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PROCESS OF TRAINING AND ACHIEVEMENT MOTIVATION IN FOREIGN PSYCHOLOGICAL PEDAGOGIC PRACTICE

What concepts of educational process motivation exist in foreign practice

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The main purpose of this article is to show Russian reader some of modern foreign approaches to formation and training (or activation) of motivation of educational activity among students.

Keywords: educational motivation; urge for success; avoiding failure; training of motivation for achievements; early family adaptation; thematic apperceptive test); motivation stimulus; motivation factors.

Main concepts of educational process and its motivation in foreign psychology

Various approaches to defining education as an interaction between two kinds of activity – training activity of students and professional activity of a tutor exist in foreign psychological – pedagogic science.

One of them claims that training is mastering knowledge and skills. According to this approach a tutor demonstrates correct answers to his students, they imitate them (or replay, repeat, and apprehend them), and then the tutor enriches and enforces these correct answers with different means, thus proving for the solidity of the mastered knowledge and skills.

Adepts of another approach claim that a student is a passive record device that is filled by a tutor with knowledge and information like an empty glass is filled with water from a full pitcher.

And, finally, the third approach says that a student is an active subject that is in process of a constant interaction with its environment. A tutor's goal here is to create the most favorable terms for this interaction or, speaking figuratively, construct a stage for a performance, give plot, costumes, and decorations to the actors, and control each of their words, steps, and gestures.

Of course, in pedagogic institutes and within courses of tutors' qualification improvement more and more is spoken of active training and motivation for education. However, the paradox is that knowledge is usually provide in a passive form, either according to the scheme of «forming knowledge and skills» or that of «information broadcast». That is why, even if tutors possess some knowledge on what a motivation is, they can not find a proper implementation of it in their practice. It happens also because motivation is not a skill of information of some sort. In other word, it can not be trained among students as it is, like skills of handwriting. Motivation can not be leaned like the multiplication table, it can only be stimulated, developed, increased, etc.

In this article we will study some principles of motivation training in foreign pedagogic practice. So, what are the special points of this

kind of work? All approaches and programmes of motivation training in foreign pedagogic psychology issue from this concept of the nature of behavior motivation, in other words, from the idea of a man as a subject of behavior and training.

The main objective of this article is to familiarize Russian reader with some modern foreign approaches to formation or training (or activation) of motivation for students' training activity.

Training of motivation for achievements

1. Theoretic and empiric preconditions for motivation for achievements

Let us take a short insight into history. In foreign pedagogic psychology first efforts to alter motives for education on purpose were taken in the beginning of 1960-ies.

It should be said that all the first half of the century psychoanalytic ideas of behavior motivation dominated in Western psychology. According to these ideas the main motives of a man are formed in early childhood in further on they are only displayed, staying unchanged. For example, a motivation for achievements plays a significant part in training (and is displayed in setting new goals, urge for success in activity, etc.). According to the views of psychoanalysts, it is a result of a childhood conflict, neurotic in its nature, when a child, in effort to achieve favour of his parent of a opposite sex (a son – his mother's, and daughter – her father's), tries to better his competitive parent. Naturally, such ideas on the origin of a man's ambitions' formation, his motivation for achievement practically closed any possibility to form these qualities on purpose in later school ages.

Significantly, under influence of these psychoanalytic ideas in later 1950-ies researches of motivation for achievement referred to studying peculiarities of a family upbringing that could explain some significant individual characteristics of children in their evidence of motive for achievements.

In accordance with theoretical concepts of founders of this approach, American psycholo-

gists John Atkinson and David McClelland this motive is formed from two opposite motivation trends – *urge for success and avoiding failure*. High level of motivation for achievement meant that an urge for success dominates within a child; low level of that, on the opposite, testified for the dominance of his effort to avoid failure. Within a whole line of experiments it was found that a high motivation is formed within children only in such families, where parents always increased level of their requirements towards their children and, at the same time, could provide them with an inobssessive help and support, and also were characterized by a gentleness and warmth in communication to their children. And, on the opposite side, in families, where parents either ignored their children, were indifferent to them, or carried out a very strict supervision, directive guardianship over them, an urge to avoid failure became dominant within children, and, therefore, low level of motivation for achievement was formed.

We see that the results of these researches, on the one hand, were obtained in works that were stimulated by psychoanalytic logics of referring to early childhood ages, terms of early family upbringing, but, on the other hand, they demonstrated an obvious independence of forming motivation for achievements within a child from logics of the development of a child's sexuality. A key factor was a character of interactions between a child and a mature. It is natural, therefore, that the obtained results stimulated new researches, now aimed for alterations in relations between children and the mature within school conditions in order to form motivation for achievement among scholars.

Another origin of emergence of special school courses of training motivation for achievement were motivation training programmes for businessmen that were quite popular in a number of Western countries in 1960-ies. The initiator of these courses, D. McClelland thought that motivation for achievement of businessmen is a necessary variable that stimulates general economic development of any country. In other words, he thought that, in order to intensify growth of one or another sector of industry of a country it is insufficient to provide a combination of favourable objective economic conditions.

An extremely important role here plays the «human factor». Under the same terms, higher economic success is achieved by those enterprises (sectors of industry) that were led by people with high motivation for achievement. Many of these ideas were probed within courses of motivation training in a number of developing countries, and reassuring results were obtained.

2. *Procedures of activation of motivation for achievement among students*

Naturally, common schemes of training businessmen were soon applied in school reality in order to increase motivation among students and, therefore, increase their academic successfulness and progress. In one of the first training courses for scholars students with inexplicably low results in study took place, as they all were characterized by an extremely high level of general intellectual development (general *IQ* among the group was higher than 120 points). Special studies were taken with these students that later led to the growth of their academic progress. However, alterations in successfulness proved to be insignificantly stable, and in a year's term they practically disappeared.

A great number of researches took place in 1970-ies. In their basis they had courses of development of motivation for achievement among scholars of different age groups. These researches were generalized in a number of scientific reviews and monographs. Various techniques and methods of formation of motivation for achievement were formed and described. In general view all these methods were narrowed to the following procedures: psychologists or specially-trained tutors told students how a man with high motivation for achievement thinks, talks, and acts. Various materials were developed in order to help a tutor to carry out training of motivation for success (educational movies, special games, pamphlets with thematic stories and psychological methods for diagnosis of motivation for achievement).

D. McClelland, while analyzing terms for formation of motivation for success, combined major forming influences into four groups:

- 1) formation of a syndrome for achievement, of prevalence of urge for success over the urge to avoid failure within a man;
- 2) self-analysis;
- 3) an output of an optimal tactics of goal-setting in certain kinds of behavior and life in general;
- 4) inter-personal support.

Each of these groups is formed, first of all, from the multiplicity of more definite influences. Thus, for example, a formation of the syndrome for achievement implies:

- a) studying methods to create projective stories (or stories that are combined from pictures of projective test TAT) with an expressed theme of achievement (student are familiarized with a standard scheme of categories that is used in diagnostics of the motive for achievement, and their goal is to use maximum number of such categories in their stories; within this training students start to outline the motive for achievement correctly within other

motives, form a special language, based on the mastered categories, with which in speech and thinking they analyze their behavior as well as that of other people);

b) mastering means of behavior that are typical for men with highly-developed motivation for achievement (selection of goals that are moderate in their difficulty and avoiding either too easy or too difficult goals; preference for situations that imply personal responsibility for the success of a project, and avoiding random situations, as well as situations where a goal is set by other people; preference for situations with a feedback on project results and avoiding situations without such feedback, etc.);

c) studying specific examples from their everyday life, and also from life of people that possess highly-developed motivation for success, analyzing these examples with a system of categories that are used in diagnostics of motivation for achievement.

Generally, D. McClelland outlines twelve specific influences, and each of them is directed to formation of a certain aspect of motivation for achievement¹.

On the foundation of comparison between different training courses of motivation for achievement authors of the guide for teachers «Training motivation for achievement» A. Alshulera, D. Taybore, and J. McIntair outlined six consequent stages of actualization and apprehension of a motive:

1) drawing students' attention to the contents of a course;

2) obtaining an experience of thinking, behavior, and emotional reaction that corresponds to the studied motive within various games and while taking special exercises by students;

3) mastering special terms that describe different components of the formed motive by students;

4) comparing this motive by each students with his ideal, his main spiritual values and personal acceptance of the motive

5) practical use of knowledge, obtained within a course, in real life situations by students (with help of their tutors);

6) independent behavior of students in accordance with mastered motive at the backgrounds of decreasing help and weakening control from the side of their teacher.

3. *Psychological-pedagogic effects of training motivation for achievement*

So, what are the results of training motivation for achievement among scholars?

If we summarize the obtained data we will see that one of the main resume in that, usually, courses of motivation training of such kind were not effective enough either for increase in academic results of students or for increase in their general successfulness in study. Separate cases of improvement in academic results were insignificant, short-term, and unstable.

When it comes to wider effects of training motivation for achievement that integrate beyond-educational activity of students, here more interesting, definite, and reassuring results were obtained. It was shown, that training of motivation for achievement significantly alters (especially among teenage students) scholars' attitude to usage of their free time, forming and perspective planning of their professional intentions and global life goals. In this area results of different training courses are way more definite. For example, as an interview among scholars after 8-18 months after motivation training showed, the great majority of them started to treat their usage of free time more constructively. Specifically, for one of the questions of an interview «What do You consider to be the most important of everything You do or think of today?» 100% (!) of high school students that took courses of motivation training mentioned a link between their good results in study ad their future career. In is character that only among 27% of the control group students (those who didn't take motivation training courses) seriously think of a relation between their academic results and their future professional career. Education becomes secondary, while various entertainments and hobbies become more important for them.

A significant influence of training upon school activity was also revealed in another research. In it 11-year old students served as being tested. In a year after the end of the training course they were interviewed via telephone. Experimenters were interested, first of all, what the teenagers were doing directly before this telephone interview.

