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CONTENTS

GEOGRAPHY

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Vlasova A.N.

LANDSCAPE PLANNING OF CRIMEN SMALL RIVER'S BASIN

Taurida National V. Vernadsky University

The features of landscape planning basin areas have been considered. The landscape plan of the Voron river basin is drawn up, recommendations for optimizing the territory are offered.

Keywords: landscape planning, river basin

One of the methods of the territory sustainable development is a landscape planning, based on assessment of the functions and properties of the landscape, on working out of proposals for conservation of its' components and aesthetic qualities. Usually landscape planning is conducted on administrative level, basin approach is applied rarely not enough. The purpose of my investigation is to show the landscape planning opportunities at river basin's organization.

Basin approach to land-use management is efficient because it is based on the territory self-organization processes, such approach provides the maximum economic and environmental effects. Basin approach to nature resource using allow to preserve the quality and quantity of water in the Crimea, it is important to the peninsula because of its water shortages.

Landscape planning of basin territories has features because in river basins there is unidirectional flow of material and energy. River basin is a paradynamic and paragenetic system. It consists of valley, slope and watershed subsystems, which are connected by cross paragenetic links. River and floodplain are the structural parts of the basin with longitudinal paragenetic links. The base of basin territory landscape organization is a system of water protection zones along the main stream and its tributaries, reservoirs, roads and railways, coastal protection zones along the sea (the system of landscape and environmental constraints) [1]. An important element of the

landscape is environment-forming territory framework (protected areas and econet). In landscape planning of rivers' basins also are used other environmental priorities - suburban areas, sanitary-protective zone of factories, etc.

Landscape planning is conducted in several stages. Inventory stage is gathering information about natural and socio-economic conditions, landscape structure and land-use patterns in the basin. In analyzing the different spatial patterns of landscape is used software package ArcGIS 9.3 [1]. Particular attention is paid to landscape-hydrological organization, to hydrological and hydrogeological features of the basin. Analytical stage is the base for organization of social- economic complex of the basin. Using the methods of landscape planning [2], information about the landscape and its components are evaluated in terms of "importance" and "sensitivity". The estimation of landscapes stability is made, component and complex characteristic of ecological state of landscapes is drawn. Then the project of landscape organization is offered, evaluation criteria are integrated into development goals (conservation, development and improvement [2]). Zoning of the territory is made, landscape plans are drawn up.

On the base of principles and methods of landscape planning the plan of small Voron river basin was made. The Voron (length - 16 km, catchment area - 52 km^2) is located in east part of the South Coast of the Crimea, flows into the Black Sea, and is a typical small river of the Crimea. During the landscape planning the following functional zones are picked out:

1) The areas of especially requiring protection (reserved territories, sites with the greatest specific variety). In this part of the basin is recommended to stop active nature using. These areas need the installing a reserve regime. The development of new activities is excluded.

2) Extensively used areas - forest and aquatic ecosystems with cultural landscapes (rivers and reservoirs, suburbs, sanitary-protective zones along the roads and reservoirs). There is recommended a temporary stop of economic use.

3) Especially vulnerable areas where development of negative processes are observed (soil erosion, mudflow, abrasion etc.). Such affected and sensitive to

anthropogenic impact landscapes need for improvement and recovery, it is recommended reducing the intensity of economic activity.

4) Intensively used transformed areas with disturbed natural features, territories that have high economic and aesthetic value (settlements, agricultural grounds, elements of a transport net). . The territory of the Voron river basin is used in agriculture and recreation, there are some conflicts in land-use. Actions in this zone include measures to improve the environmental situation. We recommend using technologies that facilitate the preservation of stability of ecosystems and their ability to heal itself (contour organization of agriculture).

Allocation of such zones is necessary for realisation of the nature protection actions, for preservation of landscape and biological variety. The proposed scheme of landscape planning of the river basin would ensure the quality and quantity of water resources in the Southern Crimea, and promote sustainable development of territories.

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S. V.Trofimenko, N.N. Grib

PULSE BEATING SEISMIC SOURCES OF ELECTROMAGNETIC ANOMALIES OF EXPLOSIONS AND EARTHQUAKES

Technical Institute (branch) of Federal State Autonomous Educational Establishment "North-Eastern Federal University named after M.K. Ammosov",

Introduction

Geophysical monitoring of geological environment is one of the basic trends in geodynamic investigations which let us follow the processes in the Earth's crust distantly. Theoretical materials, model assessment of parameters and possible sources of electric and magnetic variations, laboratory and field experiments in studying seismic electromagnetic phenomena allowed to define the physical nature of electromagnetic radiation (EMR) of rocks in their natural mode of occurrence under the conditions of changing deformation process of the Earth's interior [1-3].

The area of investigation embraces the western part of the Aldan shield southern edge of the Siberian platform and the connected with it northern edge of the late Archaean -early Proterozoic Stanovoy fold system which are separated by the Stanovoy (or Southern Aldan) stitch. According to seismic matters this area is an independent region, the so called Olekma-Stanovoy seismic zone (OSZ).

The studying of the structure of geophysical fields outside rheological objects presupposes the accordance of the built models of geophysical fields with the structural and geological formations, so that to define the adequacy of the model. In M.A.Sadovskiy's theory [9] there is an issue of the identity of the block model of the geophysical environment to the block structure of the lithosphere. It means that in geophysical fields any anomaly is a model, in geology – it is a structure. That is why any peculiarities of geophysical fields demand the accordance of rheology model of the Earth's crust in the registration point, which was analyzed in detail earlier in the work [10]. In the frame of this model [9] several suppositions have been made.

- Anomalies of EMR must manifest twice: before the earthquake during the consolidation of blocks into the united structure and after the earthquake during the disintegration of the consolidated area. One of the causes of the anomaly of EMR in this case may be the increase of the surface friction and the destruction of the uneven touching surfaces [5,6].

•This model can "work" only in dry friction, when the migration of fluids in the upper part of the Earth's crust is absent and with the thickness not more than the skin – layer for the registered frequencies of electromagnetic waves during the definite interval .

•Before the earthquake there must be a minimum of day and night anomalies of EMR after the consolidation area has been formed [7].

•During the effect of after shock it is possible for the anomalies of EMR to appear as a result of non-stationarity seismic process and the possibility of short-term repeated consolidation of blocks [7].

•Anomalies of EMR can manifest from the distance defined through the system of interactive structures in the form of the united geodynamic system [8].

If we consider the signal of EMR in the frame of additive model than the total signal can be presented like this:

$$\varepsilon_t = f(\varepsilon_t^{im},\ \varepsilon_t^{per}) \tag{1}$$

Where ε_t^{im} is and ε_t^{per} is impulse emissions and periodical constituents of the signal. Besides, apriority, the function of the source signal is not known, it means that the type of the model, found by (1), is not known.

For forecasting purposes the statistics of anomaly distribution of EMR is of great interest, which is realized on marked periods of the seismic process. In fact this task leads to the task of separation of electromagnetic radiation of exogenous, autogenic and anthropogenic origins.

The preliminary preparation of the data meant that in every three signal component: "north-south" $\varepsilon_t^{im(N-S)}$, "east-west" $\varepsilon_t^{im(E-W)}$, and "electric" $\varepsilon_t^{im(EL)}$ by the method of filtration impulse disturbances (ε_t^{im}) were distinguished, according to the criteria of excess of average statistic meanings of maximums of day and night anomalies of EMR in annual cycle of measurements (ε_t^{crit}). As a result of this procedure a data file was gathered from the initial database, which satisfied the conditions:

$$\varepsilon_t^{im(N-S)} > \varepsilon_t^{(N-S)crit},\ \varepsilon_t^{im(E-W)} > \varepsilon_t^{(E-W)crit},\ \varepsilon_t^{im(EL)} > \varepsilon_t^{(EL)crit} \tag{2}$$

Where $\varepsilon_t^{(N-S)crit}$ $\varepsilon_t^{(E-W)crit}$ $\varepsilon_t^{(EL)crit}$ is average statistic meanings of maximums of day and night anomalies of EMR throughout the annual cycle of measurements of the relative components.

The distribution of anomalies of EMR ε_t^{im} was assessed according to the random data at two points of electromagnetic radiations in annual realizations. The average massif length was: for the hour statistics – more than 100000 meanings; for the year statistics – 5602 meanings.

The results of statistical buildups of impulse of EMR explosions and earthquakes

Figure 1 shows the results of statistical buildups at two points of registration of electromagnetic radiations (“Neriungry” – “Iengra”).

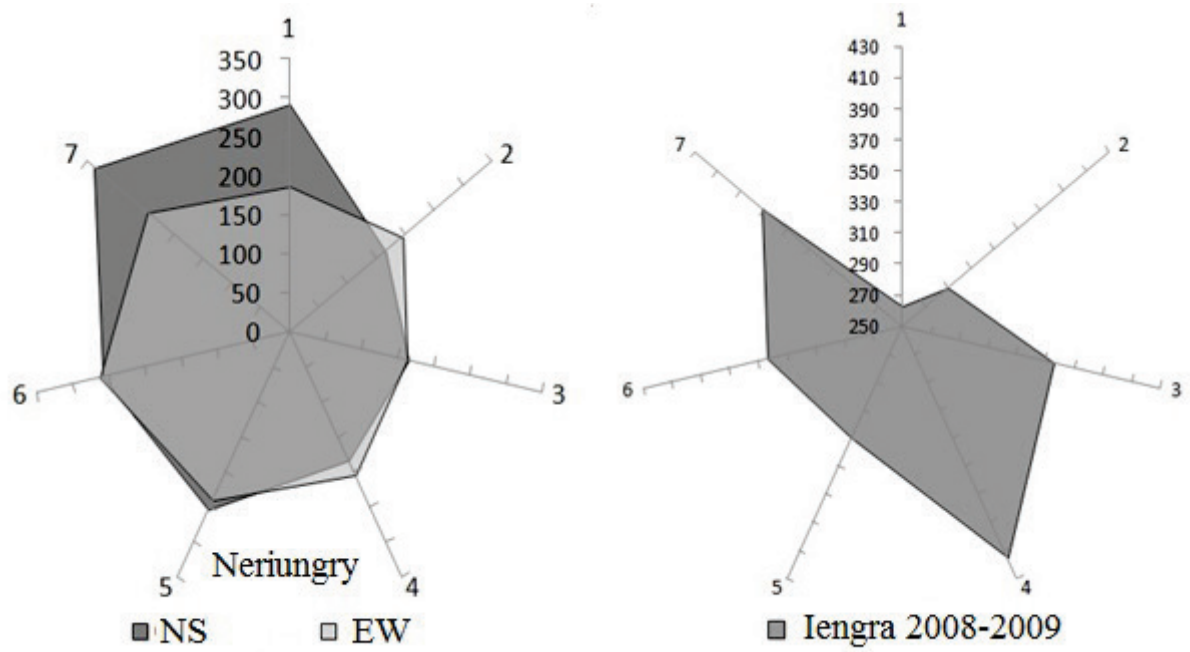

Figure 1. Change of frequency of appearing impulse constituent of EMR during a week at two points of registration “Neriungry - Iengra”.

For the statistics of seven days for both the points of registration “Neriungry” and “Iengra” it is typical to have the maximum of intensive meanings on Sunday. For “Neriungry” point this effect is observed only for the “North-South” component with excess of amplitude two times. For “Neriungry” point the change of frequency of impulse emerge of EMR is presented by convex function with the minimum of

activity from Tuesday to Thursday. In the "Iengra" point there is a maximum of activity with the presence of linear trend from Wednesday till Thursday. The data of the two points are not correlated ($K_{кор}$<0.2), though the maximum on Sunday is typical for both the points of registration. The location of the points of registration to the coal pit and the systems of active breaks is shown in Fig.2.

