develop a conceptual understanding of pedagogical practice and on the basis of this, the practitioners form their own theory in the context of their classroom work. The relevance of the

study in the field of education suggests that the need to change the pedagogical practice in accordance with the teacher's model of practical activity. Pedagogical theories are the result of teachers' research activities, as a result of their research activities using professional research methods [3].

There are differences between the professional researcher-researchers who are studying teachers' behavioral studies and classroom practices to make changes in the classroom. The knowledge gained in traditional practice remains the work of a complementary teacher and is officially rarely announced by scholars. The results of the research are seldom evaluated.

Professional training is largely based on the context of the teacher's practical activities: the classroom situation influences the school culture and the school's culture is influenced by that culture. In this regard, it is important to take into account not only the specific cultural context in which the work of a particular class teacher is objectively evaluated but also the political context of the time. Daily practice changes the teacher's perceptions and affects their experience. Therefore, the development of teaching and learning practice requires recognition of the importance of this law.

Individual studies focus on one particular problem in the classroom. Teacher defines the problem and studies solutions such as learning strategies, classroom management or student learning. In this case, teachers may be assisted by a methodologist, school principal or parent. One of the disadvantages of a personal research is that the results are not discussed publicly unless the teacher officially informs his colleagues and does not deliver a presentation at a conference.

School-wide action research focuses on issues of common concern. Particularly involvement of parents in school activities. In this regard, involvement of many parents in the main issues, organizational-management problem of the school structure. School staff work together to plan a problem, collect, analyze and make decisions in a specific action plan. An example of case studies in school is the analysis of the outcomes of the external final test to determine a specific aspect of learning, the specific research plans that will influence the final control and increase students' knowledge. The contribution of each individual in the teamwork will help to make the work effective.

Action research for teachers is a way of further professional growth and continuation of learning through the use of practical experience

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THE QUESTION OF FORMING SPEECH PERCEPTION IN CHILDREN DURING THEIR FIRST TWO YEARS OF LIFE

Early childhood is a sensitive period for learning speech. Intensive preparation for such learning takes place in infancy. In this period a baby's basic phonemic hearing starts forming, a baby learns and develops pronunciation of speech sounds and finally starts comprehending and saying first words.

Disorder of auditory sense means that the process of speech formation is extremely difficult or even impossible without special teaching. Infants' sensitivity towards speech determines the importance of organization of remedial teaching of children with speech perception disorder in the earliest possible time.

However, special aspects of formation and development of hearing (perception of speech) in infants and young children have been understudied so far. One of the reasons for that is the difficulty in detecting and assessing the disorders of auditory sense in young children [1].

Correction of sensory deprivation requires an especially vibrant social contact which may be exercised to the fullest only through correctly organized day-to-day communication of a child with others.

In this context the research carried out by M.I. Lisina [3] has strongly indicated that the role of certain analyzers in environmental perception varies depending on the child's age. During the neonatal

period it is the tactual and kinesthetic sensations that play the biggest part.

By 3-3,5 months of age the visual component of the complex stimulus starts playing a bigger part while the sound effect is still considerably indifferent for the child. By the age of 4 months the sound stimulus becomes a significant part of the complex and only during the 5th month of life sound stimuli take on a role of a strong component.

Distinguishing words among common sound stimuli occurs on the 9th or 10th month of a baby's life.

In order for a word to make sense, to denote a thing there should be special conditions that provide for the dynamic activity of a child toward the object, and for the activation of various analyzers among which the motor analyzer plays a key role.

The process of formation of speech perception in children is usually that an adult elicits a child's indicative reaction to a certain object situated near the child or held by the adult complementing this reaction with denoting the object. Repeating it over and over again causes a connection between the word pronounced by an adult and the object being perceived which collectively act for a child as the components of the complex audio-visual kinesthetic stimulus.

By 10 months a differentiated connection between the denotation and the object itself is established which is the initial form of understanding speech [4].

Speech perception is one of the aspects of oral activity which is considered foremost as the exercise of the communicative function of a language.

During the first year of life children actively perceive adults' speech using preverbal vocalizations in response to the address. Auditory perception and vocalization response collectively make up a form of personal situational communication which as opposed to the verbal communication itself may be called voice communication.