All answers of the tested were classified into eleven kinds of activities, and each of them was ranged in accordance with presence or expression of motive for achievement in it. As a result, a general index of motivation for achievement within out-scholar activities was calculated for each of the tested. It turned out, that 77% of students who took the training course (compared to 11% of the control selection students) had a high overall index of expression of motivation for achievement within out-scholar activities. Similar results were obtained in studying 16-year old students.

It is interesting, though, that these results were obtained in studying boys. Among girls no significant differences in a character of their

¹A detailed description of the procedure and contents of forming motivation for achievement is provided in the guidebook «Training motivation for achievement» by A. Alshulera, D. Taybore, and J. McIntair. This guidebook contains practical recommendations, directed to school teachers on organization special training courses.

outer-scholar activities were revealed between girls who took a motivation training course and those who didn't take one. It testifies for that, first of all, motivation training has a greater influence upon boys and, secondly, lesser effectiveness of such training upon girls is a result of their lesser anxiety of their future professional career, their orientation for finding a solution for most of their life problems within marriage and in creation of a family.

4. Factors of successfulness of training motivation for achievement

As in any other kind of motivation training, successfulness in forming motivation for achievement is dependent on a whole number of factors and conditions. One of such factor is an age of the tested. As the results of some studies show, the best results of such training is usually observed in secondary school among students of 11–14 years (though today there are some efforts to create wholly playing courses of such kind for pre-school children).

Another factor of training successfulness is, as it already has been outlined, sex of students. Boys, as a rule, discover greater alterations in motivation for achievement (especially in the area of outer-educational activity).

One more factor of training successfulness is an area of its practical implementation. It has been shown that a training proved to be way more efficient in relations with those academic subjects that imply specific study activities, where a link between an action and a result is simple and obvious, and where a direct feedback between an action and a result exists (in other words, a link between an action and its success or failure). That is why training motivation for achievement proves to be more effective in increasing academic progress and successfulness in mastering such subjects as mathematics, physics, chemistry, etc. In human science, where no such obvious successfulness grade exists, an efficiency of such training is usually way lower.

An important factor of motivation training successfulness is the involvement of school teacher into it. Some research results testify that training that takes place in school with psychologists who meet students occasionally is less effective than one, carried out by school teachers who, in their turn, took a course of such training under the mentorship of psychologists. Such («involved») combination of motivation training and general school training is the most effective.

5. Training motivation for achievement among teachers.

A necessity to involve teachers into training procedures made psychologists search

ways to provide teachers with practical help in organizing training of motivation for achievement that is included into an everyday practice of school education. Such applied aspects of training became the development and introducing of various guidebooks into the practice of school teachers. They explained and showed on examples different techniques and procedures of training activities with students. Some of these techniques can be used within regular classes, some of them require separate specific classes.

Different forms of training with teachers and psychologists showed that, along with mastering courses of motivation training teachers, as a rule, altered their class work in accordance with their altered views. However, an urge to various innovations and alterations in traditional education process on the side of teachers-experimenters didn't define the successfulness of their work alone. A much greater factor of such successfulness was an attitude of students towards such innovations.

For example, a teacher could alter a class work in a way, when students obtained more independence in education and started to feel more responsible for their results. However, if they took such reconstruction as one that leads to a greater indefiniteness of academic goals, then the teacher could not, of course, count on achieving positive results. Such cases showed that a feedback from students is absolutely necessary in a work of an experimenting teacher, and it can only be established through different kinds of tests and question lists that allow them to reveal the general psychological climate within experimental classes and more specific attitude of students towards different aspects and sides of their teacher's activity [11].

There may be a question: what exactly alters in work of a teacher who took a training of motivation for achievement? The answer was given by an accurate analysis of video footage, taken at classes where students were either totally involved into training, or constantly distracted from it for some other business. Analysis of these recordings allowed us to outline a number of peculiarities in a teacher's behavior that significantly correlated with the involvement of students into their work. With certain conditionality all these characteristics of a teacher's behavior can be divided into three groups:

1) drawing attention, or showing enthusiasm, interest to the taught contents, liveness of explaining, high emotional tone, etc.;

2) establishing a maximum readiness for a response from all students, usage of different means of training and educational tasks,

demand to listen and evaluate answers of each other;

3) creation of a feeling that the teacher sees and knows everything within a class, in other words, constant involvement of a teacher into the events in his class, creation feeling that the teacher is constantly with his students, he sees and correctly understands everything that happens to class and to each student.

All these three dimensions of a teacher's behavior in the class are indirect results of motivation training, and they created a special psychological climate in a class (which is created in a class by good teachers without any motivational training), that provided for deeper involvement of students into the process of education and, therefore, a significant increase in studies.

Moreover, usage of various means of motivational training (pamphlets, games, visual aids, etc.) within classes and outer-class activities gives every teacher an ability to significantly increase all these three dimensions of his own behavior, as usage of new and various educational aids draws the attention of students. These aids are formed so that they provide for the work of the whole group (be that a game or completion of a question list), and, finally, all they give each student a clear and definite feedback on his results. Thus, using techniques and procedures of training motivation for achievement in his work, a teacher practically alters his behavior in class so that it becomes closer to ideal as it provides for a maximum involvement of students into the class work.

We would like to answer the question: what alters during motivational training of students and teachers – their motives or skills of organization of behavior? Regretfully, there is no clear and definite answer to this question yet. The main difficulty here has an absolutely methodical character. The point is that the main diagnostic methodic to evaluate motivation for achievement – so called «thematic apperceptive test» (TAT) – is actively used in training courses as educational material to study key categories of motivation for achievement, to create stories on achievement. As the result, all that devaluates TAT as a diagnostic methodic and doesn't allow a researcher to use it repeatedly in order to define ongoing (or not) alterations in motivation.

That condition made D. McClelland formulate the following conclusion in one of his works (which is called «What is the effect of training motivation for achievement in schools?»): «We consider to be simpler and theoretically more substantiate the conclusion that courses of training motivation for achievement improve academic results because they train abilities to improve skills of behavior or-

ganization in class and life, not because it directly alters the need for achievements»².

Let us now refer to domestic practice. Quite a number of works studied problems of motivation in our domestic science. Motivation was studied by: A.B. Boukuradze, V.G. Aseyev, O.S. Vikchanskiy, E.P. Ilyin, S.B. Kaverin, A.V. Karpov, R.L. Krichevskiy, Y.V. Novoselov, O.A. Novikova, A.I. Naumov, E.A. Sidenko, E.A. Utkin, and others.

The basis for studying motivational area of a person in domestic psychology are the developments of psychological phenomena that are character for various directions of a person in terms of activity, relations, interactions, and emotional experience (A.B. Boukuradze, Y.V. Novoselov, O.A. Novikova, and others).

Let us make a summary of domestic terms that refer to motivational processes.

All factors that take part in motivation process and dependent a worker's behavior within process of labour, is called in our domestic science **motivational factors** or **motivators**³ that represent motivational structure of a person⁴.

For domestic researches that are devoted to problems of **stimulus**, a division into two large groups – material and spiritual is character. In its turn, material stimulus can be divided, according to L.S. Blyakchman into material-monetary and material-non-monetary. The first group will include salary, surcharges, markups, etc. The second – valuables and other kinds of material benefits⁵. Material-non-monetary stimulus will also include different labour conditions: technical, sanitary, organizational.

Stimulus can also be classified according to their direction of emotional impact upon an employee (positive and negative), to an object of impact (individual and collective)⁶.

In conclusion we would like to outline that for a successful achievement of new goals of our education system that are announced in standards of the second generation, not only various material resources are needed, but one of the main condition of achievement of the planned results in education is qualified personnel: managers, their deputies, teachers. And especially important becomes an urge of pedagogues to work effectively, and it is directly dependent on their *labour motivation*.

²Heckhausen H. Motivation and activity. – M., 1986

³Vikchanskiy O.S., Naumov A.I. Management: human, strategy, organization, process. – M., 1996. – 416 p.

⁴Vikchanskiy O.S., Naumov A.I. Management: human, strategy, organization, process. – M., 1996. – 416 p.

⁵Blyakchman L.S. Production group: aids to manager. – M., 1978. – 197 p.

⁶Fayzullayev A.A. Motivation and self-regulation of a person. – Tashkent, 1987. – 137 p.

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*Materials of Conferences***NOVATION DIDACTIC PRINCIPLES OF MODERN EDUCATION IN RUSSIA**

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The problem of contemporary process of modernization of Russian education is discovered in the article, where new quality of a graduate of a contemporary school comes to the fore – meta-object competence. In a frame of reference of meta-object of contemporary education it is necessary to form new didactic principles of its organization.

The process of education is traditionally created in the sphere of actual development taking into account operable processed linkage and quality of a final result. Model of modern education is directed to global both a process and technologies of education where means and forms are determined with meta-object of new knowledge.

Didactic principles that our soviet pedagogic was based on through long decades (as follows demonstrativeness, consciousness and activity, availability, scientific character, individual attention to students in conditions of collective work, consistency and consecution, stability in knowledge achievement, skills and abilities, combine the theory with the practice etc.) have practically run their course, especially under the conditions of implantation of new education standards and creation of new education content.

It is important to take into account some general and partial didactic principles:

Principle of humanity – unity of generally cultural, social and moral and intellectual development of a personality adopting collective origin in civil society development.

Principle of culture succession – comprehension of deep meaning of folk artistic culture that makes fundamental principle of preservation and development of statehood.

Principle of culture congruity – unity of culture, traditions and experience of creative work under the conditions of world culture comprehension.

Principle of nature congruity – backstop on individual abilities and peculiarities of a personality developing in laws of kindness and beauty.

Principle of social partnership – equality of participants, respect of positions, consideration of perspectives and needs of participants of cooperation and interaction.

Principle of individual and creative self – actualization – phenomenon of creative translation of system of values into scientific and research, practical and art I activity.