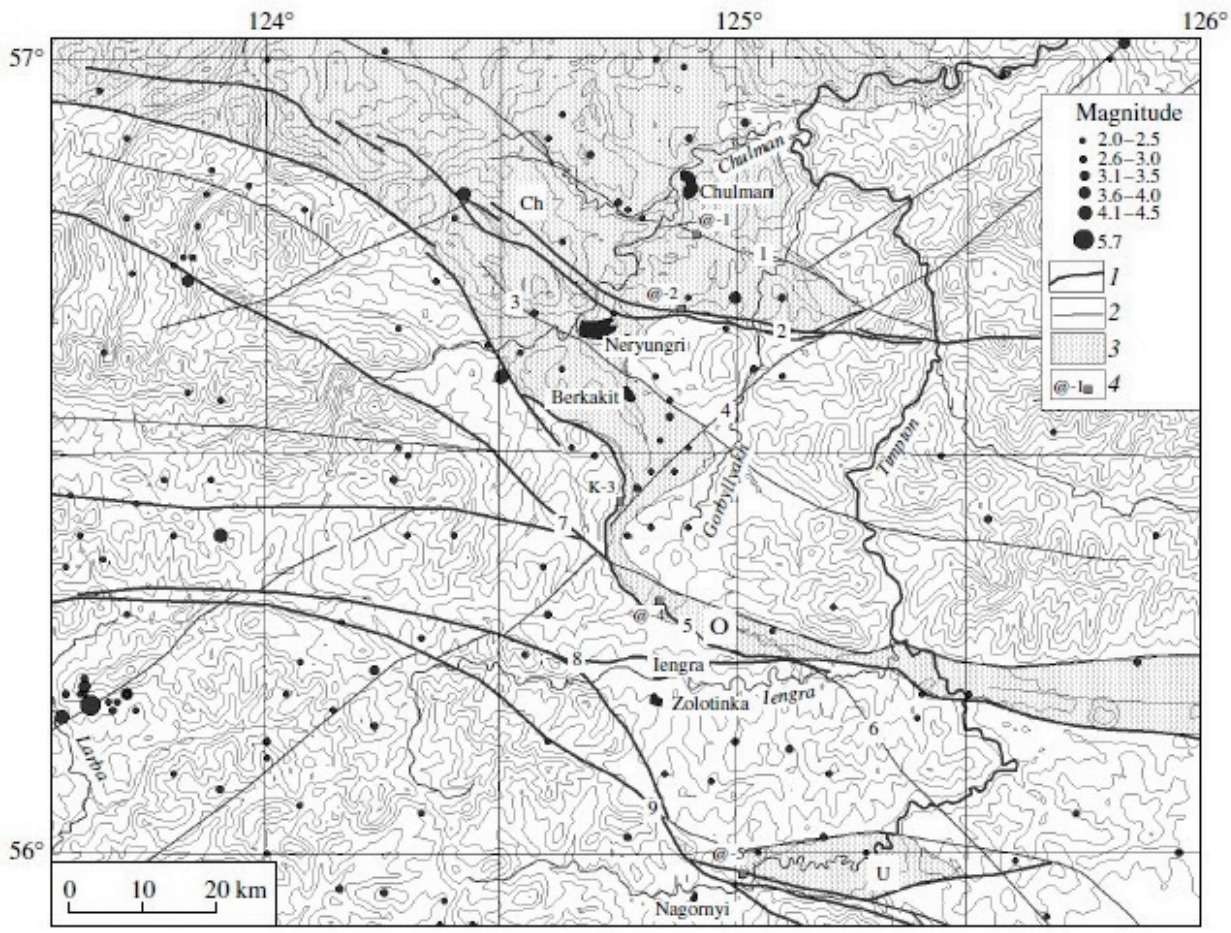

Fig.2. The location of registration points of EMR in the system of active breaks of South Yakutia. Conditional signs: *1,2 – active breaks: K- Kabaktinskiy; N-Nizhne-Neriungrinskiy; B- Berkakitskiy; S-Sunnagino-Larbinskiy; S-Ya-South-Yakutian;V-Verkhne-Gonamskiy; N-S-North-Stanovoy (northern branch); N-S (m)-North-Stanovoy (main branch); S-S (n)-South-Stanovoy (northern branch); S-S (m) – South-Stanovoy (main branch); 3 – epicenters of earthquakes according to the catalogue of the Geological Service of the Russian Academy of Sciences; 4 – inhabited settlements; 5- technological site of the Neriungry open pit mine, 6 – the radius of correlation of anthropogenic and natural sesmisity; 7 – registration points of EMR.*

Fig.3 shows the statistics of distribution of explosions in Neriungry open pit mine, which is situated in 10-15 km to the North-West of Neriungry (Fig. 3a) and earthquakes in the radius of 100 km from the open pit mine (Fig. 3b). In order not to mix up the data connected with explosions and earthquakes, the explosions with the time difference of running t_s-t_p=(1-2)c, were considered and for the earthquakes- 2c< t_s-t_p <10c.

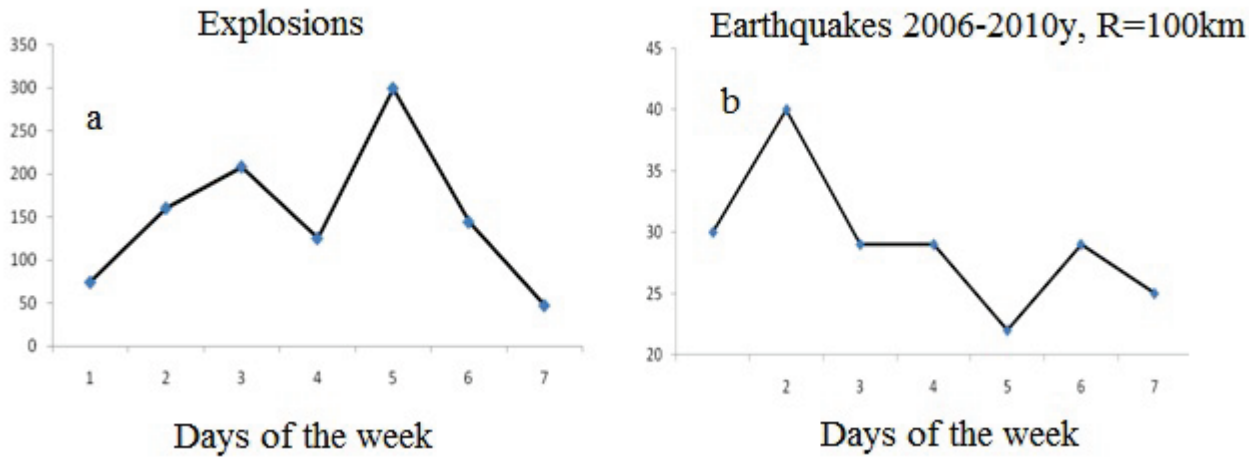

Fig 3. The distribution of explosions and earthquakes outside the radius of correlation (3-10 s.) according to the data of Neriungry seismic station during 2006 – 2010

Fig. 4 shows the statistics of the distribution of earthquakes during all the period of observation according to the catalogue of the Geological Service of the Russian Academy of Sciences (Fig. 4a) and all the earthquakes registered by the Neriungry seismological station (NSS) during 2006-2010 (Fig. 4b).

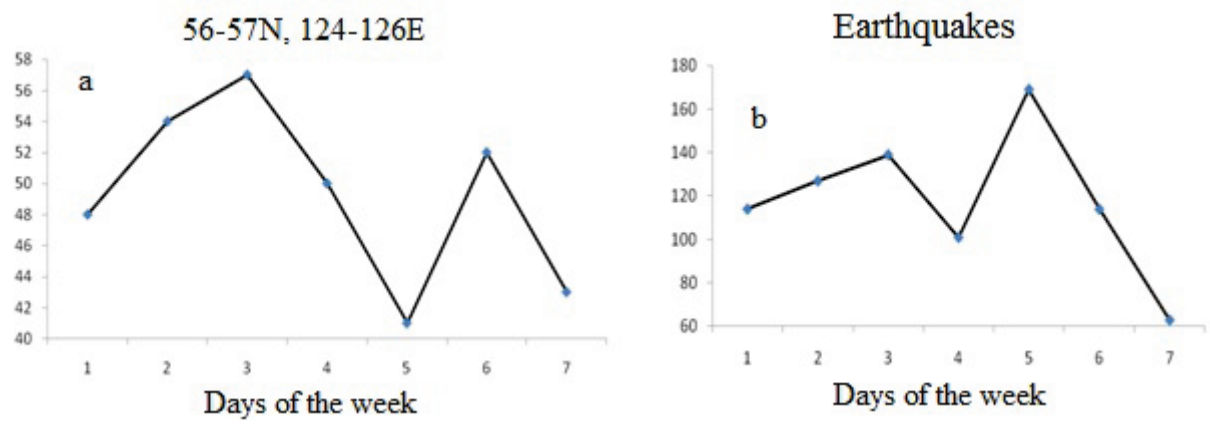

Fig 4. The distribution of earthquakes (345 events) according to the catalogue of the Geological Service of the Russian Academy of Sciences during 1962 – 2005 (a) and all the earthquakes in the nearest zone (827 events within the radius of correlation. See Fig.2) according to the data of Neriungry seismic station during 2006 – 2010 (b).

The coefficient of correlation for the data array "explosions – all the earthquakes" makes 0.92 and it is reflected by the forms of graphs in Fig. 3a and 4b. For graphs in Fig. 3b and 4a the coefficient of correlation makes 0.7 and for the other cases it is close to zero. Thus, near the open pit mine the dynamics of seismisity in low energetic areas ($E< 10^7$ joule) is formed by the anthropogenic factor mostly. For the earthquakes outside the radius of correlation the distribution of earthquakes during the seven days differs from the statistics with minimum of activity, which is on Friday (Fig. 3b, 4a). This statistics is characterized by the presence of local minimum which is on Friday and linear negative trend. The earthquakes with the energy of $E>10^8$ joule (Fig 4a) have the angular coefficient of 1.25, and for low energetic classes it is $E<10^7$ joule – 1.57. It means that for maximum of free elastic energy in the nearest zone due to explosions and earthquakes (Fig 3a, 4b) there may be the reason for the decrease of background seismic activity.

Discussion of the results of statistic buildups

The logical change in the statistics of the distribution of discharge (emissions) on week days may be the sequence of the imposition of two processes.

Firstly, in analogy with statistics of distribution of weak earthquakes (Fig. 3b) the form of the curves is similar to the observed effect of the "weekend days" [4,11], though in this local case the reverse effect of "the weekend days" is observed, in other words for the minimum of seismic activity there is a maximum of impulse EMR.

On the other hand, it is known that the distribution of stormy microseismic noises and macro earthquakes correlate with the Moon-and-Sun tidal variations of the force of gravity. This abundant seismic energy can be transformed into the energy of

electromagnetic radiation, which is observed in the statistics of regular component ε_t^{per} of impulse anomalies EMR [5-11]. In the context of this supposition, the anomaly ε_t^{per} - is the analogue of stormy micro seism.