M.I. Lisina has made an assumption that during voice communication special conditions are created which are favourable for speech acquisition. Some of them are connected with development of verbal communication and the other – provide for formation of speech articulations [3].

Both the understanding of an adult's speech and verbal response to it are performed based on active perception of the statement and on pronouncing it. In this case pronunciation acts as perceptual action modelling specific tones of voice and also as the instrument of voluntary articulation of a spoken word [4].

In general, given the data obtained by V.A. Kovshikov, V.P. Glukhov and other researchers of child's speech it may be stated that by the age of two years formation of phonemic awareness of a child with normal intellectual and speech development is ultimately completed and the child comprehends all the phonemic subtleties of speech of adults around him/her. Furthermore, due to early development of phonemic awareness a child learns to distinguish for the first time various phonemic elements of speech and their exact auditory representations which start regulating formation of such elements in his or her own pronunciation [2, 5].

In logopedic practice there is a group of infants whose development of auditory perception of speech happens in the form of dysontogenesis which hinders their healthy development.

Nowadays there is no correct methodological approach to evaluation of mental development of an infant with perinatal pathology on the preverbal level which leads to late diagnostics of partial constituents of mental and verbal functions in young children and to delay not only in medical treatment but also in psychological and educational support.

In this context special emphasis is put on the social factor in speech development, in particular it is the role of child's family in determination of a problem at the earliest stage and organization of timely logopedic support.

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COMPARATIVE APPROACH IN THE TEACHING OF TRILINGUALISM IN KAZAKHSTAN

«If you talk to a man in a language he understands,
that goes to his head. If you talk to him
in his own language that goes to his heart.»

Nelson Mandela

The number of languages in which a person can express their thoughts fluently has always been one of the indicators of education and the level of culture, and in some countries and a measure of hospitality. In Kazakhstan the policy of trilingualism proposed by our president is being actively introduced everywhere.

«The people will be wise in raising their descendants, taking care of their health, education and worldview ... He will equally well master Kazakh, Russian and English languages ... He will be a patriot of his country, known and respected throughout the world» [1]. According to the Head of State, the introduction of trilingualism in the sphere of school education is the preparation of Kazakhstan children for the future. In this case, the main question arises: should we teach children at once to three languages? Which method is preferable: first the child should learn the native language or simultaneously study several foreign languages in such a way that the parallelism of their mastering facilitates the learning process.

This issue we will consider in the article.

The aspect of the mutual influence of different languages with simultaneous learning has been considered by many scientists for a long time. Based on their work, a comparative analysis was created. Originally it was believed that the knowledge of the native language could have an impact on the mastery of foreign language. Later, scientists came to the conclusion that the new language was more influenced by the first foreign language, due to the identity of the techniques used to master it. A comparative method is study and description of the language through its systemic comparison with another language in order to clarify its specificity (systemic idiomatic). This method is aimed primarily at identifying the differences between two compared languages and is therefore also called contrastive. It lies in the basis of contrastive linguistics. Comparison as a kind of

comparative study of languages differs from other types of linguistic comparison, although in general SM connects with the general principles of typology, being applicable to languages regardless of their genetic relationships.

The idea of a comparative method was theoretically substantiated by IA Baudouin de Courtenay. The elements of comparison can be found in grammars of the 18th and 19th centuries, but it began to be formed as a linguistic method with certain principles in the 30s and 40s. of 20 century. In the USSR, an important contribution to the theory and practice of the comparative method was made in those years by ED Polivanov, LV Shcherba, SI Bernshtein. Studies in the USSR Polivanova (1933), Sh. Bally in Europe (1935) became a classic application of comparison. At present, the importance of this method is going up due to the increased interest in the linguistic foundations of the teaching of non-native languages

One nuance exists when Russian-speaking people study Kazakh language and vice versa. Since the Kazakh and Russian languages are actively used, people of our country create the mistaken opinion that they almost speak another language. For example, all the signs in our country are written in two languages. From here we know from childhood that нан – хлеб (bread), сүт – молоко (milk), балық – рыба (fish), ақша айырбастау - обмен валюты (currency exchange). *The problem is that knowing individual words is impossible to build the correct phrases in a foreign language. To speak fluently a foreign language you need to master grammar, to have a reach vocabulary, to apply collocations, phrasal verbs, noun with prepositions and so on. I suggest considering and comparing grammar in three languages.*

Since in English only two cases of nouns have survived: the Common case and Possessive case while there are 6 cases are in Russian and 7 cases in the Kazakh languages. The relations of nouns to other words in the sentence, which in the Kazakh language (as in Russian) are transmitted through case endings, namely the relations of the genitive, dative and instrumental cases, are transmitted in the English language by a noun in the general case in combination with prepositions.