Principal of purposeful cooperation and joint creative work – interaction in a dialogue which is

focused on formation of new styles of scientific, creative and social mentality.

Principle of differentiation and integration – comprehension of process and results of activity on the basis of continuity and unity of interrelation of the general, the partial and the entire.

Principle of diagnostics – testability of actions results using parametric and nonparametric methods of mathematical statistics. Principle of unity of fundamental nature and career guidance of educational process – connection of education with everyday life, science and culture, theory with practice, individual needs with social necessity.

These principles are taken as a basis of a new conception of new education didactics in reference with new pedagogical technologies, forms and content of modern system of education.

Principles of modern didactics became scientific-practical norm and law for education system only under the conditions of new pedagogical requirements functioning which can develop specificity, the general and the partial as in the context of material and technical fitting out as in the context of formation of new structure of its content.

Given didactic principles discover clear connections of the most important meta – objective knowledge in social and professional achievement of personhood with civil responsibility for his or her life, life of the country and destiny of ancestors.

These connections are associated with a teacher as a repository of world view who remake folk, creative and scientific experience into the pupils students' knowledge system according to the scheme:

Ethno – «I» (I – ethnic) – *Ethno* – «We» (I – social) – *Ethno* – «Knowledge» (I – pedagogical) – *Ethno* – «Culture» (I – cultural).

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EDUCATIONAL TRAINING OF TECHNICAL UNIVERSITY STUDENTS DURING INNOVATIONS

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Nowadays when we speak of innovative processes in high school, we often think of concepts, programmes, technologies. Such is a standard term set. It should alert us as an experiment transforms into a goal itself within institutions of higher education. And position of students in such institutions, their level of training and civility can stay relatively low. Perhaps the problem is that, in effort to implement innovations, we have not formulated main value orientations of educational training of students.

Changes that have conditioned the necessity for every civilian to accept his responsibility for his own destiny leads to a gradual affirmation of a new system of value orientations in social consciousness. Young people who enter life do not always accept values of free democratic society. Hereby a process of value self-definition within an institution of higher education becomes significant as well as establishing a system of value orientations that is especially necessary for successful realization of future professional activity within a system «person-person».

Pedagogic realization of these values must be aimed for improvement in general culture of a student, its familiarization with national and universal values. It requires cultural direction in higher education. Especially when we see that the «ozone layer» of culture now in our society becomes thin, and spirituality, general level of culture falls while the whole volume of information increase. Organization of educational and training process of developing moral-value orientations of students in terms of etno-regional system implies:

- Theoretical basics that study a multiplicity of scientific concepts and define essential characteristics of a person;

- Methodological basics that unite the system of scientifically-based approaches to organizing educational and training process;

- Didactic basics that reveal structures of educational and training processes as a totality of mutual means of education on general and professional subjects.

Specific contents of main categories of moral values and their character suffer significant alterations within a world of culture, spiritual life of a person. «My culture is a spirit of nation that I belong to, a spirit that leaves its sign on my highest thoughts as well as on the simplest gestures of my everyday existence» (Thierry de Montbrial). A student's personality is studied as a flexible autonomy of value orientations that are displayed in process of perception and apprehension of suggestions, terms, demands, given by the society, and development of moral-value orientations is a process, within which a student integrates the society, obtaining knowledge, mastering values and skills of adequate behavior; solves the problem of developing realized, correct attitude towards ethnic and social roots; makes his own individual preferences in world-perception and world-apprehension.

It is necessary to study moral-value orientations as a behavior standard that represents a totality of qualities that provide for a positive perception of sensible and evaluated artefacts in its correspondence with text ideal and personal experience in area of moral consciousness. Accounting of how a student self-defines in moral-value environment, masters processes of his own value-educational activity allowed us to define the following directions of work in this area:

- Organization of training and education in accordance with modern economic, political, and social realities of a region;

- Improvement of main peculiarities of modern educational system via implementation of value approach toward solution of professional and life situations;

- Studying traditional and modern philosophic, pedagogic, and moral ideas on language and culture as basic elements in setting a goal in education;

- Development of moral-value orientations among students of regional technical institution of higher professional education via teaching professional subjects through apprehension of value nature of culture and morality by a student, as they represent both forms of fixation of such knowledge within a person and source of its mastering;

- Optimization of efficiency in educational-training process through student's interest in results of their education.

A modern tutor of an institution of higher technical education must know of many ways that can help him to achieve his goals. During the search for value orientations in student's training, its harmonization, and education update concepts of a person, a student, spirituality, scholarship, individuality, national and universal culture, health, choice, responsibility, variability, tolerance become the most common ones. It is important that all these categories are fixed in pedagogic mind of a tutor, defining his professional culture and contents of his everyday labor.

The work is submitted to the International Scientific Conference «Science and education integration», Maldives Islands on February, 15-22, 2012, came to the editorial office on 14.02.2012.

CHANGES OF ERYTHROCYTES FORM IN LICHEN RUBER PLANUS AND INFLUENCE OF INTRAVASCULAR LASER IRRADIATION OF BLOOD ON ITS CORRECTION

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It is shown by methods of transmission, scanning electron microscopies as well as by light microscopy, thick drop and morphometry, that marked shifts in proportion of discocytes – normal RBC and stomato-, echinocytes – pathological forms takes place in peripheral blood of patients with lichen ruber planus. At that, the share of echinocytes is significantly higher. It was revealed, that the changes occur more in the blood obtained from lichen ruber planus plaque than in the blood from finger. Intravascular irradiation of blood leads to normalization of proportion of discocytes and pathological RBC as in peripheral blood, as well as in blood obtained from plaques.

Keywords: erythrocytes, lichen ruber planus, intravascular laser irradiation of blood

Patients with lichen ruber planus (LRP) comprise from 0,5 to 2,4% of all dermatological patients. This dermatosis often occurs on the background of various somatic diseases, which not only restricts the use of many conventional treatments, including photochemotherapy, but also often causes their inefficiency [4, 8, 13-18].

This necessitates search and studies of new treatment methods.

Low-intensity laser irradiation (LILI) being one of the most effective non-drug means that influence on pathological processes, has been successfully used in the treatment of various dermatoses for several decades. The marked effect of LILI was also noted in the treatment of LRP [1, 3, 9-12].

One of the conventional methods of laser therapy is intravascular laser irradiation of blood – ILIB. It is widely used in dermatologic practice [3, 9-12].

The development and implementation of specially designed for ILIB devices, such as «Matrix-VLOK» (Russia) made ILIB procedure not only more efficient but also easier and safer [3].

An important factor in the effectiveness of ILIB is its direct effect on red blood cells (RBC).

However, the forms of RBC in patients with LRP and in the complex treatment of this dermatosis with ILIB were not carried out.

In the work we studied the relation of discocytes – RBC of normal biconcave form to their pathological forms – echinocytes, stomatocytes, RBC with crest and other forms, in the peripheral blood taken from finger and from skin lesions (papules) of patients with LRP, before and after comprehensive treatment of this pathology with the use of ILIB.

Materials and methods of research

Capillary blood taken from finger and from skin lesions of 19 patients with typical form of LRP was subjected to morphological examination before treatment,

and on the day 10 of treatment. In 9 cases, the complex treatment was without the use of ILIB.

The complex treatment of patients included sedatives, antihistamines, vitamins, hepatoprotectors, topical steroids in the form of ointments and aerosols, and tableted drug «Grofilin» (pentoxifylline).

Most patients indicated on an association of illness with mental trauma. Disease duration ranged from 2 months to 1 year. We also studied blood of healthy volunteers – 8 cases.

ILIB was carried out with apparatus «Matrix – VLOK», (produced by a scientific-research center «Matrix», Russia) with radiating head KL-VLOK, equipped with a special needles and optical fibers having Teflon coating KIVL-01, the wavelength 0,63 microns, the power output of the optical fiber 1,5-2 mW, exposure time comprised 20 min.

The ILIB procedure (output power was 2 mW, wavelength, exposure 20 minutes) was conducted on a daily basis. A course consisted of 10-15 sessions.

Evaluation of the ILIB influence efficacy was judged by the change in the ratio of RBC in the peripheral blood obtained from finger and from papules

To study the forms of red blood cells, we used scanning electron microscopy (SEM) and the express – method of «thick drop» (EMTD).

The technique of EMTD was developed in the laboratory of pathologic anatomy of RSCS named after acad. V. Vakhidov, Republic of Uzbekistan. It is patented in the patent offices of the Republic of Uzbekistan «Method of determining the shape of RBC» № МКИ 6 and 61 В 10/00, as well as the software – «Express diagnosis of RBC forms» № ED-5-05.

To do this, the pad of ring finger or human psoriatic plaques punctured with scarificator and 2-3 drops of received blood are placed in 2 ml fixating 2,5% solution of glutaraldehyde prepared on phosphate buffer (pH 7,4). A drop of fixed unstained blood then placed on a slide and covered with a coverslip. The proposed technique, allows saving the natural state of erythrocyte to a certain extent and having them approximately same with those in the vascular lumen. This, in turn, facilitates more adequate assessment of the erythrocytes' functional morphology. This method is applicable as for qualitative study of erythrocyte forms, as well as for morphometric study of ratios of normal and pathological forms.

It should also be emphasized, that using this method, the objective morphometric evaluation of RBC deformability can be obtained within 10-15 minutes with a simple

light microscopy. This makes it possible, to monitor the structural and functional status of erythrocytes and other blood cells to assess the severity of a pathological process and the adequacy of the treatment.

Previously conducted comparative studies of the erythrocytes counting in peripheral blood specimens with SEM and EMTD, have shown reliability of the last [1].

Morphometric counting of normal and pathological forms of erythrocytes ratios were carried out, using at least 1000 erythrocytes in each case with the subsequent statistical analysis. Results are given as mean \pm SEM the significance of differences between mean was evaluated by Student t test for unpaired data and by two – way analysis of variance (ANOVA) followed by Duncan's multiple range test.