Additionally to the mentioned causes of manifestation of statistics of the distribution of discharges ε_t^{im} of EMR the total signal can contain the effect of the nearest and far earthquakes due to the activation of surface structures in the zones of dynamic influence of activated breaks when penetrated by elastic waves. According to the principle of the superposition of electromagnetic waves both the effects can manifest themselves simultaneously, after which the division of the total signal in model (1) is quite problematic.

However in this case, in the stationary phase of development of the seismic process the uniform distribution of impulse anomalies should be expected in case of activation of sub latitudinal tectonic structures, which stretch westwards of the registration points.

E.g. for the presented statistics of the distribution of “EMR - seismicity” antipodal distribution of events is typical in seven days realizations. In other words, the increase of the number of explosions and earthquakes in the radius of correlation leads to the decrease of the number of discharges (impulses) of EMR ε_t^{im} in the “Neriungry” point to the contrary with the change of regular (periodical) constituent, where the dependence is direct. For the “Iengra” point the decrease of the number of events during the week (Fig 3b and 4 a) leads to the positive trend ε_t^{im} (Fig. 1b).

The nature of the phenomenon for the seismic events of the “weekend days” is not quite clear (Fig. 3b,4a). For the electro magnetic radiation this effect can be directly connected with the dynamics of the activity of the industrial enterprises and can be referred to anthropogenic effects.

In the block structure of the Earth’s crust [9] the dynamic change ε_t^{per} is controlled by the kinematics of interaction of blocks and microblocks and it is proportional to the speed of dissipative processes of the energy of elastic deformations. The periodical components of anomalies of EMR will manifest only at

the presence of mobile systems of active fissures. The physics of the process has been discussed earlier [6 -8].

When the seismic activity decreases $\Delta E/\Delta T$ (the number of earthquakes during a definite time interval) the relative deformation of both stitch zones and blocks increases. In this case when the constant horizontal constituent of the tensor tension is preserved it is possible for the new micro fissures to appear or to renovate the already existing ones, when reaching the ultimate strain of deformation of the destruction for this level of the blocks hierarchy.

For the "Neriungry" point the increase of the number of explosions initiates the low energetic seismicity and leads to the temporal disintegration of blocks. As a result, the deformation decreases, kinematics of the microblocks becomes low and the decrease of number ε_t^{im} of impulses in the same geodynamic conditions which have been described above.

The obtained results of the statistic modeling of discharges (emissions) ε_t^{im} of EMR differ from the results obtained earlier [3,10], but the nature of them can be explained in the frame of the A.A.Vorobyov's theory [1,2] taking into consideration EMR models, which are described in [3] and seismic process in the block environment [9].

Consideration of the origin of the heterogeneity of seismic activity during the seven days is out of the framework of this paper and it demands a special analysis.

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Kostylenko K.I., Pushenko O.V., Morgun V.N.

FEATURES OF FORMATION OF FOAM STRUCTURE IN CEMENT-SAND MIXTURE

Rostov State University of Civil Engineering Southern Federal University

Shows the features of the liquid phase mass transfer controlling foam aggregative stability of mixtures. It is shown that saturation of the gas phase is highly water-bearing sand-cement slurries using surfactant mixtures allows therefore lose their propensity to acquire sedimentation and aggregative stability.

Keywords: Aggregate stability, foam concrete, surface-active agent, water content

Rising the cost of energy and increasing demands for comfortable buildings make scientific and practical conditions for the development of energy-saving technologies uncured foam concrete, because of resource and energy efficiency are important problems of the modern construction industry, as most material-intensive areas of human activity.

Foam concrete mixture in the initial period after mixing, are of highly dispersed systems. The quality of concrete obtained from the such mixtures depends strongly on the duration of the existence of structures obtained with stirring. Aggregate stability of these systems depends on the binding energy between the solid particles watered and mass transfer characteristics of the period:

a) mixing of raw components;

b) a phase transition from viscous to solid [1,2,3].

The analysis of phenomena that take place in the structure of foam concrete mixtures on the micro and macro levels, will make the first step in making science-based methods of management of the properties of energy and resource materials.

In the watered-disperse granular systems there are two energy states differ radically on the mechanism of organization structure. At low moisture content of the

energy state of the system is predetermined by the surface forces that developed in the liquid phase at the interface "liquid-solid."

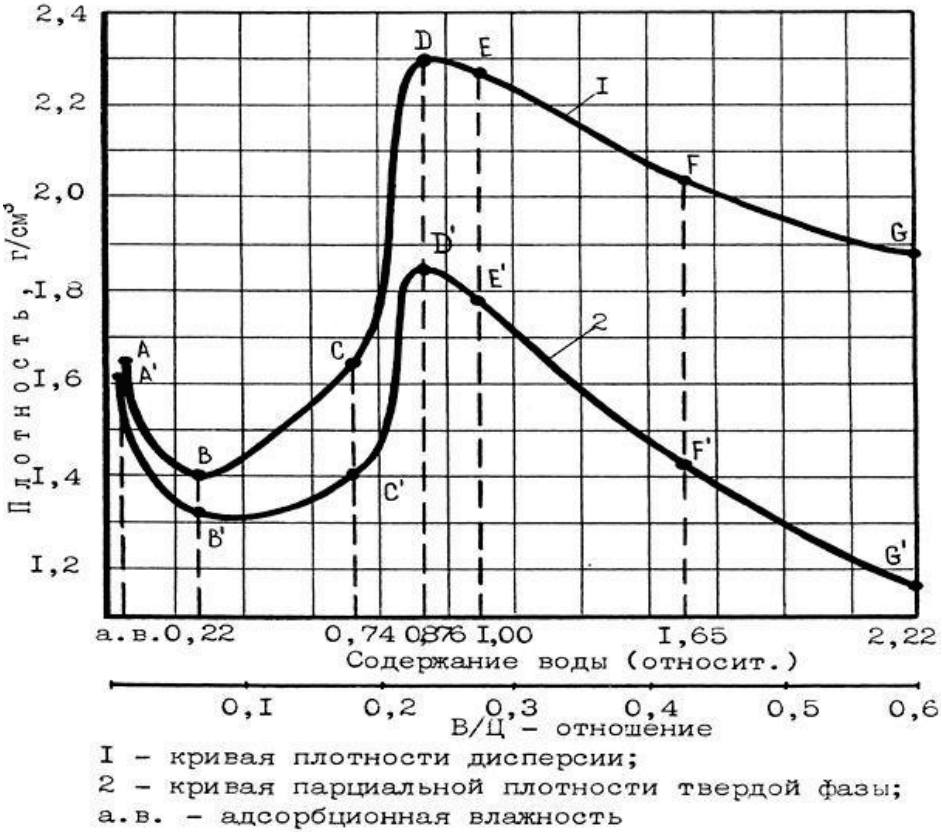

Fig. 1 - The influence of water content on the density of the cement-water dispersion [2]

With a minimum moisture content the packing density of particles is characterized by the fractional composition and shape of grains. With increasing humidity, the liquid begins to adsorb on the surface of solid particles, thus increasing the distance between them. Since the density of solid particles is greater than the fluid, the density of the system decreases. This effect reflects in the area of the curve AB (Fig. 1). Separation of the grains carry the membrane thickness of which is increasing with increasing moisture content up to the extreme point (point B). The site CD is characterized by a gradual increase in dispersion, and the section CD avalanche. On the segment BC is observed linear increase in density due to the location of the fluid in the cavities between the particles of the solid phase. In the area start to show CD capillary forces, which manifest themselves in a strong mutual attraction of particles of the disperse system and consequently lead to a sharp increase

in density. This fact, established by E.I. Shmitko [2] indicates that the water molecules change the structure of packaging dispersion [4], resulting in growing connectedness and density of the dispersed system.

In the process of further increasing the quantity of water, grain, cement insulated from each other by a distance at which the effect of tightening efforts would be negligible. When water content, which exceeds the normal density of cement paste at 65% (point F in Figure 1), the thickness of water layers is 100 nm (10^{-7}m). Considered [2, 5], which is already at such a distance between the particles of the solid phase the resultant internal forces leads to a loss of aggregate stability of the dispersed components of the system. Such a cement paste becomes kinetically unstable suspension, resulting in its bundle. It follows that, theoretically, when the water content of more than 42.5% is impossible to obtain high-quality cement [1,2].

However, in practice the water demand of foam concrete mixtures [1, 2, 3, 5] is always higher W / C = 0.4, and the experience of their production shows that, despite this, the aggregation is possible to produce stable foam concrete mixtures with sufficiently high levels of quality. To understand the causes of this phenomenon in order to control the quality of foam concrete mix and concrete, consider the features of air entrainment into the structure of foam concrete mix.

Analysis of the structure of the foam shows that they are a mixture of water and lyotropic liquid crystals [6], then there are the nematic liquid. Such systems are formed by dissolving substance, whose molecules have the shape of the rods and in any solvent are placed in layers. The scheme of this arrangement is shown in Fig. 2.

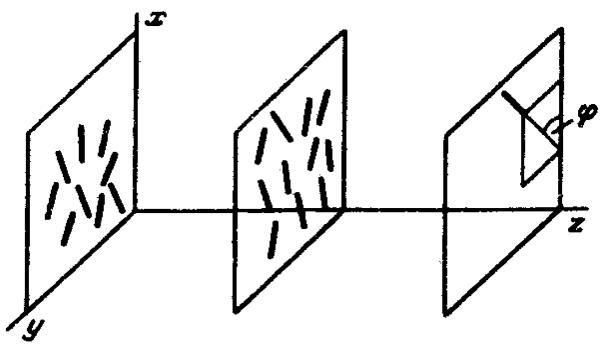

Fig. 2 - The location of surface-active agent in the blowing agents [6]

The water between the surfactant molecules within the layers has a high viscosity. We believe that the external power influence on the foaming agent (mixing) leads to a shift of layers on the surface of the liquid phase of lyotropic crystals, because the internal links in them, due to the high viscosity of water, are more robust than those that occur in the direction orthogonal to the relative position of layers surface-active agent.

Thus, the rod-like surface-active agent molecules are in the process of mixing in the non-equilibrium energy space, which consists of liquid and gas phases. Violation of highly dispersed state of rest of the system leads to an increase in its specific surface. In this case, the hydrophobic part of surface-active agent is energetically favorable to capture the physical portion of the air, and the hydrophilic part of it at this point focuses around a portion of the additional water is not associated with particles of cement-sand slurry. Turbulization of stream of liquid in the mixing aggregate closes the captured portion of the air inside the foam membrane of highly and cement-sand mixture saturated with dispersed gas inclusions. The process of air entrainment will continue as long as the formula does not foam concrete mix will involve all surface-active agents that may pass from the dissolved [7] in the interparticle fluid on the interface between two phases, or is exhausted the amount of water that is able to participate in the formation of foam membrane.