Consider such a phenomenon as the genus of nouns. In Russian there are three gender of noun: masculine, feminine and neuter. The student must correctly determine the gender of the noun in order to match it with the adjective. In the Kazakh language, nouns do not change by gender. In English, it is impossible to determine the gender of

nouns according to the ending of the word. It can be identified only by lexical meaning or by context.

A large number of common Russian and English words are formed from Greek and Latin roots and have a similar sound. It is known that in the Middle Ages Latin was the international language of scientists, through it all the European languages passed a huge number of words that have become international. Practically all terminology in medicine and many other sciences go back to Latin: *куб* - *cube*, *квадрат* - *quadrate*, *сфера* - *sphere*, *эллипс* – *ellipse*, *антибиотик* - *antibiotic*, *бактериофаг* – *bacteriophage* etc. Words in the Kazakh language do not have roots from the Latin language. This is because the Kazakh language belongs to the Turkic language group.

The word order in the sentence is very different in the three languages. There is a fixed word order in English, that is, the subject always comes first the predicate follows it. In the Kazakh language the verb is always located at the end of the sentences. In Russian there is no fixed order of words.

A distinctive feature of the Kazakh and Russian languages is the absence of Perfect Tenses. Students have to do a lot of exercises to understand the essence of this grammatical phenomenon.

In addition, there is a semantic difference in the use of collocations. For example: fresh air - свежий воздух – таза ауа. In Kazakh language adjective “таза” means “clean”. Latest news – свежие новости - соңғы жаңалықтар.

Moreover the difference in the forms of infinitives should be mentioned. In the Kazakh and Russian languages, the infinitive is an indefinite form of the verb that answers the question: what to do? For instance: писать – жазу – to write. In English there are six forms of infinitive: four active and two passive.

Therefore, there are two groups of verbs in English. After first group of verbs we use infinitive: afford, agree, appear, arrange, ask, attempt etc. After second group of verbs we use gerund: admit, appreciate, avoid, be capable of, be good/bad at, be interested in etc.

The grammatical phenomenon “Sequence of Tenses” occupies an important place in English. Reported speech is based on it. But there isn't such grammar rule in Russian and Kazakh languages.

In conclusion each language is individually peculiar not only in relation to the "features" of its details, but also in its entirety and in all its elements, in its "drawing," as E. Sapir might have said. System is in relation to each tier of the linguistic structure, and the entire language as a whole. The admission cannot be based on isolated, disparate

"differences" of disparate facts, but must proceed from systemic oppositions of categories and ranks of one's own and another's. The main approach in the teaching of trilingualism in Kazakhstan should be comparative one on the cognitive basis, which undoubtedly serves to intensify the learning process, to develop the feelings of the student language both in the second and third foreign languages.

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CONTINUING EDUCATION AS A VITAL PROCESS OF RAISING MORAL AND ETHICAL SKILLS OF A PERSON

Abstract: the article presents continuing education as a vital process of raising the moral and ethical qualities of man in the modern world. The article may be of interest to social workers and teachers of high school education.

Key words: continuing education, human-centred paradigm, andragogically anthropology

Defining a methodological problem as a social-cultural Institute of human development and society is the way of representation of the idea of Man in andragogy and the education and, consequently, the way of representation of his Being. Enough cognitive capabilities and, in particular, to creativity, to continue learning and participation in formal education". In all likelihood, research in developmental psychology regarding the adult population exposed to the strong indoctrination. Anyone who had computer literacy or driving in adulthood, knows what incredible difficulties. All the optimistic conclusions in the ongoing

psychophysiological research based on the fact that experiments conducted in the framework of the skills of professional activities, and conclusions are drawn about the cognitive abilities and creativity in General, that is, outside professional activities.

What was the reason?

First, the intelligentsia of the early XX century in Russia was essentially in internal exile and was deprived of the active positioning and the cultivation of their own intellectual and spiritual position in life.