The examination and photographing of light microscopic preparations were performed with usage of microscope «AXIOSKOP-1940» (Carl Zeiss), Germany, with a digital camera Prog Res, Capture Pro 2.6, attached to PC Pentium IV.

Peripheral blood erythrocytes in psoriasis were studied with the aid of SEM and EMTD after medical treatment without ILIB application and with ILIB application. Blood was also taken from practically healthy volunteers – aged 20–30 years (total 8). Blood sampling was conducted in October – November and March – April in order to minimize the influences of too hot and too cold temperatures.

The RBC of peripheral blood obtained from a finger or from human psoriatic plaques for scanning electron microscopy, were fixed in 2,5% solution of Glutaraldehyde in phosphate buffer (pH-7,4). After dehydration in solutions of alcohol – acetone of ascending concentration, the samples were dried by transition through the critical point of nitrous oxide in the apparatus «HCP-2» (Hitachi) and then coated with gold in the apparatus – IB-2.

Samples then were mounted on aluminum mounts with electroconductive glue. After being gold ion sputtered in the apparatus «IB-3» (Eiko, Japan), samples than were studied and photographed in SEM «Hitachi S-405A» with Canon digital camera from the monitor screen of the microscope.

Results of research and their discussion

Clinically, cutaneous manifestations are represented by polygonal papules of bluish-red color, with smooth, shiny surface and umbilicate indentation in the center. The surface of most elements had a clearly expressed Wickem's grid (Fig. 1). The rash in 5 patients was generalized and occupied more than the half of the skin's surface. In the remaining patients, eruptions were limited in character and localized on the flexor surfaces of the extremities.



Fig. 1 a. Patient B, Lihen Ruber before treatment



Fig. 1 b. Patient B, Lihen Ruber after 7 days of treatments

A slight leukocytosis, lymphocytosis (35%), eosinophilia (10%), accelerated ESR (25 mm/h) was noted at laboratory studies. Patients with hypertrophic form of disease and having lesions of buccal mucosa were noted to have diabetes mellitus. There were no deviations in biochemical tests of blood found.

Patients administered intravascular irradiation of blood (ILIB) in the complex treatment reported good tolerability of ILIB, and there were no side effects noted. Patients reported some drowsiness after the procedure. It should be noted that, 3-5 sessions discontinued the progression of the process, reduced itching, rash started to diminish after 4-5 sessions. By

the end of the treatment, papules disappeared with leaving brownish spots on the place (Fig. 1, 2).

Both SEM and EMTD revealed the dominance of pathological forms of RBC in the blood obtained from papules (Fig. 3, 4, 7, 8, Table).

Morphometric studies have shown that, patients with LRP have a more than twofold reduction in the number discocytes accompanied by fivefold increase of echinocytes in blood obtained from the plaques. Pathologic and irreversible forms of red blood cells are also revealed to be increased. In the blood taken from finger, these changes are expressed to a lesser extent (Table).



Fig. 2 a. Patient N, Lihen Ruber, before treatment



Fig. 2 b. Patient N, Lihen Ruber, 15-th day of treatments



Fig. 3. The dominance of erythrocytes with numerous processes (echinocytes) in the blood from plaque. Lichen ruber planus SEM 2000



Fig. 4. Pathologic forms of erythrocytes in the peripheral blood from finger. Lichen ruber planus SEM 2000

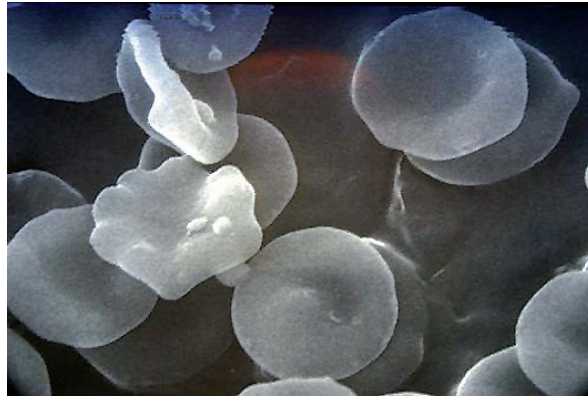


Fig. 5. Reduction in the proportion of pathological forms of erythrocytes. Blood from the plaque after a course of ILIB. SEM 2000



Fig. 6. Reduction in the proportion of pathological forms of erythrocytes. Blood from finger after a course of ILIB. SEM 2000

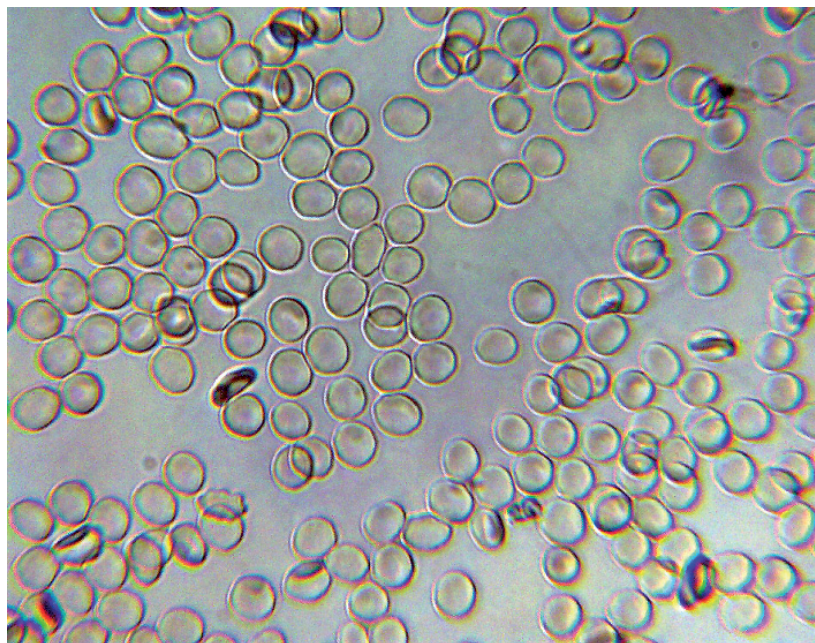


Fig. 7. Control, blood taken from finger. 10x40 1 gr

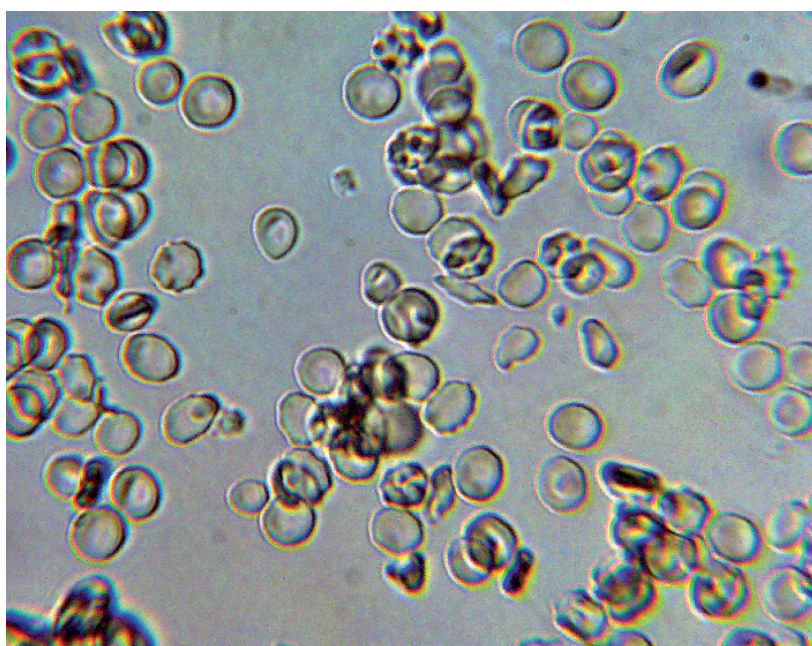


Fig. 8. Lichen ruber planus, before treatment. Blood from finger 10x40. 2 gr

Changes of RBC ratios in patients with lichen (ruber) planus and under influence of ILIB

Forms of RBC	Control, blood taken from finger 1 g. M ± m	before treatment. Blood from finger. 2 g. M ± m	before treatment Blood from plaque. 3 g. M ± m	treatment without ILIB. Blood from finger 4 g. M ± m	treatment without ILIB. Blood from plaque 5 g. M ± m	10 sessions of ILIB. Blood from finger 5 g. M ± m	10 sessions of ILIB. Blood from plaque 6 g M ± m
Discocytes	89 ± 1,7%.	57 ± 1,8%*	40 ± 1,4%*	62 ± 1,7%	60 ± 1,5%**	83 ± 1,4%***	80 ± 22%****
Echinocytes	9 ± 0,6%.	33 ± 1%*	49 ± 1%*	29 ± 0,8%	30 ± 0,9%**	10 ± 0,8%***	9 ± 0,3%****
Stomatocytes	1 ± 0,04%.	4 ± 0,2%*	5 ± 0,3%*	6 ± 0,3%	5 ± 0,2%**	2 ± 0,4%***	5 ± 0,2%
RBC with crest	0,5 ± 0,01%	4 ± 0,3%*	5 ± 0,2%*	2 ± 0,2%	3 ± 0,1%**	3 ± 0,3%	4 ± 0,1%**
Irreversible forms	0,5 ± 0,07%	2 ± 0,2%*	1 ± 0,2%*	1 ± 0,2%	2 ± 0,1%**	2 ± 0,1%***	2 ± 0,4%**

Notes:

- * – Statistically significant (P < 0,05) compared with group 1;
- ** – Statistically significant (P < 0,05) compared with group 3;
- *** – Statistically significant (P < 0,05) compared with group 4;
- **** – Statistically significant (P < 0,05) compared with group 5.

Complex treatment without ILIB, lead to an increase of discocytes, which was more marked in the blood taken from finger (Fig. 8, 9, Table).