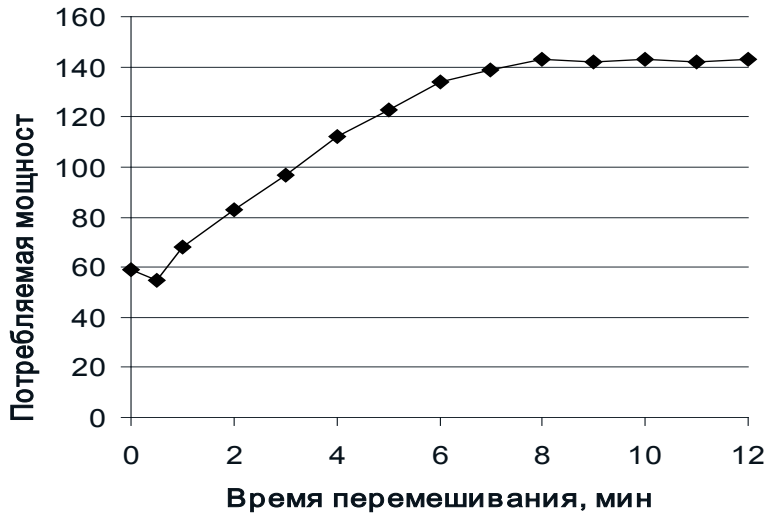

Fig. 3 - The impact of air entrainment on the power consumption in the manufacture of foam concrete mix

Confirmation of these arguments found in the results of experimental studies, V.T. Pertsev, from which it follows that the power (Fig. 3) required for electric mixer, increases as the saturation of the gas-phase cement-sand slurry flooded [2]. It follows that the density of foam concrete mix depends on the work of the motor consumed with stirring.

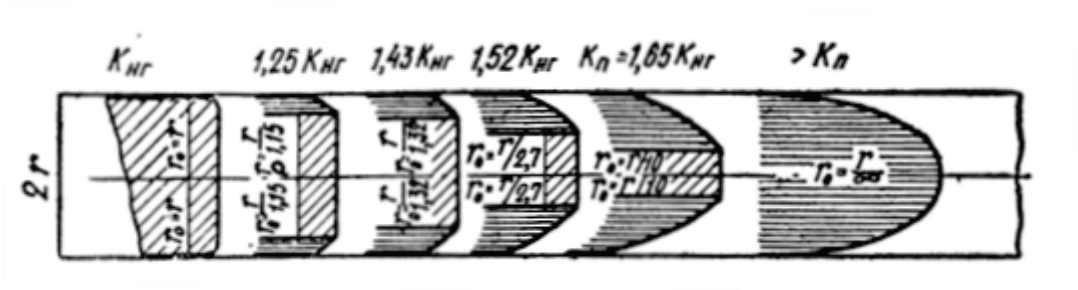

Fig. 4 - Typical profiles of stream cement gel, depending on water content relative to the normal density of cement paste [8]

After saturation of the structure of foam concrete mix some limit the number of dispersed gas phase, the process of filling a mixture of air stops (Fig. 3). We consider that the cessation of air entrainment occurs when the water content of the mixture reaches interporous partition ratio W / C <1.25 the coefficient of normal density (Fig. 4).

The water in the solvation shells around the particles of the solid phase is strongly related to capillary forces, and losing the opportunity to participate in the formation of foam membrane. In turn, the part that went to the foam that is physically connected around the dispersed particles of the gas phase and the foam concrete mix, despite the high initial water content, becomes the property of aggregate stability. As a result of redistribution of water foam concrete mix acquire aggregative stability, and subsequently the mechanical strength.

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CID: J31202-440

Fomina, A.S.

The assessment of the risk of loss of stability of the roadbed depending on the modulus of elasticity of soil

SSTU named after Gagarin YU.A.

The task of this calculation is to establish the probability of loss of stability of the roadbed with a given modulus. For the decision of this task was applied the normal law distribution of the modulus of elasticity.

Key words: modulus of elasticity, the risk of loss of stability of the roadbed, the coefficient of variation.

Modulus of elasticity characterizes the strain resistance under the action of a load.

The risk of loss of stability of the roadbed depending on the modulus of elasticity of the soil can be identified by the following formula:

$$r = 0{,}5 - \Phi\left(E - E_{крит} \Big/ \sqrt{\sigma^2_{Eср} + \sigma^2_{Eкрит}} \right) \quad (1)$$

where E is the actual module of elasticity of the soil;

$E_{крит}$ - critical (minimum) modulus of elasticity of the soil, where the probability of loss of strength roadbed is equal to 50%;

σ_E - the average quadratic deviation of the parameter E;

$\sigma_{Eкрит}$ - the average quadratic deviation of the parameter $E_{крит}$.

Parameter σ_E determined according to the following dependence:

$$\sigma_E = C_V^E \cdot E \quad (2)$$

where C_v^E - the coefficient of variation of the parameter E.

Critical modulus of elasticity in the formula (1) is determined on the basis of the following transformations.

Considered the boundary conditions, in which the risk of the working layer of roadbed tend to zero. The condition will be possible when the parameters E and σ_E will be equal to the acceptable performance of the elasticity modulus of the soil ($E_{доп}$ and $\sigma_{Eдоп}$) on the condition that, in the ground there are no irreversible movement.

$$r = 0{,}5 - \Phi\left((E_{доп} - E_{крит}) \Big/ \sqrt{\sigma^2_{Eдоп} + \sigma^2_{Eкрит}} \right) \Rightarrow 0, \quad (3)$$

where $E_{доп}$ is a valid module of elasticity;

This condition is satisfied when applying the integral of the probability of the number of F(U) = 0,5.

The critical factor of compression roadbed, you can install using the formula (3).

The equality is reached when U ≥ 5, and, therefore, the most reliable solution in which the parameter $E_{крит}$ has a maximum value:

$$(E_{доп} - E_{крит}) \Big/ \sqrt{\sigma^2_{E_{доп}} + \sigma^2_{E_{крит}}} = 5; \quad (4)$$

Here

$$E_{крит} = E_{доп} - 5\sqrt{\sigma^2_{E_{доп}} + \sigma^2_{E_{крит}}}; \quad (5)$$

$$\sigma_{E_{доп}} = C_V^{E_{доп}} \cdot E_{доп} . \quad (6)$$

Permissible tensile modulus can be defined by the formula

$$E_{доп} = E_{опт} \cdot \left(1 + t_н \cdot C_v^E\right), \quad (7)$$

where $E_{опт}$ - optimal value of the modulus of elasticity for a ground, MPa; t - ratio of the significance of the level of reliability of P. In construction, as a rule, take P=0,95, with the t =1,96; C_v^E - the coefficient of variation of the average module of deformation of the soil.

Critical $E_{кр}$ and the actual E modules deformation belong to the same population.

$$C_v^E = C_v^{E_{кр}} = \sigma_E / E = \sigma_{E_{кр}} / E_{кр} , \quad (8)$$

Equation remains unsolved about the parameter $E_{крит}$, since in the right part of it contains the indicator $\sigma_{Eкрит}$, functionally independent from $E_{крит}$.

To solve this equation in relation to $E_{крит}$, taking advantage of the dependence:

$$\sigma_{E_{крит}} = C_V^{E_{крит}} \cdot E_{крит} . \quad (9)$$

Imagine equation in the form:

$$E_{доп}^2 - 2 \cdot E_{доп} \cdot E_{крит} + E_{крит}^2 = 25\sigma_{E_{доп}}^2 + 25\left(C_V^{E_{крит}} \cdot E_{крит}\right)^2 . \quad (10)$$

Solving this equation on $E_{крит}$, we obtain:

- when $C_V^{E_{крит}} \neq 0{,}2$

$$E_{крит} = \left(\sqrt{E_{доп}^2 + \left[25\left(C_V^{E_{крит}}\right)^2 - 1\right]\left(E_{доп}^2 - 25 \cdot \sigma_{E_{доп}}^2\right)} - E_{доп}\right) \Big/ 25\left(C_V^{E_{крит}}\right)^2 - 1 , \quad (11)$$

- when $C_V^{E_{крит}} = 0{,}2$

$$E_{крит} = (E_{доп}^2 - 25 \cdot \sigma_{E_{доп}}^2) / 2 \cdot E_{доп} . \quad (12)$$

During the construction of the permissible deviation coefficient of variation is taken not more than 5%:

$$\sigma_{E_{доп}} = 0{,}05 \cdot E_{доп} . \quad (13)$$

The graphic dependence of the risk of loss of stability of the roadbed at different value of the modulus of elasticity of the soil is presented in Fig. 1,2.

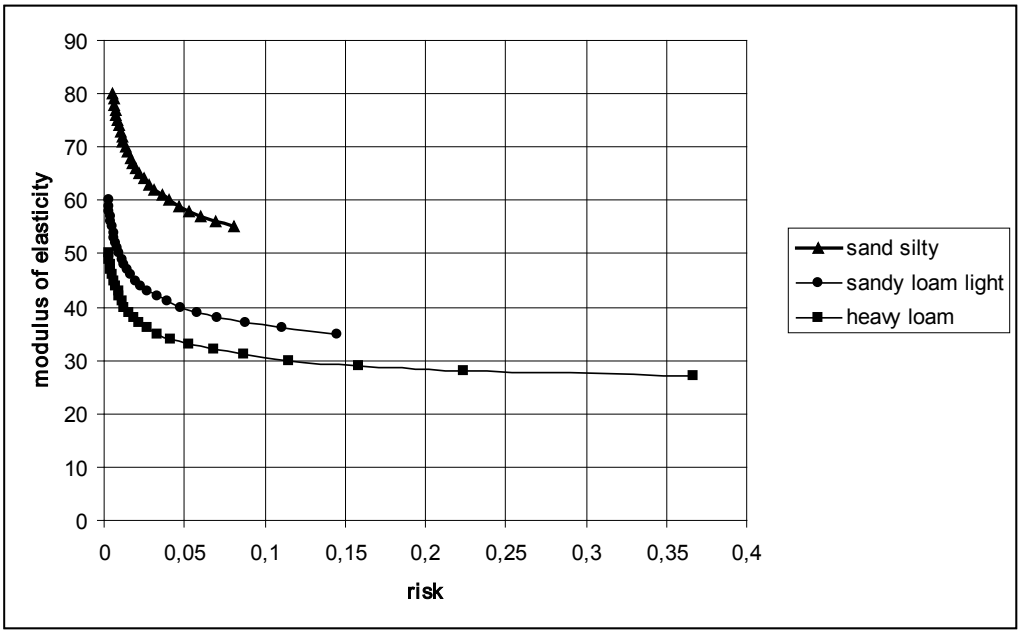

Fig.1 The schedule of dependence of the risk of the modulus of elasticity with a Cv=0,2

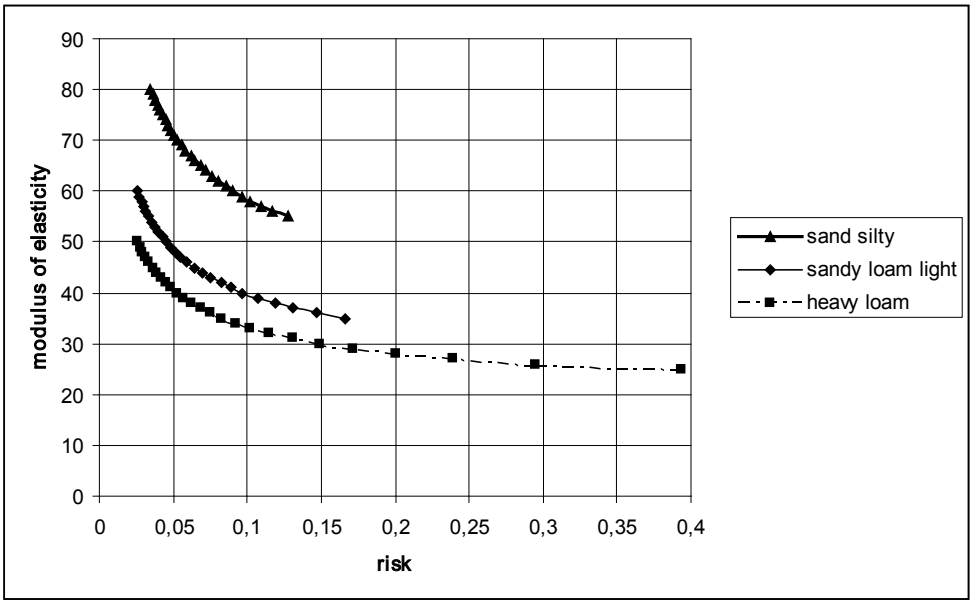

Fig.2 The schedule of dependence of the risk of the modulus of elasticity with a Cv=0,3

Thus, the module of elasticity has a direct effect on the risk of loss of stability of the roadbed. The calculations have shown, that at reduction of the modulus of elasticity of the soil, the risk is reduced.