Second, human-centred, humanitarian-anthropological project required for the implementation of other institutional forms, rather than existing institutions of education.

Thirdly, the situation of the development of anthropological knowledge not prepare the public for the perception of human-centred project, not ontologically, neither regulatory nor institutional, nor, especially, socially, psychologically.

It should be noted that today the fate of practical anthropology in Russia depends on the solution to the above problems.

The idea of continuous education, providing an ideological influence on the psychophysiological study of adults is based on the intersection of the interests of society, state, personality and the education system itself. It is clear that these interests are not all the same. The education system is a conservative social institution with his employment, his educational services in the labour market, their budget. So the idea of continuing education, existing at the intersection of interests with the continuously changing balance of power, actually does not have its own conceptual content, its content exclusively casual (casus - case). In practice, this means that the use of the idea of lifelong education requires a regular examination of the ontological, which aims, first, to determine what, in fact, reality is subject to public understanding of the idea of lifelong learning (leisure, vocational education, professional education, politics, religion, art, culture, family, etc.), and I. secondly, it is necessary to invest in the idea of continuous education, to the idea of PE has turned into a worthless slogan, "talk and writings" (M. Heidegger). Ontological newcontent ideas continuing education it requires regular maintenance in the form of concept development, designed either for the moment or for the future. This task should be decided by the qualified scientific community. Meanwhile, the scientific community both in the West and in Russia (represented mainly teachers) are very slow in understanding the contemporary nature of "lifelong education".

Of course, many researchers are well aware of the fact that the real content of "lifelong education" has never remained the same. If in 60-ies of the 20th century the meaning of continuity of education was reduced to the continuity of technical progress and, consequently, to improve professional training within pre-retirement age, already in the 80-ies in the West, in the center of attention gets "further education". As correctly noted by A. M. Mitina, "additional education of adults, especially in industrialized countries with a high educational level of the population is an essential element of lifelong education, it is, in its modern sense gives continuing education the true meaning and content" (A. M. Mitina). However, the supplementary education A. M. Mitina understands "functional literacy" that can be interpreted as the ability to live in a civilized metropolis. That is the "functional literacy" is actually a "bonus" to the profession in the labour market, such as the possession of a personal computer and a foreign language, have experience of driving a car, legal knowledge, etc.

By the end of the 20th century the meaning of "further education" was clearly to go beyond "functional literacy". In particular, on the basis of a developed economy and high standard of living began to be a problem of the educated leisure: family, friendly, corporate, individual. Leisure communication in itself, outside of professional interests, requested education: education not only as a scientific knowledge, but also as a culture (cinema, sports, music, history, cooking, tourism, dance, religion). The process of globalization has given an impetus to the development of education: this, and the problem of international convertibility of the educational certificates and the problem of development of uniform public utilities, transport, communications, financial system, visa system, and the problem of etiquette in foreign travel, - and all this against the backdrop of national cultures. On the other hand, existential problems of the individual gave rise to the need for self-realization, that is, the in-depth development of the aesthetical faculties, moral feelings, religious search of physical perfection. In fact, at the turn of XX and XXI centuries was followed by an inversion of values about a civilized society: no rest for the labor, and labor for rest. The twenty-first century begins to get used to the idea that leisure pastime then you might also need the education, not small.

Currently, under the idea of lifelong education there are three different orientation:

- professional education;
- functional literacy of a global civilization;
- cultural leisure.

Note that the vector of development of the content of lifelong education is not a vocational education, but, on the contrary, it is in the direction of cultural and leisure activities. Is this fact a simple incident of our time, or we are dealing with a fundamental phenomenon of modern civilization?

To answer this question, you need to pay attention to the following points:

First, one should not exaggerate the ability of adults and older people to training, education and, especially, to education. So we should not exaggerate the susceptibility of adults and the elderly to stimulate and motivation. No need to exaggerate the need for adults to change their education, especially professional. And this is understandable from an anthropological point of view: with age, the ability to education are falling, and the efforts and costs of adult education, respectively, increase. Today in the developed countries expenses for the education of adults exceed the cost of education of children and youth combined.

Adult education is an extremely costly policy, not only financially but also in time, and organizational. The experience of history shows that any society that prefers to invest money, time and effort mainly in young people.