Use of ILIB in the combined treatment of LRP lead to marked increase in the number of discocytes. Number of echinocytes reduced to that in control group. Significant reduce was

also seen in the number of stomatocytes, erythrocytes with crest and irreversible forms of erythrocytes (see Table).

10-15 sessions of ILIB lead to almost complete normalization of the ratio discocytes-echinocytes. Although the number of stomatocytes and erythrocytes with comb remained high, as compared with control, it was still

much smaller than that of patients before treatment (Table, Fig. 10).

Thus, the treatment without the use of ILIB leads to an increase in the number of discocytes and reduction in the number of RBC with comb.

It is known that, normally, discocytes – biconcave shaped RBC dominate in the periph-

eral blood [1, 7]. At the same time, as a normal finding we may see altered forms of red blood cells – stomatocytes, echinocytes, red blood cells with crests and other pathological forms of erythrocytes which are all reversible, that is, able to return to normal after cessation of influence of adverse factors. However, red blood cells may also take irreversible forms.

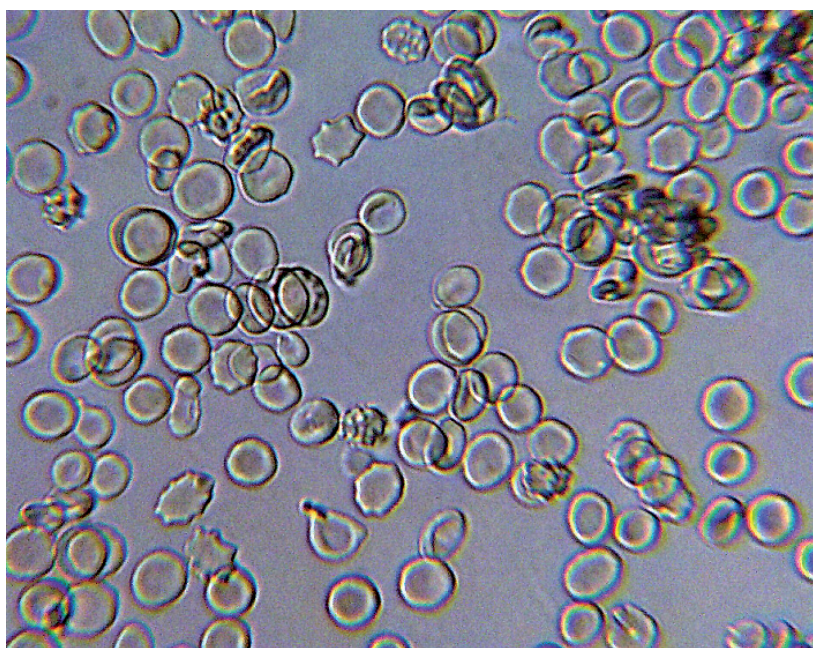


Fig. 9. Lichen ruber planus treatment without ILIB. Blood from finger. 10x40 3 gr

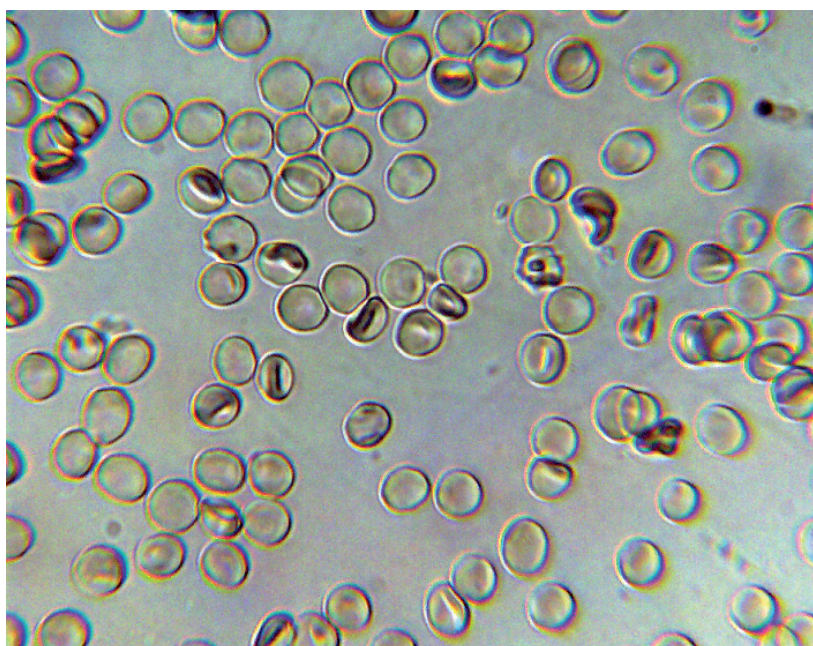


Fig. 10. Lichen ruber planus. 15 sessions of ILIB. Blood from finger. 10 x 40. 4 gr

Various pathological conditions and the impact of exogenous factors can lead to the violation of normal ratio of discocytes to pathological forms. It was shown, that various dermatoses such as eczema, atopic dermatitis, rosacea, and syphilis, increase the number of pathological forms of erythrocytes. Specific treatment, along with laser therapy leads to restoration of the proportion discocytes and pathological forms of erythrocytes [1, 6, 7].

The studies of changes in the shape of RBC caused by endogenous and exogenous factors, as well as those that take place in dermatovenerological practice were usually performed by means of scanning electron microscopy – SEM [1, 2, 6]. In evaluation of shape of RBC, SEM is considered to be the most objective method. However, this method is quite laborious, expensive and requires quite a long time to get the results. The conducted comparative studies have shown that EMTD is not inferior to SEM by its informativeness and objectivity, but requires significantly less expenditures, both as funds as well as time [1].

Our studies of changes of red blood cells showed that pathological forms of RBC substantially increase in LRP. This is particularly marked in the blood obtained from skin lesions. Specific treatment without the use of ILIB reduces the number of pathological forms. ILIB has a marked effect on red blood cells, shown in the normalization of ratios of discocytes to their pathological forms, as in the blood from the elements, and more marked in the blood from fingerhis allows us to recommend ILIB in LRP as a method of treatment of this dermatosis.

Our studies allow us to estimate the EMTD as an objective way to assess the status of erythrocytes in peripheral blood and the criterion of effectiveness of the treatment.

Conclusions

1. LRP leads to a significant increase in the number of pathological forms of erythrocytes in the peripheral blood, especially in that obtained from skin lesions.

2. The specific treatment leads to a reduction of pathological forms of RBC in the blood, both as obtained from the skin elements, as well as obtained from finger.

3. In the treatment of LRP, ILIB contributes to a significant normalization of the ratio discocytes – pathological forms of RBC.

4. Express-method of thick drop technique is a simple and reliable way to determine the relationship of discocytes and pathological forms of erythrocytes and can be used in dermatology for evaluation of the severity of the pathological process and the effectiveness of treatment.

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Materials of Conferences

**SPECIFIC FEATURES
OF THE FUNCTIONAL CONDITION
OF THE VEGETATIVE NERVOUS SYSTEM
IN TOP-LEVER KICK-BOXERS**

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In recent years there have been received convincing results contributing to the fact that high training and competitive loads while practicing kick-boxing influence on the functional condition of athletes' vegetative nervous system (VNS) in connection with the fact that VNS participates in adaptive mechanisms of the regulation of physiological processes. However, the analysis of the scientific literature shows that not so many papers are devoted to the problem of the kick-boxing influence on the VNS indices. At the same time the violation of the functional condition is based on many pathological changes; moreover the deviation of vegetative reaction parameters often leaves behind the clinic-laboratory picture of a disease.

The aim of the research is to define specific features of the VNS functional condition in kick-boxers in a precompetitive period of their training session. The investigation was held at the medicinal health-related centre of the State-Budget Educational University of Higher Professional Education (SBEU HPE) «South-Russian State University of Econom-

ics and Service». 33 17-21 aged kick-boxers took part in the investigation. Their sports level is a Master of Sport and a Master of Sport of International level (N. Rusanov, senior coach of Kick-boxing Federation of Russia in full-contact section). While estimating VNS functional condition the following indices were used: Kerdo index, active one-minute orthostatic test and a variational range of RR intervals. As a result of investigations it was established that Kerdo's index meaning in kick-boxers. Testifies to it's a bit higher tone in parasympathetic VNS part ($-11,57 \pm 2,14$).

The results of an active one-minute orthostatic test revealed the picture proving its satisfactory endurance ($12,87 \pm 3,17$).

The dynamics of the index of the variational range of RR intervals testifies to some predominance of the tone of the VNS parasympathetic part ($RR - 0,29 \pm 0,03$).

The information received allow to take into account the degree of the tension of central mechanisms of kick-boxers regulation in the process of their adaptation to some changing environmental influences.

The work is submitted to the International Scientific Conference «Priority directions of development of a science, technologies and technics», Italy (Rome-Florence), April, 10-17, 2012, came to the editorial office on 22.03.2012.

THE HIGH – TECHNOLOGY BIOREACTORS MAKING WAYS WITH THE HELICOID TYPE ROTOR

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The simulation modeling practical application, with the purpose of the device creating for the mycelial forms cultivation of the microorganisms is considered in the work. The device modeling results for the high – quality production obtaining at the desired performance and the minimum specific energy consumption achieving are given.

Keywords: hydrodynamics, homogeneity, material dispersion, body, strip, cavity, profiling, rotor, suspension, trajectory

So, the microbial cells growth and further development, in the process of their cultivation, is occurred under the influence of the great number of the factors, having determined by the environmental conditions. The most significant of all these factors is: the carbon – containing substrates, the oxygen, the mineral nutrient medium, the physicochemical factors (e.g. pH, the temperature, the pressure and the others).

The biochemical reactor work efficiency, to the large extent, is determined by the interaction conditions in the microorganisms' growing population with the environment. So, the cell population development is connected with the nutrient substances transport from the fluid mass to the cell surface, and the metabolic products diversion from it, when the microorganisms' deep cultivation methods application using in the fermenters.