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UDC 624.072.2

Dozorenko J.I.

MANUFACTURING OF THE CASTELLATED BEAM WITH THE FIXED BODY STRESS DISTRIBUTION DIAGRAM

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The given article is devoted to the questions of the body stress distribution diagram in metal constructions at the stage of their manufacturing.

The given work is directed onto the further research of a stress condition of the castellated beams, opportunities of the minimization of labour and cost expenditures, taking into account technology of their manufacturing.

Key words: *a rolled section, a stress condition, plastic deformations, a pole (cutting), zigzag cutting, body stress.*

INTRODUCTION

In Ukraine as well as in other countries steel I-beams (channels) with the perforated wall are frequently applied. For the obtaining of the castellated beam, a wall of the rolled beam is cut onto a zigzag line with the definite pitch. It is carried out by means of the gas, laser, plasma cutting, or with the help of powerful presses, then both halves of the cut T-beam will be connected with the welding and will be combined among themselves in corbels of the wall. In result it leads to the increasing in height of the beam, enhancing of the inertia moment and the section resistance moment. The load carrying capacity of the beam increases in several times.

I-beam is the raw material for the castellated beams manufacturing.

In the rolled section I-beam there shall exist both as the compressing and stretching residual stress [1-4], and rather of a high level. During the T-beam pole (cutting) process fulfilling, the certain curvature from the realization of the body

stress shall be received for the elimination of this factor it will be performed the additional technological operations with the T-beam during the manufacturing: a backward curve, a wall dot heating, installation stiffening beams, walls cutting onto the separate parts, etc. [4,6]. All these operations lead to the zones occurrence with the high residual stress besides in the apertures corners the stress concentrators shall be formed. During the work of the given construction the elemental fields of the residual stress shall be combined with working, essentially reducing load carrying capacity and leads to the cracks and deformations occurrence.

DISTRIBUTION DIAGRAM OF THE BODY STRESS

The thermal method of decreasing and redistributing of the stress shall be described below.

The purpose of this method is creating of such a distribution diagram of the body stress which could take into account and compensate all lacks arising while the manufacturing and working out of a ready construction of the castellated beam.

During the manufacturing of the castellated beam, prior to the beginning of the pole (cutting), it is offered to carry out the preliminary heating of the wall of the initial I-beam so that after the T-beam cutting, the distribution diagram of the longitudinal stress will be formed which shall provide their straightness.

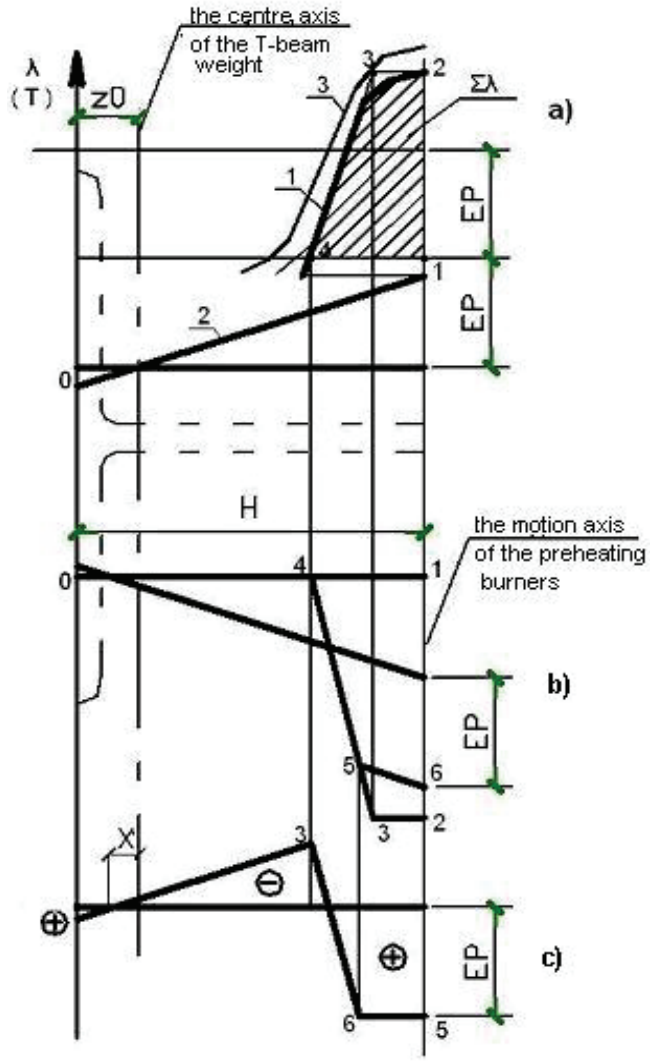
In the calculation of the advanced (pilot) preheating modes, necessary for the obtaining of the curvature, the theory of metal deformation shall be used while heating (N.O.Okerblom) [11].

The calculation of the temperature field – the temperature distribution in the I-beam from the advanced (pilot) preheating shall be carried out after the theory of the heating and cooling while welding(N.N.Rykalin). [12].

The distinctive feature of the suggested construction procedure of modes of the pole (cutting) with advanced preheating is in its body stress condition of the dismissed I-beam, which shall be taken into account.

Plastic deformations zones of shortenings, formed by means of the advanced preheating, it is rational to create under two diagrams, performed in the picture 1, 2 [5].

Under the given diagrams the optimum modes of the pole (cutting) with preliminary preheating by means of the single-flame gas burners shall be calculated with lugs №1-7, where the speed of the pole (cutting) varies in limits from 20 up to 120 sm / min



Picture 1. The diagram of the pole (cutting) with one preheating burner

In the picture 1 the calculation diagram of the pole (cutting) with one burner is presented, in the picture 2 - of the longitudinal pole (cutting) the diagram with two burners is performed:

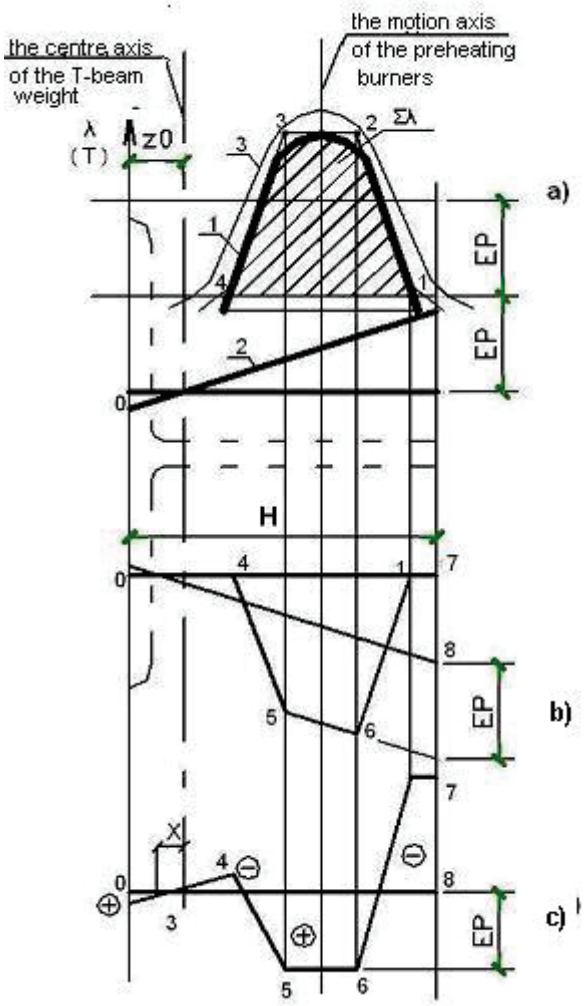
a) While heating by the advanced source;

b) After cooling;

c) The accepted scheme of the body stress in the T-beam.

In the basis of the calculation modes procedure of the pole (cutting) under the

first and second diagram there shall be the necessity of the creation in the wall of the T-beam of the body stress, which will be reverse by the sign to the body stress in the I-beam shall be put, i.e. redistribution of this stress [6-9] shall be combined.



Picture 2. The diagram of the pole (cutting) with two preheating burners

In the first and in the second case the stress condition of the I-beam shall be used: stretching body stress shall be summarized with some thermal stretching stress.

This circumstance, and also the big stiffening of the wall in the plane of the beam, shall allow achieving a necessary level of plastic deformations at the temperature 250÷360°C which would provide straightforwardness of the received T-beam.

At the diagram of the pole (cutting) with one preheating burner (picture 1) it is possible to achieve only one diagram of the body stress distribution in the T-beam for which the compressed zone of the body stress in the area of the free edge of the wall

of the T-beam shall be specific. This diagram allows adjusting width of the stretched zone over a wide range. Raising the power of the preheating burner, the level of plastic deformations shall be increased and in this connection, the width of the zone shall be decreased.

The using of two preheating burners allows achieving the greater variety of the distribution diagram of the body stress in the wall of T-beam due to the variation of two parameters of the pole (cutting): effective power of preheating burners and distance between them. The change of distance between preheating burners forms the various diagrams of plastic deformations which in the picture 2í shall be limited to points 2, 3 and 4.

The pole (cutting) can be broken into three basic stages. At the first stage heating of the I-beam wall shall be fulfilled by the preheating burner in one of two performed diagrams. During this period, from the initial moment of heating to the moment when the given section of the I-beam will be cut, the field of the maximal temperatures shall be limited by the curve 3 (picture 1,2), and relative thermal compression deformations shall be limited to a curve 1 and are proportional to the first one, since.

$$\varepsilon_m = \alpha T \qquad (1)$$

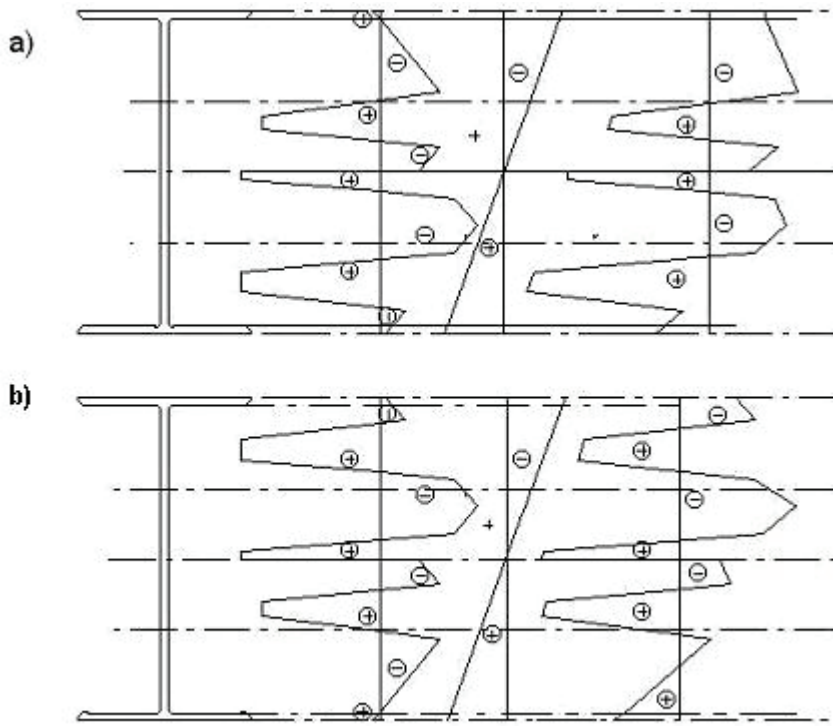
Where α – a factor of the linear expansion of steel at heating

T-temperature of heating.