Secondly, one should not naively to suggest that the labor for income and education for a living are compatible. An adult at eight-hour working day is very poorly prepared for the beginning of educational activities in poslerabochee time, primarily because of fatigue. Even traffic regulations forbid driving under the onset of fatigue. If to be guided by humanitarian considerations, the education plan for income, it is necessary to prohibit the trading day. Or to implement it within the work time with pay. This once again confirms the extraordinary costs of adult education, especially in the observance of morality. Not accidentally, all the education of the adult working population so often based on mutual deception learner and the teacher, producing bribery and corruption.

Thirdly, adult education is not conducive to the fact that any excessively stratified society by all means prevents the vertical (upward) social mobility. That is, increasing education, even the best training does not guarantee career advancement, and the more you advance in the higher strata of society. In terms of matchmaking and nepotism continuing and professional education loses its meaning, turning into a romance one and a waste of time in others. Young scions of noble families are able to occupy all the prestigious positions with minimal effort on obtaining of the diploma of undergraduate or postgraduate

education. In a better position than vertical social mobility is horizontal social mobility.

In the second half of the twentieth century it was customary to believe that technological progress will make to the formation of sharply increased requirements. However, in reality this did not happen. Rather, the opposite occurred thanks to the emergence of "interface", a special way of communication between man and machine in human language, not machine.

European civilization, city by way of development, focus on comfort, available to any full member of society. Comfort - as a principle of organization of activity of the Western companies - does not imply a high education. Considering that getting an education is hard work, and comfort is for the purpose of relief work, it is clear that the focus is on comfort at the same time means a reduction of efforts to education. In any case, it is obvious that in conditions of technical progress adult education in principle, should not rely on labor-intensive activities. Education as the labor necessary in children and adolescence, and it is not appropriate in a Mature age or even older. Ideally, adult education is education for leisure, as leisure time and its as if no student's work. In this political culture and education of an adult, University graduate, is much below the minimum of civic responsibility. Extra knowledge is necessary, as a result, the civilization loses the "Civitas" - citizen.

Thus, durable unrealized potential of adult human continuously connected with the unawareness adragogical anthropology and human-centred paradigm in adult education.

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SECTION VII. Political science

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US AND RUSSIA'S INTERESTS IN THE ARCTIC ZONE IN THE CONTEXT OF INTERNATIONAL SECURITY

Abstract. The article analyzes the importance of the Arctic region from the standpoint of Russia's interests and the policy of the United States. The author argues that in the Arctic the interests of many countries overlap. The US has socio-economic and military interests expanding its sphere of influence from the position of global leadership. It is possible to prevent the transformation of the Arctic into a militarized region by strengthening cooperation in the field of military security, expanding the economic importance of the Northern Sea Route and developing the infrastructure of the Russian North.

Keywords: national interest, Arctic region, energy resources, USA, Russia.

The modern world is characterized by significant changes and complications of socio-economic, political, cultural, information and military processes. The driving force behind all changes is the global power imbalance and the formation of a new balance of powers in different regions of the world. Against this backdrop, the problem of protecting national interests in the context of de-globalization, regionalization and reducing the degree of US might to influence upon global political and economic trends was actualized.

The Arctic zone occupies the most important place in the system of ensuring national interests for Russia. More than 60% of the territory of Russia belongs to the Far North area. It actively develops and produces energy resources (natural gas, oil), non-ferrous (nickel, tin) and precious (gold) metals, as well as diamonds. The regions of the Arctic have a positive balance in intergovernmental relations with the federal center and provide almost 50% of the country's foreign exchange earnings and produce about 11% of its gross domestic product [1].

Due to the special importance of the Arctic region, the task of protecting national interests in the area and blocking emerging threats is being actualized for Russia. In such conditions it is very important

regularly to monitor the threats to the national security of Russia in the Arctic, determine the degree of their danger and develop measures to protect Russia's national interests.

The US has a special strategy for the Arctic region. Under international law, the United States can claim only a relatively small sector of the Arctic and they also seek to achieve international use of Arctic resources and open access to them transnational corporations.