At the same time, the nutrient substances transport conditions to the cell, its supply of all them the essential ones for the further normal growth and the development, are largely dependent on the hydrodynamic conditions, and the situation in the biochemical reactor. So, the fermentation time, which is necessary for the required substrate utilization and the microorganisms' growth, is completely depended on the currents' and the flows' structure, on the medium mixing conditions throughout the device's entire volume [1].

The transport challenges of the nutrient supply components to the cells, and in the first place, the oxygen at the aerobic microorganisms' cultivation are, particularly, complex and significant at the fermentation in the large volumes. So, the oxygen transfer velocity in the three – phase system, such as the gas – the fluid – the cell is complicated by the cell – cell agglomerates presence, by the non – uniform distribution of the dispersed phase, by the local areas with the oxygen's low concentration presence in the device, and etc.

So, the influence is quite also significant on the fermentation processes such factors, as the dead zones, by – passing flows and the currents presence and so on. So, in the dead zones, where the cells are being left significantly

longer time, than the fermentation's estimation time, it is quite possible their lysis and the infective microflora's microorganisms formation, which then is inhibited the cells' further growth process in the reactor. The by – passing flows and the currents presence is resulted in the nutrient substances and the elements break-through, in a number of cases, the much expensive substrate, and also their incomplete and the under – utilization.

So, all these and many other shortcomings of the bioreactors' modern designs are not possible to be obtained the finished product's output volume more than 65%.

In this connection, the best conditions of the substance transfer and its further consumption in the biosynthesis process of the reactor to be ensured, it is necessary to be created the specific hydrodynamic environment [1].

At this moment, all these goals' achievement is difficult enough task feasible, because of the weak, as theoretical, well as the practical knowledge on the mixing process. At the present moment, many attempts are made to the quite different and the various research methods application to be accomplished this intractable and difficult challenge to be solved, and one of them is the computer simulation.

So, the computer simulation, in particular, the imitation simulation, is quite allowed to us to be solved the significant complexity challenges, thus, having provided any multiple processes simulation with a large number of the elements. So, in such processes, the separate functional dependencies, as a rule, can be described, as the very cumbersome mathematical expressions, the practical use of which is involved the compulsory need for the simplification, having associated with the additional use of the empirically derived dependencies.

At the same time, the imitation simulation can be efficiently used in the scientific researches, exactly the systems with the complex structure, in order specifically identified challenges solutions to be obtained [2]. So, the «Solid Works» program with the «Flow Simulation» application is allowed to be performed the imitation simulation, in the field of the hydrodynamics.

So, the given program has been used at the fundamentally new multifunctional device development with the helicoid type rotor.

So, this work's aim has been the multifunctional mixing device development with the helicoid type rotor, with the help of the «Solid Works» imitation simulation program with the «Flow Simulation» application, by means of its functional efficiency determination in the using process.

Thus, two sets of the liquid flow hydrodynamics researches in the cavity flow of the mixing device with the imitation simulation use have been performed. The rotational speed of the mixing body has been set consistently, in accordance with its following digital series: 100, 200, 300, 400, 500 rev./min. (e.g. clockwise).

The device computer model of the classical cylindrical design with the four vertical reflective strips has been applied in the framework of the researches first set. So, the helicoid type rotor has been used, as the mixing body (Fig. 1).

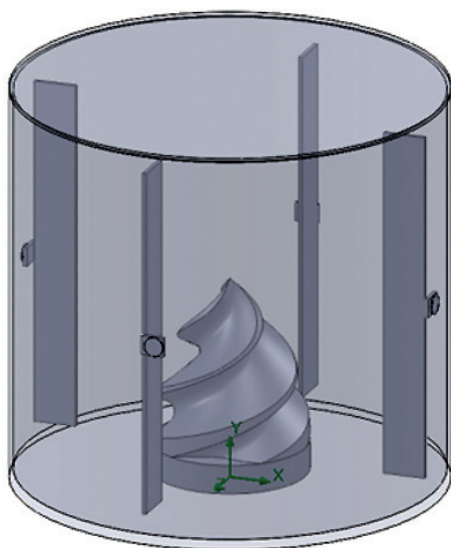


Fig. 1. The Cylindrical device with the helicoid type rotor and with the vertical reflective strips:
the 1–1 section; the 2–2 section;
the 3–3 section; the 4–4 section;
the 5–5 section; the 6–6 section

It had been revealed in the obtained data analysis, that the standard design of the device body with the vertical reflecting strips, as it was expected, is allowed to be excluded the central funnel formation effect, but, for all this, such device design is made the «dead» zones unit and also the large hydraulic losses in the fluid motion, which is negatively affected upon the mixing quality, thus, the power consumption is being increased. In our view, this shortcoming of the reflective strips can be significantly re-

duced, at the expense of their further modernization – by the creation of the upper movable part of the partition, which will be deflected in the fluid flow direction. This will be given the possibility to be streamlined the fluid flows movement, and the device mixing degree will be increased [3].

So, the device cavity has been divided, by its height, into the six vertical sections, for the axial and the circumferential velocities determination (Fig. 2).

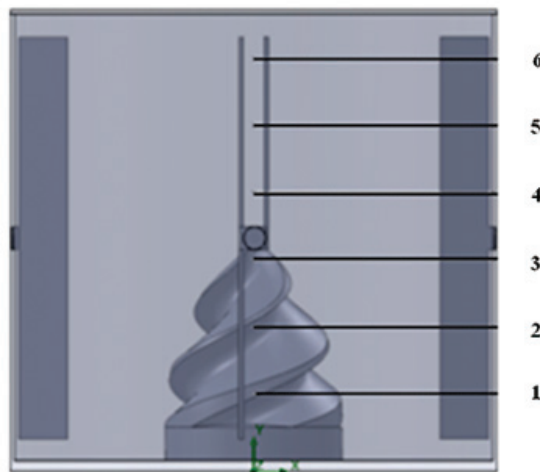


Fig. 2. The sections arrangement by the height unit:
the 1–1 section; the 2–2 section;
the 3–3 section; the 4–4 section;
the 5–5 section; the 6–6 section

Thus, the graphical components construction of the fluid motion dependences velocities has been carried out for each section. Here, below, as the example, the diagram of the circumferential and the axial velocities of the fluid motion at the rotation frequency of the mixing body, which is equal to 100 rev./min, has been given (Fig. 3).

So, the obtained curves on the diagrams are analytically described by the polynomial equations systems of the third order. So, for example, for the axial component velocity at the mixing organ rotation $n = 300$ rev./min, the equations system is taken the following form:

$$\begin{cases} y = 32,13x^3 - 4,362x^2 + 0,180x + 0,002 \\ y = -246,9x^3 + 35,37x^2 - 0,913x + 0,005 \\ y = -386,9x^3 + 53,30x^2 - 1,115x - 0,007 \\ y = -759,2x^3 + 129,6x^2 - 5,280x + 0,032 \\ y = -1219x^3 + 247,9x^2 - 13,6x + 0,166 \\ y = -1335x^3 + 307,8x^2 - 20,43x + 0,361 \end{cases} \quad (1)$$

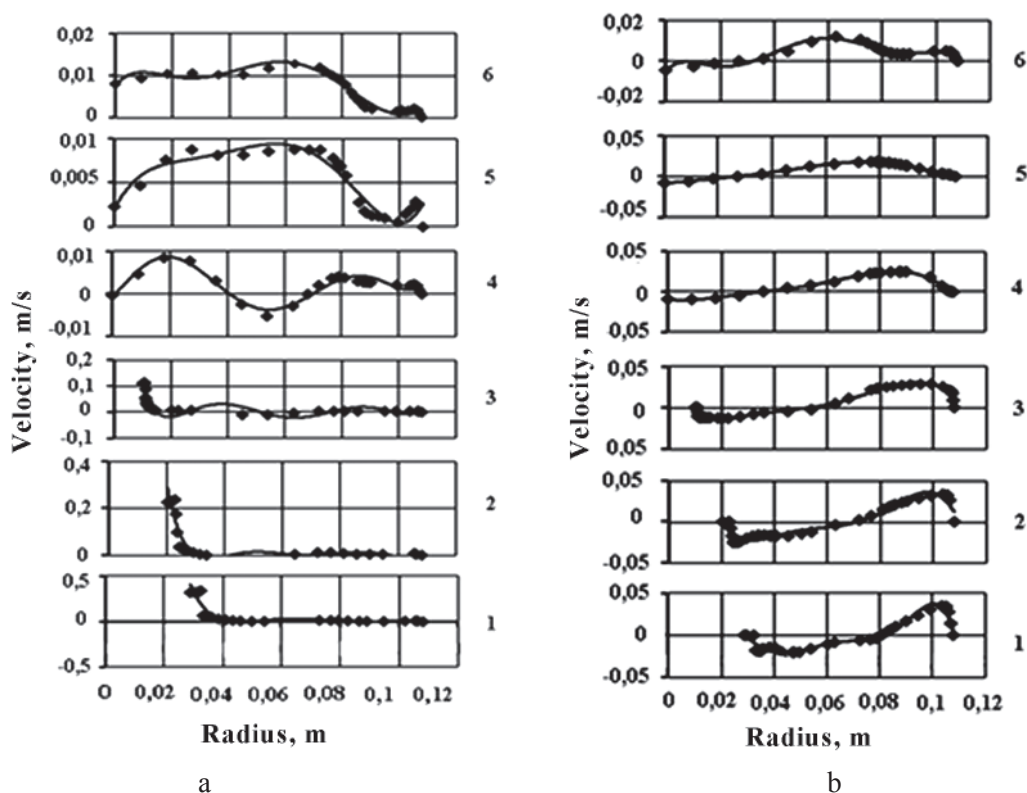


Fig. 3. The fluid velocity schedule at the rotation frequency of the mixing body $n = 100$ rev./min: a – the circular velocity component; b – the axial velocity component; the 1–1 section; the 2–2 section; the 3–3 section; the 4–4 section; the 5–5 section; the 6–6 section

So, it has been revealed in the diagrams analyses, that the peripheral velocity is gradually increased with the rotor’s increasing rotational frequency up to 500 rev./min in all the sections of the device. This is due to the fact, that with the rotational frequency increase, the energy transfer to the liquid flow from the rotor is also being increased.