The field of the relative deformations being consequence of the external influence, shall be combined with the distribution diagram of the deformations from the body stress [7,13].

The second stage will consist in the division of the I-beam into T-beams. The infringement of the balance of the body efforts in the I-beam is expressed in the curvature of the T-beam. This curvature shall be increased due to the thermal deformations limited to the area 1-2-3-4 (picture 1,2).

The third stage - a stage of cooling and formation of the curve, the reverse to the curve from the body stress realization of the I-beam. The plastic deformations limited to the polygon 1-4-5-6 participate in it.



Picture 3. The distribution diagrams of the body stress from the various technological operations and resulting distribution diagrams of the body stress in view of the work of external loading: *a) the pole (cutting) with the preheating of the top T-beam under the first diagram (1 burner) and bottom under the second diagram (2 burners); b) the pole (cutting) with the preheating of the top T-beam under the second diagram (2 burners) and the bottom under the first diagram (1 burner).*

For the calculation of the modes and the analysis of the pole (cutting) of the hot rolled I-beams on T-beam, the program "The pole (cutting)" is developed.

At the first stage in the program the initial data in dismissed I-beam are entered: the geometrical sizes of section, the initial level of the body stress in the I-beam and characteristics of steel.

Then the data in burners are specified: capacity of a burner and initial distance between burners (through the calculation under the second diagram).

Through the calculation such fixed diagram is selected at which the deflection from the body stress realization at the pole (cutting) will aspire to zero.

In the program "The pole (cutting)" the calculation upon two diagrams of the

pole (cutting) for I-beams 36Б, used as the initial section for the manufacturing of the castellated beam.

Taking into account the body stress arising in the beam during the work, the following formation diagram of the internal stress condition in the beam has been offered:

-as the castellated beam will consist of two T-sections beams, welded among themselves, it is offered to carry out the pole (cutting) of the top and bottom part of the beam under various diagrams, namely:

The top part of the castellated beam, working on the compression is made under the first diagram with one preheating burner, the bottom part is carried out under the second diagram with two preheating burners (picture 3a) or on the contrary (picture 3b)

During the work of the castellated beam working on the cross-section bend, the body stress will be summarized with the working stress. The body stress distribution diagram in the finished construction, taking into account the working stress shall be performed in the picture 3a.

In result, in the area of apertures in the places of concentration of body stress shall be formed such the body stress distribution diagram, allowing to lower the risk of the cracks occurrence, and also to increase the reserves of loading capacity in the castellated beams.

THE CONCLUSION

The above-stated facts allow to draw a conclusion on the perceptivity and economic efficiency of the manufacture and application of the castellated beams with the fixed distribution diagram of the body stress.

The methods development of the management by means of the body stress in materials shall be the realization of the opportunities of the powerful reserve of the quality improvement in metal products and reliability of constructions.

It is recommended for exception of a mistake of accommodation of T-beam of one size with different distribution diagram of the body stress not on the place it is necessary to pawn the castellated beams of the asymmetrical section as it is

recommended by CNAR (The Construction Norms and Rules) II-23-81 * [14] in the project.

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UDC 628.8.02:536.24

Dyupin A.V

INCREASING COMFORT LEVEL WHEN HEATING SYSTEM IS TURNED OFF BY USING PHASE CHANGE MATERIAL.

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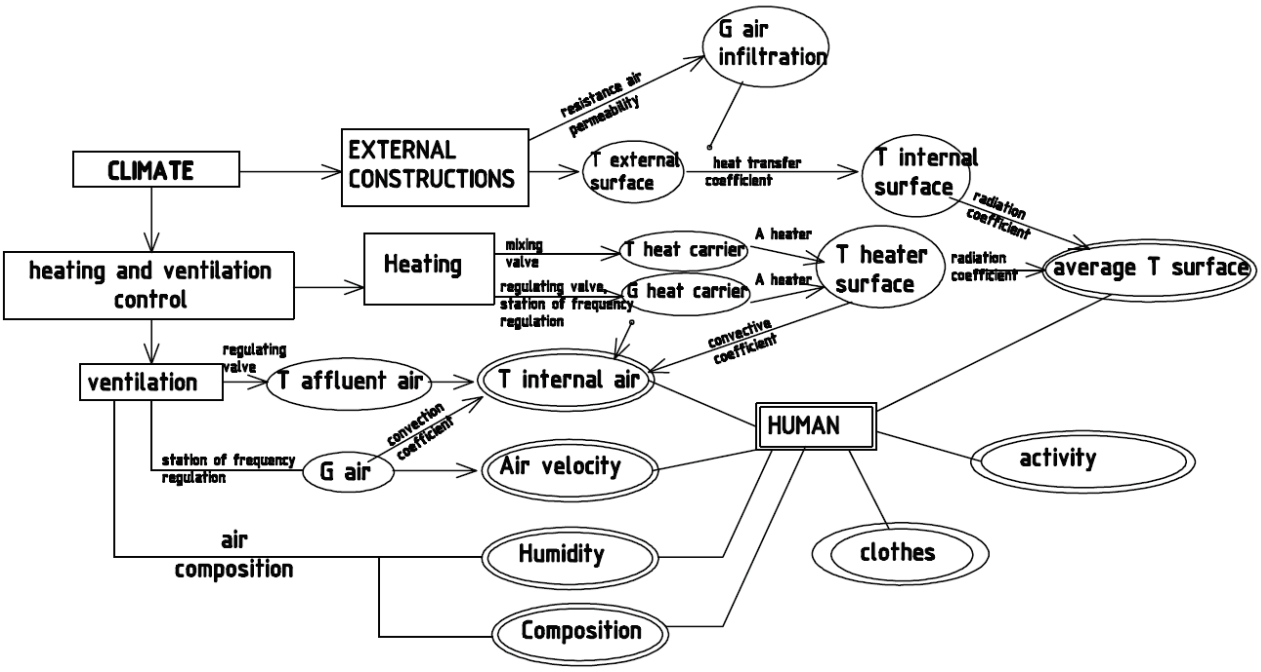
Using phase change materials in external building construction is increased comfort human level in room after 2 hours, when heating system is turned off of 15%.

Keywords: heating balance, phase change materials, thermal conditions in room, turned off heating system, structure of the control climate in room.

Decrease of charge of heating energy consumption in dwelling room is important task for government [1]. Transmission heat loses through external building protecting constructions are more than 40% of energy consumption in house, therefore using phase change materials in external building construction is the most actual problem in this task, especially in conditions, when heating system is turned off. Health and efficiency of the human depends on thermal conditions in dwelling

room, by-turn these conditions depend on characteristics of building external protecting construction materials.



Pic. 1. Structure of the system of control microclimate parameters in room.

For assessment influence of different factors [2] were designed structure of the system of control microclimate parameters in room (pic. 1). This structure takes into account influence of different factors on state of person's thermal comfort. In this work thermal sensation of the person is important criterion of control microclimate parameters in room. Thermal sensation of person is evaluated from +3 (hot) to -3 (cold).

When heating system is turned off (for example, damage on heating main, periodic heating system) mathematical model is:

- Equation of the heat balance

$$c_{int}\rho_{int}V_{int}\frac{\partial t_{int}}{\partial \tau} = \sum_{i}^{N=constr} k_i(t_{ext}-t_{int})(1+\sum\beta)F_i + \sum_{i}^{N=constr} c_i\sqrt[3]{(t_{int}-\tau_i)}(t_{int}-\tau_i)F_i + \\ + \sum_{i}^{N=constr}\alpha_{rad}(\tau_i-\tau_R)F_i + \sum_{i=1}^{n} Q_{humi}. \quad (1)$$

- Equation of the thermal conductivity [3] with boundary data of 3 type:

$$\frac{\partial t_i}{\partial \tau} = \frac{\lambda_i}{c_i\rho_i}\left(\frac{\partial^2 t_i}{\partial x^2}\right), \quad (2)$$

$$-\lambda_i \left.\frac{\partial t_i}{\partial x_i}\right|_{x=0} = \alpha_{ex}(t_{ext} - \tau_{exn}), \quad (3)$$

$$-\lambda_i \left.\frac{\partial t_i}{\partial x_i}\right|_{x=\delta} = \alpha_{in}(t_{int} - \tau_{inn}) + \alpha_{rad}(\tau_{inn} - \tau_R); \quad (4)$$

- Equation of the human's heat balance:

$$\frac{\partial t_v}{\partial \tau} = (q_{lose} - q_{prod}) F_h / c_h m_h, \quad (5)$$

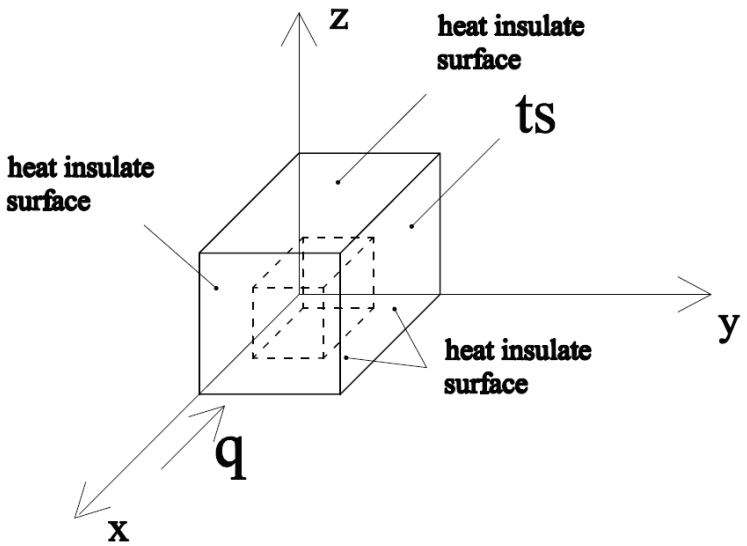
Here: c_{int}, ρ_{int} – internal air density and heat capacity; V_{int} – volume of the room, m^3; t_{ext}, t_{int}, τ_{inn}, τ_{exn}, τ_i, τ_R, t_v – external and internal air temperature, temperature on internal and external surface of the construction, temperature on i surface, average radiation temperature of the room, average human's body temperature, °C; τ – time, s; k_i, – heat transfer coefficient of the construction , Wt/(m^2K); β – coefficient of extra heating loses; c_i – coefficient depends on position of the surface; $\alpha_{in}, \alpha_{rad}$ – convection and radiation coefficient of the heat emission, Wt/(m^2K); F_{ok}, F_i – window area, area of the i surface, m^2; Q_{humi} – human's heat production, Wt; q_{prod} – human's heat production, Wt/m^2; q_{prod} – human's heat loses, Wt/m^2 ; F_h, c_h, m_h – area of the human's body surface, heat capacity, weight of the human's body; δ – thickness of the construction, m; λ_i –heat conductivity coefficient of the material.