The foundations of the current US strategy in the Arctic were defined by President Clinton's decree in 1994. The document established six key goals in the Arctic: 1) ensuring USA national security; 2) conservation of Arctic ecosystems; 3) ensuring sustainable socio-economic development in the region; 4) strengthening international cooperation between the Arctic states; 5) involvement of the indigenous population in the management process; 6) further extension of scientific environmental monitoring.

The next important document was the presidential directive of 2009 [2], signed by George W. Bush. It fully confirmed the priorities laid down in the 1994 decree, describing in details certain policy directions. In particular, the document strengthened the US position on the regime of international governance in the region, according to which, as long as economic activity in the Arctic will be increasing, it is necessary to raise the issue about developing new international legal instruments.

In this Directive certain measures were formulated to protect the national interests of the United States in the military-strategic sphere (missile defense and early warning system, the deployment of the Navy and Air Force assets to ensure strategic nuclear deterrence and naval presence), as well as in the fight against terrorism, economic and environmental security. In this document, the United States proclaimed its main goal, the expansion of the American economic presence in the region while simultaneously demonstrating maritime power. At the same time, it was declared that The United States plan to defend their goals and intentions not only in the 200-mile economic zone, but also "exercise proper control" in the adjacent water areas [2].

At the same time, if we compare the importance of the Arctic for Russia and the United States we shall see that the polar region plays a significantly smaller role in ensuring the state interests of Americans. The United States has the smallest of the five coastal states water areas in the Arctic sector. The icebreaker fleet of Americans consists of only three heavy diesel-electric vessels (Russia has more than 40, of which 8 are nuclear ones).

The prospects of US government to extend its jurisdiction over continental shelf (that is, to the shelf areas beyond 200 nautical miles from the coast) remain unclear. The most effective and internationally recognized instrument for securing the rights of states to the extended shelf is the 1982 United Nations Convention on the Law of the Sea, which has not yet been ratified by the US Congress.

Under the B. Obama's administration only some accents were changed in the Arctic policy. In the «*National Strategy for the Arctic Region*» adopted in 2013, it is stated that the task is to raise public awareness of Arctic problems, first of all, environmental problems. The text of the Strategy also says that the United States plans to apply to UN for the expansion of the continental shelf of the Arctic shelf [3].

In 2014, "U.S. Navy Arctic Roadmap 2014–2030" was adopted which presents a plan for the development of a military grouping of US forces in the Arctic zone [4]. The Roadmap emphasizes the special importance of cooperation USA with Arctic allies within the framework of NATO. A medium-term plan for scientific research of the Arctic was also adopted.

The D. Trump's administration, known for skeptical statements about climate change, has announced that the oil and gas fields on the Arctic shelf of the United States are beginning to be developed. At the same time, the overall US strategic course in the Arctic is the same. Indirect confirmation of the continuity of the current Arctic policy of the United States is the fact that almost all the key employees of the State Department, responsible for the implementation of US policy in the Arctic under the Obama administration, have retained their seats under the new president.

At a press conference in Juneau, Alaska, on March 10, 2017, John Bolton, who was Deputy Assistant Secretary of State for Oceans and Fisheries and concurrently chairing the Committee of Senior Officials of the Arctic Council, noted that the US course in the Arctic over the years has undergone a minimum of changes. According to him, the key goals in the region are unchanged and are based on the social and economic interests of Alaska and the need to ensure the ecological safety of the region [5].

The Arctic zone for Russia is a key link in the national security system, covering at once several aspects: economic, energy, military, border, and transport security. From the geopolitical point of view, the Arctic is important for Russia, as a transport center and a zone for containing military ambitions of the United States and the NATO bloc. All other Arctic states: the USA, Canada, Denmark, Norway are NATO

members. In conditions when there is no clear international legal framework for the division of the Arctic, the risks of military confrontation are increasing.

On this background, the vector of US and Russian policy should be focused on minimizing the threats of confrontation of their national interests, transforming the conflict potential into a format of competition and putting forward, as a general priority, the creation of a regional security complex in the Arctic.

The most important element of the system for protecting US and Russia's national interests in the Arctic zone should be international cooperation on a multilateral basis between the Arctic powers. The Arctic Council can become a key platform for a special discussion of the Arctic problems. It can be the leading intergovernmental forum promoting cooperation, coordination and interaction between the Arctic states, indigenous communities and the rest of the inhabitants of the Arctic, addressing common Arctic issues.

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