So, the axial velocities values are being increased by the device height, with the rotor rotational frequency increase from 100 rev./min up to

500 rev./min. For all this, with the rotor rotational frequency increase in 5 times, the axial velocity increase is taken its place, approximately in 2–4 times, depending on the device considered section. This is explained by the fact, that the vertical strips presence at the device walls is contributed to the tangential forces transformation of the moving fluid flow into the axial forces.

Thus, the liquid flow resulting velocity, at the different rotational frequencies of the rotor, has been presented in the Table 1.

The Liquid Flow Velocity, at the Rotor’s Different Rotational Frequencies

Table 1

Velocity, m/s	100 r./min	200 r./min	300 r./min	400 r./min	500 r./min
Min. velocity	0	0	0	0	0
Average velocity	0,0159	0,0287	0,0372	0,0448	0,0532
Max. velocity	0,485	0,944	1,335	1,6822	2,102

According to the obtained diagrams of the axial velocities, one can be seen, that the vector velocity shift is occurred in the device working cavity, while the fluid motion. So, this shift is caused by the fact, that the fluid flow, hav-

ing encountered the resistance along its further motion trajectory, is tended to be left to the area with the least resistance.

The vertices of the curves on the diagrams are indicated the maximum flow rate, i.e. the

flow, along its further motion trajectory, is occurred with the least resistance. So, the resistance decrease during the fluid motion is allowed to be maximized the mixing degree, the circulation intensity, and the device performance, which, in its turn, will be led to the decrease in the specific energy consumption, when the device operating.

One can be seen in the diagrams reviewing with the axial velocities, that the vertices of the curves (e.g. the maximum values) are located in the definite sequence. If the isoline to be drawn through the vertices, then it is quite possible to be obtained the definite curve, along which the fluid flow has the maximum axial velocity during the motion into the device working cavity from the bottom to its top (Fig. 4).

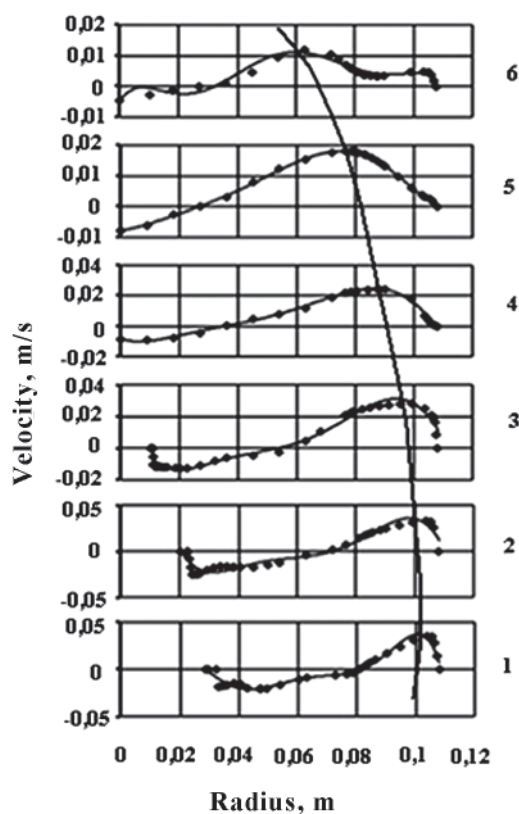


Fig. 4. The Scheme of the isolines construction on the obtained curves tops:
the 1–1 section; the 2–2 section;
the 3–3 section; the 4–4 section;
the 5–5 section; the 6–6 section

On the basis of the given assumption, the lateral surface construction of the device has been made, in the first approximation, which is equal to the radius of the arc:

$$R_{arc} = D_{dev} \quad (2)$$

where R_{arc} – is the radius of the arc of the device lateral surface, mm; D_{dev} – is the diameter of the device, mm.

Having used the obtained dependence, the challenge on the lateral surface profiling of the device body is really become the solvable one.

Thus, having performed the lateral surface profiling of the device, the transition geometrical construction is being made from the lateral surface of the device to its lower and the upper parts. So, the given three elements must be conjugated by the surface, having provided the unseparated and the steady circulation of the fluid flow, as it is moved from the mixing organ, through its guide rails, before the mixing body entering.

The best optimum alternative of these given conjugations implementation, by the earlier carried out researches results, is the parabola fragment at the bottom part of the $x^2 = 2Py$ [4] form, but in the upper part – the hyperbola fragment kind

of the $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ form. As a result of such the construction, we get the device with the shaped and the profiled body, having shown in the Fig. 5.

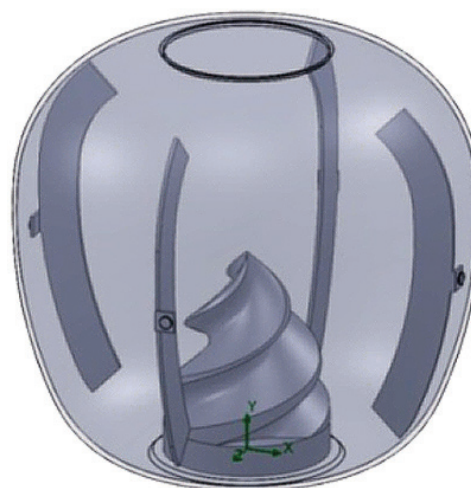


Fig. 5. The shaped body device with the helicoid type rotor

Then, the second research has been carried out on the computer model of the device, having had the shaped and the profiled cross – section. Thus, for the given body, the trajectories for the fluid flow motion and the graphical dependencies have already been received.

By the fluid motion trajectories, it is quite possible to be made the following conclusions: the axial velocities are mostly dominated in the working cavity of the shaped and the profiled body, even at the low frequencies of the rotor rotation, and also there is no presence of the «dead» zones.

The diagram of the circumferential and the axial velocities of the fluid motion, at the rotational frequency of the mixing body 100 rev./min has been given below (Fig. 6).

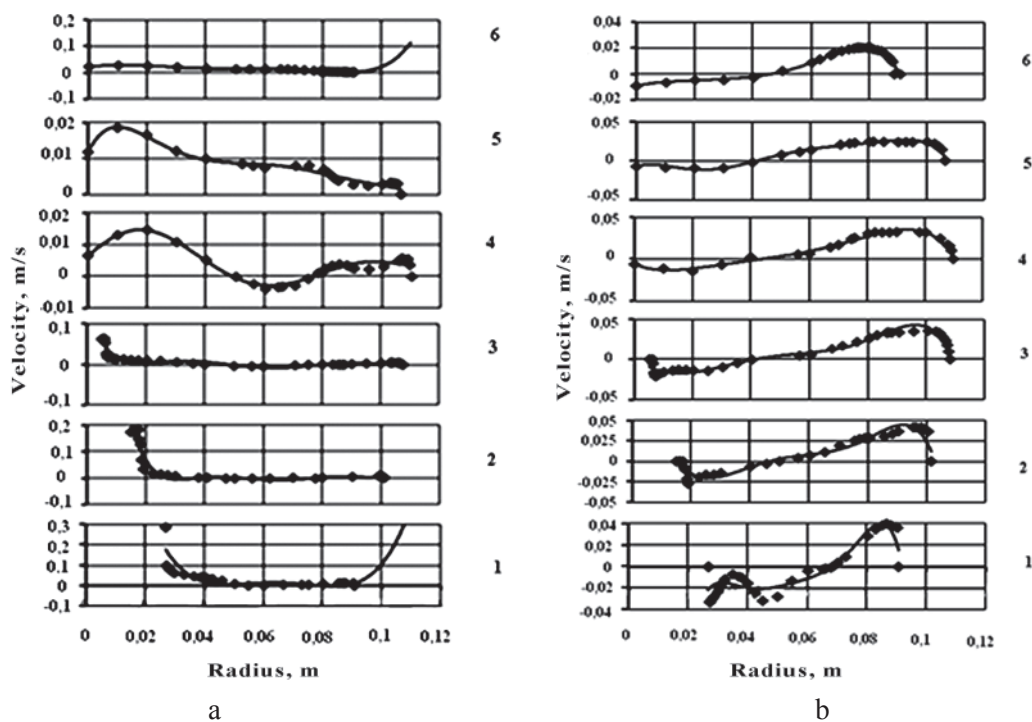


Fig. 6. The fluid velocity schedule at the rotation frequency of the mixing body $n = 100$ rev./min: a – the circular velocity component; b – the axial velocity component; the 1–1 section; the 2–2 section; the 3–3 section; the 4–4 section; the 5–5 section; the 6–6 section

So, the obtained curves on the diagrams are analytically described by the polynomial equations of the third order. And, for example, for the axial velocity component at the mixing body rotation $n = 300$ rev./min, the equations system is taken the following form:

$$\begin{cases}
 y = -221,5x^3 + 30,87x^2 - 0,763x - 0,006 \\
 y = -318,8x^3 + 52,34x^2 - 1,708x - 0,004 \\
 y = -538,7x^3 + 88,47x^2 - 2,832x - 0,008 \\
 y = -750,6x^3 + 123,4x^2 - 4,187x - 0,004 \\
 y = -1158x^3 + 204,5x^2 - 8,937x + 0,064 \\
 y = -2265x^3 + 436,3x^2 - 24,23x + 0,352
 \end{cases} \quad (3)$$

So, it has been revealed at the diagrams analysis, that the axial velocity is gradually increased with the rotor rotational frequency increase. So, in comparison with the cylindrical construction device, having the installed vertical strips, the shaped and the profiled cross – section body, in average, is given the increase in the axial velocity component up to 55%. So, with the axial velocity component further increase and the fluid circulation is directly proportional increased in the device. That is why, the liquid circulation time is one of the main characteristics, that are served to be estimated the devices different types with the mixers performance, as it is made the significant impact upon the whole mixing process [5].