Human's heat loses [4], average human's body temperature, human's comfort level depend on internal air temperature were calculated. Mathematical model was made in programming language Pascal 7.0. Differential equations were solved by finite difference method. Equation of the human's body balance was solved by Euler method.

If heating system is turned off and if hard compact materials with big heat capacity are used in external building protecting constructions, then time, when person is in room in comfortable condition, are increased.

At present in modern technology people use a phase change materials (PCM). These materials can accumulate more energy than standard material, because they contain latent heat [5]. PCM use in medicine, auto construction, clothes and etc.

Energy-saving increases if PCM are added to external building protecting constructions (pic. 2).



Pic. 2. Physical model of element in construction with PCM.

When phase change material melts, its physical characteristics change depend on degree of melting, thereafter equation of the thermal conductivity of the element with PCM are solved by equivalent characteristics:

$$\lambda_{eq} = f(k, \lambda_{bas}, T_S) = q\frac{\delta}{T - T_S}, \quad (6)$$

$$(c\rho)_{eq} = f(k, (c\rho)_{bas}, T_S) = \frac{q}{\overline{T}_{av}}, \quad (7)$$

где k – melting phase; λ_{bas} – heat conductivity coefficient of the material (liquid or solid phase), J/m·°C; $(c\rho)_{bas}$ – product of heat capacity and density material (liquid or solid phase), J/m^3·°C; T_S – melting temperature (solidification), °C; $\overline{T}_{av}$ – average temperature of surface, °C; δ – element dimensions, m.

Heat flux density:

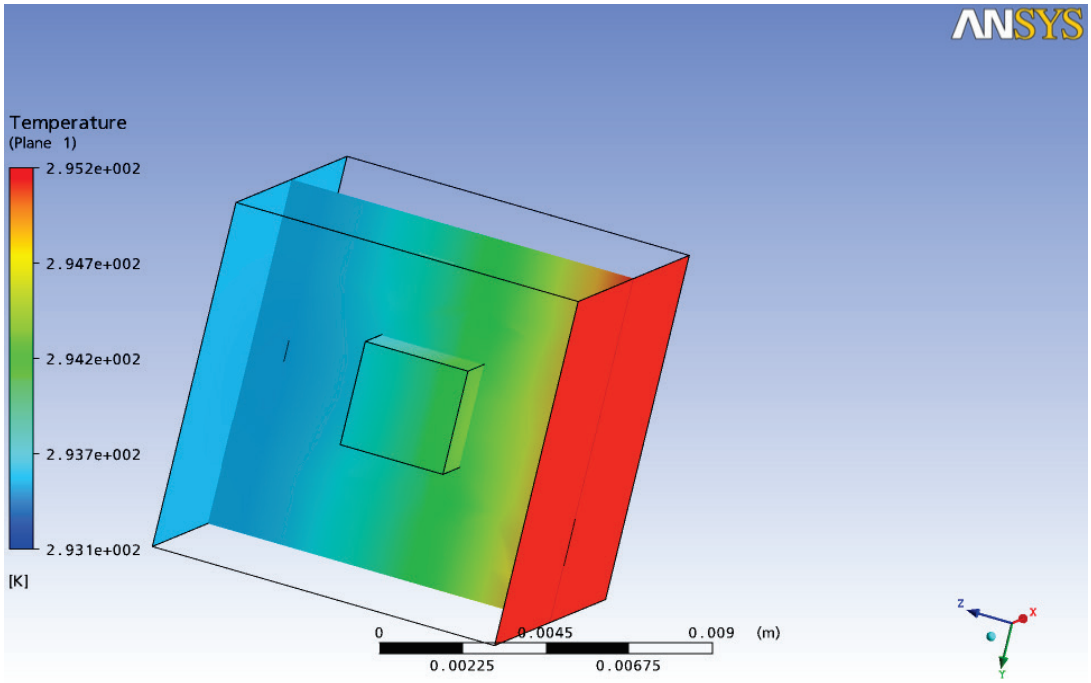
$$c\rho\frac{\partial T}{\partial \tau} = div(\lambda gradT), \tag{8}$$

With boundary data:

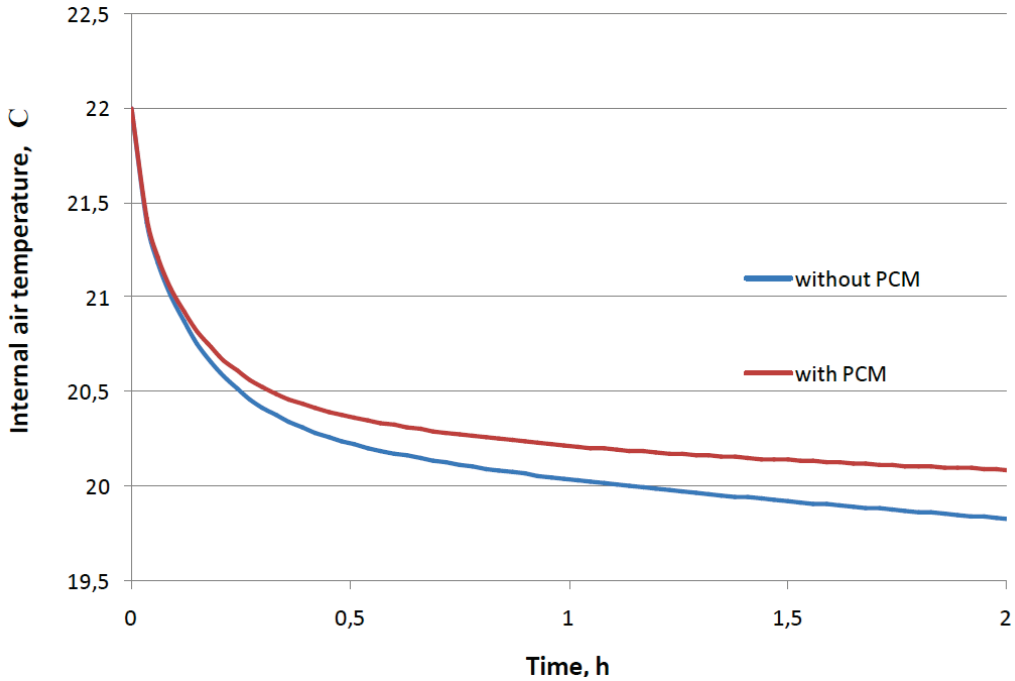
$$T = T_s \text{, by x=0,} \tag{9}$$

$$-\lambda\frac{\partial T}{\partial x} = q \text{, by x=}\delta\text{.} \tag{10}$$

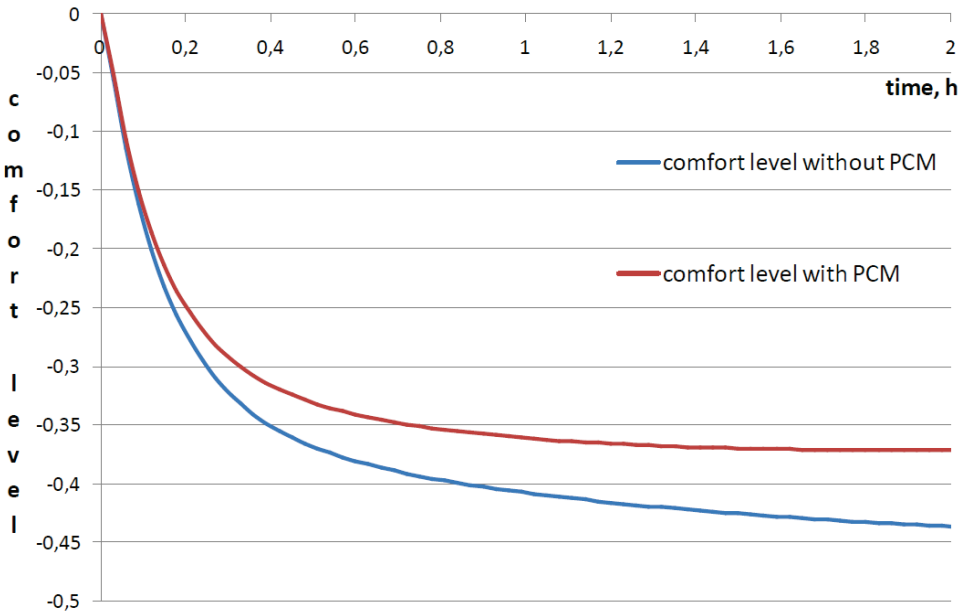
In software package ANSYS 11 Workbench numerical experiment for different material dimensions was made (pic. 3). As result of experiment were regression equations calculated. These equations were added in common mathematical model. After solution this model internal air temperature and comfort level were obtained (pic. 4, pic. 5).



Pic. 3. Heating process in body with PCM (35 sec).



Pic. 4. Graf of change internal air temperature with and wihout PCM.



Pic. 5. Graf of change comfort level with and wihout PCM.

Conclusions:

As result of this work, influence of PCM on the thermal conditions dwelling room and human's comfort with turned off heating system was researched. Analysis show, that using PCM in external building protecting constructions is efficiently.

After 10 minutes the difference of internal air temperature of room with and without PCM is 0,1 °C, after 2 hours is 0,3°C.

The period, when internal air temperature reaches minimum permissible temperature according sanitary norm [6] (for Izhevsk this temperature equals 20 °C), increases on 1 hour by using PCM. After 2 hours, comfort level in room with PCM is 15% more than in room without PCM. It says that using PCM in external building protecting constructions is efficiently.

Using PCM in external building protecting constructions increases period when human feels comfortable, when heating system in room is turned off.

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CID: J31202-120

Koltamenkova E.V.

Self-presentation of the author in the context of modern culture

In usual thinking, the author is in its origin, sacred and mystical figure, which should not have a referent in reality. While reading the text, we can not imagine a real

subject behind, we think the author in the past tense, even if a real person who created it, in fact is alive. Thus, in the mind of the reader the text is primary in relation to the author.

With the beginning of screen culture "secret of the author" has started to break down, especially on the Internet, which allows to communicate directly with the author, to discuss with him his work, arguing with him. Thus, the thesis of "the author's death" in modern art can be seen as an attempt of the same author, to keep distance between himself and his creation. In the immediate presence of the author the text is complete, finished.

The artistic language of this century gives rise to justify the concept of "the poetics of drafts." Art today - is, first of all, the ability to create your own context, and even better - to construct their readers.

The popular post-modern thesis of the "death of the author" in the contemporary art takes many forms. Thus is revealed a problem related to authorial intention.

Such self-destruction of the author shows the internal contradiction and ambiguity. It is not complete destruction, only deconstruction, which does not entail rejection of the existing structures, but puts them revised. Such an analysis of the text shows the possibility of their coexistence, without pre-setting of priorities, which allows us to ascertain both the presence and the author, and his absence. As a result of these manipulations, the author is overkill and not enough in relation to his creation.

With the emergence and spread of Internet culture, the focus is on socially constructed elements of intentional content. Now, there is a perception that the current state of intentional participants online communication form not only of intention, but such intentions, which are connected with the process of interaction between the author and the reader.

Intentions form the basis of the content authoring and a deep voice, which is directly connected to business objectives and the "vision of the world," the author, his attitudes. Thus, an understanding of the product is largely determined by the perception of an intentional aspect of the question. Samoprezintatsiya can manifest

itself in the conscious desire to present themselves in a certain light, or a definite impression on the reader.Thus, the intention of the author's self-presentation can be viewed as a subject focused on the representation of a reader during the reading of the work and the author's attitude to himself and reality.

CID: J31202-574

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The creation of the air transport in Komi.

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The development of the productive forces of the northern territories of the Soviet Union was necessary for economic development. The territory of the Komi ASSR, that has significant reserves of natural resources (coal, oil, gas, wood), was economically attractive. However, there were reasons that prevented the planned development and mining. Due to the territorial remoteness from the center of the Komi ASSR, acute was the question of transport communication with other regions. Regional features of the Komi ASSR impede quick, timely transport links both within the region and neighboring territories. The main means of transportation available to the majority of the population was horse-drawn vehicles, unable to cope with the transportation of industrial products. The use of river transport was hampered by its seasonal nature. Climatic conditions limit the use of waterways for 4 - 6 months in the year that did not contribute to year-round activities in the workplace. Road and rail transport, as well as aviation, were only in the process of making.

All the existing means of communication did not differ in mobility which is necessary for rapid transportation and communication between the production units, in the role of which in 1930s camping items were. Thus, the creation of aviation has become a prerequisite for the implementation of urgent transportation in the territory of the republic.

In the process of studying the history of airfield construction in the Komi Republic in the 1930 - 1950s published and unpublished archival documents from the

National Archives of the Komi Republic, the materials of the periodical press of the Komi Republic, Nenets Autonomous Okrug, Arkhangelsk region, the publication dedicated to the development of aviation were used.

Creating the conditions for the existence of aviation and its emergence has made the possibility of the development of resource-rich territory in the Komi Republic. On the example of the formation and development of aviation, the factors that contributed to the formation of local and national air traffic can be traced clearly. The peculiarity of the appearance of aviation was the fact that it like many other industries of the republic, was born in the GULAG.

February 1, 1926 by the order of the OGPU special department the North airway Solovki camps and Vishersky air way were organized. In 1932 "the Uhtpechlag OGPU‘s air way" was created, which operates in almost all the north-east of European part of USSR. A place for the central air base at Ust-Tsilma in the village Karpushovka, was not chosen by the accident - this point is the crossing of the waterways from Ukhta and Vorkuta. Here repair shops, hangars, warehouses and ancillary services, housing for staff were focused.

In addition to the central air base, the points in Vorkuta, Ukhta and Ust-Usa were equipped to receive, send and refueling planes, other words, landing site (WFP). The personnel was right there in the camp: convicted drivers, aeronautical engineers and mechanics, technicians. Among them was the pilot Leo Kovalevsky. He was appointed by Jakov Moroz, the Head of Uhtpechlag, to arrange Vozduholiniyu(air way) Uhto-Pechora Trust - a business organization, legal entity that performed the camp. In June 1932 Leo Kovalevsky has led to the river Izhma that is near the village of Ukhta three seaplane U-2 – double seated planes of the former naval intelligence obsolete old design, but still serviceable and usable. On the fuselage, they had written, UPT(Uhtpechtrest). In the summer they landed directly on the floats on the water. In winter, the aircraft "shod" skis. They flew all the year round except for short periods of ice cover and the opening of the rivers. Later the Air way enriched with K-5 aircraft, the U-2, etc. "We flew a lot of time, but there was no airfield, and landed

wherever it was necessary to land a human or deliver the goods". [1] Kovalevsky died in April 1934 during a forced landing in a blizzard.

This air way was special. "The uniqueness lays in the fact that the entire flight and technical personnel of the air way were disgrased people. Its uniqueness consists in the fact that, perhaps, throughout this island of GULAG archipelago was the only one where we are not reminded of our servile position". [2] The aircraft Y-2, despite the difficulties, bad weather conditions , has laid one of the first air routes – from Karpushevka to Vorkuta. In 1932 the prisoners of Uhtpechlag: pilot Hinze, V.A. and the mechanic Kurlyshev S.P. did it. In addition to them on the board was J.Moroz, the head of Uhtpechlag. [3] "... In Vorkuta heavy parts and assemblies for the narrow-gauge railway locomotives Vorkuta-Vom were transported. They transported different types of cargo, but more often they brought to the place urgent passengers and mail. "[4]

The distance to the Archangelsk was covered for 6 flying hours, to Kotlas - 3 hours. Airways were laid at a low altitude and the pilots were guided and orientated by the railways and river beds. "... We flew from Kotlas to Naryan-Mar and Vorkuta, where previously one did not fly. They took the camp authorities and experts, and sometimes small loads, such as explosives for blasting, emergency oxygen for welding. There were also flights for searching. Actually a lot of flights were risky because of unpredictable weather. "From the memoirs of a pilot Sushchinskii: "I worked there with pleasure, the difficulties did not seem excessive, there was an atmosphere, which didn’t remind us of our servitude." GULAG prisoners were involved in the maintenance of airport facilities, at home and at work were no different from civilian employees. Even the food was prepared according to standards of the Air Force. "This Air way was an exception, and a foreign body in the Gulag. They combine the incompatible - work in freedom-loving aviation, formally deprived of their liberty. "

August 15, 1941 SNK Komi made an order about the construction of airfields. Their construction in the Komi Republic was carrying out in five camps: Sevzheldorlag, Ustvymlag, Uhtizhemlag, Pechzheldorlag, Vorkutlag.

Sevzheldorlag was engaged in the construction of the airfield in Knyazhpogost. The camp began working in August 18, 1941, and had to complete construction and put into operation and exploitation in September 3, of that year. On this day Admission Commission arrived at the airfield Knyazhpogost and after the inspection could not take the airfield.

The Commission, taking into account the defects, couldn't accept the airfield. [5]

It can be assumed that the airfield was not completed due to the simultaneous construction of the North-Pechora railway.

In conclusion, the commission says that Knyazhpogost airfield is accepted for use as an airfield with the restrictions as an airport of group V intermediate airports. Restrictions on use: 1) only for the U-2, 2) only day-time. [7]

Ustvymlag was engaged in the construction of airfields in Vozhael and Pezmog. There is no information on the construction of the airfield in Vozhael. September 1, 1941 the commission produced a survey of work performed by Lokchim department of Ustvymlag for the construction of the runway in the area of D. Pezmog. Airfield in Pezmog was found fit for use in the fall, winter, spring for all types of aircraft, and in the summer - for the operation of aircraft - fighters. The committee noted that for year-round exploitation of the airfield it is necessary to plant the airfield with the perennial grasses. [9]

More specifical information about the construction of airports can be found on the airfield in Ukhta's example, construction of which was engaged in Uhtizhemlag. The camp began the construction in August 19, 1941 and ended in September 10 of that year. The airfield is located 7 miles east of the village settlement of Ukhta and 5 km from the railway station "Ukhta" and connected with passing at a distance of 1 km to the south of the site road Ukhta -Krutaya. [10] At the airport there is the minimum airfield equipment in the form of runways, cones - on the type of fabric construction. There are also airfield constructions: gasoline storage, water- and oil-heating elements, warehouse, temporary gasoline storage semi-underground type of storage in barrels of gasoline a total capacity of 35-40 tons. The gasoline storage is

deposited in barrels of oil a total capacity of up to 10 tons. Water-and oil heating elements are temporarily located in the vicinity of the temporary camps. At the airport there are no hangars, bombs storage (although the project is provided), workshops (repair produced at sites). The airfield is also not equipped with fire means. There is a "pozhvodoem" – special fire pond capacity of 100 m3, a number of fire extinguishers and sand boxes. [12]

In summer ground operation, the profile and dimensions are suitable for taking off and landing single military aircrafts, bombers, reconnaissance aircraft and medium type. In winter - snow covers mitigates the profile of the airfield. During this period, the airport is the landing pad. Thus, the size of the airfield allow any operations for all of the above types of aircraft. [13]

Pechzheldorlag was engaged in the construction of two airfields: in Abez and Kozhva. Abez airfield was built in 1941 operated an airfield aircraft such as the U-2 and P-5 GULZhDS. [14]

Kozhva airfield was also constructed in 1941 on the basis of orders SNK Komi Republic № 174 cc on August 16, 1943 which have been made to check the status of airfields. To enhance soil airfields and save them from the rain spills grass seed such as bent grass is white, couch grass, clover, white, timothy grass were used. [18]

Vorkutlag was engaged in the construction of airfields in c. Dutovo and Vorkuta. The airfield was built in Dutovo in 1941, the size of the airfield were 950h550 m site, but has not been used and overgrown with bushes and small forests. [19] Only in the late 1940s. Only part of the airfield was used. Due to the fact that the flights were not made and the site is overgrown, the sizes have been reduced.

In 1941 by the decision of the republic's government departmental aircraft - Air Force Base Uhtpechlag was transferred from the Ust-Tsilma to Vorkuta. The flights were made from winter airfields. In the summer of 1943 in Vorkuta a small land base was built.

September 1, 1943 in the village of Vorkuta the condition of the building airground has been tested. According to the commission: length - 500 m, width - 100 m soil areas – dry clay, filled with gravel thickness of 15 cm would be suitable for

receiving medium aircraft (U-2, P-5). Approximate time of commissioning - October 1, 1943 [20]

The condition of the active aero-ground in the Vorkuta-Vom was verified. We can assume that this air ground is the construction of Vorkutlag as "both air grounds belong to Vorkutlag NKVD". [21] This site was located near the river Usa 60 kilometers from the village Vorkuta. Length - 700 m, width - 400 m soil loam, ground overgrown with grass, operated, and is suitable for heavy aircrafts. [22]

By the camps forces in 1941-1943 there were built nine sites, the area which was mostly sand and not enough solid ground.

On the basis of the decision of the Military Council of the Air Corps of the Archangel of July 7, 1942 № 0 т 32 and securing airfields' plan for 1943 and 1944 about conservation and maintenance of airfields in good conditions, with the Executive Committee of the Komi ASSR airfields in Izhma, Vorkuta, Abez, Ust-Kozhva, Ukhta, Dutovo, and Pezmog Obyachevo were fixed . This event took place on August 3, 1943. [23]

July 7, 1943 was a breakdown of airfields, which were built by the prisoners, into classes. Airports in Ukhta, Pezmog, Vozhael, Knyazhpogost, Kozhva, Vorkuta and Abez were included in Class IV (intermediate), and became known as the airports. [24]

April 3, 1945 issued a decree № 215 on the transfer of the Office of the Knyazhpogost airfield from the Sevzheldorlag NKVD to the jurisdiction of a single squadron of Syktyvkar. May 25 of that year, the airport in Knyazhpogost passed into the hands of Syktyvkar Squadron. [25]

In September 1953 the fleet Uhtpechlaga was admitted to the Syktyvkar air group.

Thus, the construction of the airfield was determined by the needs of economic development in the region. The first air line connected the industrial centers of the republic, not administrative ones.

The peculiarity of the construction of airfields in contrast to other modes of transport was the fact that they occurred not far from population centers, mainly in populated areas. This facilitated the living conditions of builders - the prisoners.

During the creation of the aircraft prisoners' labor was used , which is seen as a cost-effective because of cheapness. However, the benefits of free labor was often illusory, as many buildings did not response the necessary standards. In addition, the construction of airfields in the territory of the Komi Autonomous Soviet Socialist Republic was engaged at the same time five camps - a linear scheme of the complex construction of transport facilities precluded the use of previous experience that relates to the costs of forced industrialization.

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6. The same. L.58

7. The same. F.1009. Op.1 D.529. L.87-89

8. The same. F.605. Op.4. D.100. L.60

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10. The same. F.1009. Op.1. D.540. L.6

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18. The same. D.100. L.154
19. The same. F.1009. Op.1. D.159. L.21
20. The same. F.605. Op.4. D.146. L.58
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