Table 2

The Liquid Flow Velocity, at the Rotor’s Different Rotational Frequencies

Velocity, m/s	100 r./min	200 r./min	300 r./min	400 r./min	500 r./min
Min. velocity	0	0	0	0	0
Average velocity	0,019	0,029	0,038	0,046	0,054
Max. velocity	0,451	0,841	1,262	1,683	2,104

In general, the absolute velocity has already been grown in the shaped and the profiled body, in comparison with the traditional body of the cylindrical form. For all this, the highest increase is observed in the velocity, at the rotational frequency $n = 100$ rev./min, and it is made up about 20%.

It is resulted from the obtained results, that the shaped and the profiled body is allowed to be enhanced the suspensions mixing quality, even at the low rotations numbers of the mixer. For all this, the «dead zones» will not be practically present in the working cavity of the device, that positively be impacted upon the efficiency improving of the device performance, as a whole.

So, the Equations (1) and (3), at the further work, can be used to be found the values of the liquid flow rates at any point of the device working cavity. This will be given the possibility, as quantitatively, well as qualitatively to be estimated the devices performance efficiency with the mixers and the stirrers.

Conclusions

Thus, the developed device for the microorganisms' mycelial forms cultivation is practically permitted:

– to be excluded the «dead zones» appearance possibility, as the stationary, well as the dynamical type;

– to be achieved the hydraulic losses reduction, in the fluid flow motion;

– to be ensured the concentration uniform distribution throughout the device entire volume, at the expense of the further maximizing increase of the suspension circulation degree in the flowing cavity of the capacitive device;

– to be obtained the high – quality final production, at the minimum energy consumption.

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*Materials of Conferences***THE REVIEW OF MODERN SYSTEMS OF DATA GATHERING**

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The data gathering system is the complex of means intended for work together with the personal computer and the carrying out automated gathering of the information on values physical parameters in the set points of object of research from analog and/or digital sources of a signal, and also preprocessing, accumulation and data transmission.

Now a lot of attention is given to designing of systems of data gathering.

As a rule, data gathering systems are issued now in following kinds: the external modules of input-output ADC-DAC, connected to the computer through interfaces USB, RS-232 or Ethernet; the universal payments of input-output ADC-DAC established directly in the computer in sockets of tires PCI or ISA; LTR kreit – as modular system. First two executions are most extended.

The price of such systems of data gathering depends on the basic indicators of their main component – the analog-digital converter (ADC): word length (from 8 to 24 categories), frequencies (from units of Hz to hundreds in MHz), numbers of channels (from 2 to 32).

According to these indicators the price changes also. And, in very wide limits: from 3 000 roubles for the block with 8-digit ADC (JIA-50USB, Company «Rudnev-Shiljaev»), to 99 000 roubles for the block with 14-digit ADC (AD-USB2-14.400 MHz, Company «the Company the Signal»), and even to 327 568 roubles for the block with 14-digit ADC (ADP64Z4CP2, «Center ADC»). As the price and depending on frequency of work used ADC promptly grows.

It is obvious that most expensive an element of modern systems of the data gathering, in such wide spectrum their price, the analog-digital converter is defining.

It is connected also by that at analog-digital transformation there is a problem: the more word length (that is potential accuracy ADC), the more slowly it works (that is the less its frequency of digitization). For today of the compromise while isn't present. Developers aspire to create fast and exact ADC. And consumers not against, but want that it was not expensive. Here also it turns out that manufacturers of electronic components (ADC, DAC, sources of basic pressure, sample and storage devices) work over perfection of the products, periodically letting out high-precision, but very expensive copies. And developers of systems of data gathering complete the systems with typical, average blocks at the price, losing thus accuracy of system.

Therefore the alternative is required: to create inexpensive, but exact system of data gathering. Our scientific research is devoted working out of such system.

The work is submitted to the International Scientific Conference «Modern high technologies», Dominican republic, April, 13-22, 2012, came to the editorial office on 22.03.2012.

WAYS OF PERFECTION OF MODERN SYSTEMS OF DATA GATHERING

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We work over creation of universal systems of data gathering for various applications, on the basis of offered external modules of increase of accuracy the analog-digital converter (ADC), such as: the sample and storage device; the device of formation of absolute value of signals; the device of formation of basic pressure; the device of correction of errors.

Scientific novelty of decisions offered by us consists that we work over increase of accuracy of the devices entering into block ADC and operations, realized by them, considering block ADC as difficult system. While neither among developers, nor in the technical literature to these operations it is not given proper attention. Developers of systems of data gathering simply use standard schemes of these devices, considering block ADC as «a black box».

We can realize two variants of such systems with use of the developed external modules of increase of accuracy ADC: on the basis of cheaper element base that will provide characteristics of our system, comparable with analogs. A principle: quality (accuracy) – too, the price – more low; or on the basis of the same element base that will provide increase of accuracy and efficiency of our system in comparison with analogs. A principle: quality (accuracy) – above, the price – a little above.

The expected result of our work is a universal system of data gathering with use of the developed modules of increase of accuracy ADC, with possibilities:

- uses of cheaper element base (less exact ADC and DAC) at the expense of application of the developed module of correction of errors ADC;

- increases of word length used ADC at the expense of application of the developed modules of the device of formation of absolute value of entrance signals ADC (provides increase in word length ADC at 1 category) and a source of basic pressure (provides increase of effective word length ADC on 1-3 categories because of decrease in level of noise of a source of basic pressure and increase of its temperature stability);

- increases in speed ADC at the expense of application of the developed module of the device of a sample and storage (provides decrease in time of a sample and storage time increase);

- decrease in power consumption in case of application of more simple ADC with the lowered power consumption

It is natural that the price of systems offered by us will be much more low, than at competitors.

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Short Reports

AN ELECTRONIC STABILIZER WITH MINIMAL VOLTAGE DISTORTION OF A POWER LINE

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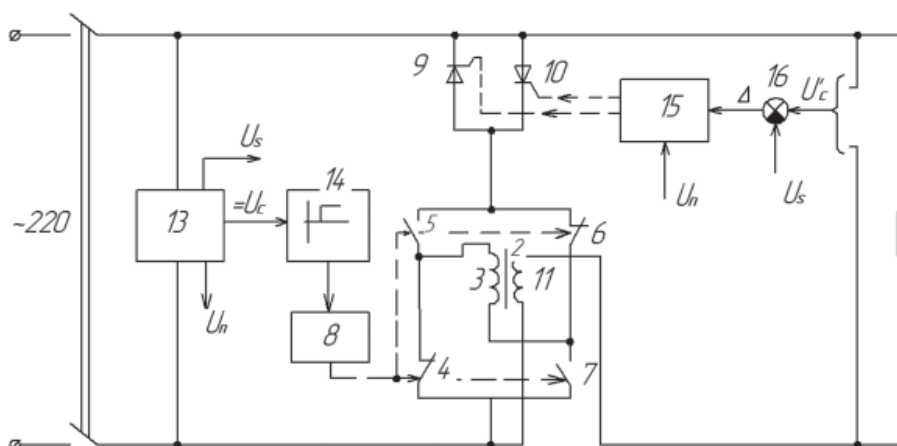
It is offered to use an electronic voltage stabilizer on change expensive and bulky ferroresonance voltage stabilizers of small capacity and the voltage stabilizers of the big capacity executed on the basis of the autotransformer.

Nowadays a phase i.e. smooth regulation inside steps by means of impulse-phase controlled

thyristors is replacing expensive and bulky ferroresonance voltage stabilizers of small (up to 1 kVA) capacity based on an autotransformer with step regulation of voltage adding welded points employing a semiconductor commutator. However, voltage distortions in the net are inevitable in the process and it is not always acceptable.

An electronic voltage stabilizer with a voltage adding transformer, filter condensers connected in parallel with loading and a regulating key with a control system is offered [1].

The scheme of the device offered is shown in Figure.



An electronic stabilizer with minimal voltage distortion of a power line

The device functions as follows. If automatic switch 1 is on and the voltage below nominal is applied to a stabilizer, the signal equal U_c of power unit 13 is also below the operation level of semiconductor relay 14, accordingly relay 8 is off and contacts 5, 6 are closed. In this case transformer 2 is used as voltage adding, i.e. the voltage of transformer secondary winding 11 is added to the voltage of power line U_c . Let U_c have plus on the top terminal of loading 12 at the considered moment of time. We name this half-cycle positive. In this case a network voltage «positive» signal and a current zero signal in transformer 2 primary winding 3 enter one output of logic circuit. At the same time transistor is unlocked and winding 3 is short-circuited via voltage gauge, therefore the whole voltage of network U_c is applied to the loading. The positive signal of voltage and zero signal of current form a logic unit at the control unit of key 15 and the very first pulse from a pulse-width modulator comes to the base of transistor 9 unlocking it. The voltage at transistor 9 falls practically up to zero, transistor is locked and

the voltage of network U_c is then applied to primary winding 3 of transformer 2.

At secondary winding 11 of this transformer there develops the voltage which adds to the network voltage. The resulting voltage U_n average by condenser not shown for simplicity by a module extruder also having a condenser at the output, is compared to the reference voltage U_s supplied by power unit 13.

If $\Delta = U_s - U_n > 0$, i.e. the network voltage is i.e. with pulse width modulation below the nominal one, the pulses from unit 17, extend, increasing the average by voltage adding, otherwise pulses of pulse width modulation are compressed, i.e. the signal from comparator determines the porosity of pulse width modulation. During a negative half-cycle the scheme functions similarly with the described one, the only difference is that key 16 is unlocked and winding 3 is periodically short-circuited by transistor. As logic circuit carries out the elementary function of summation and is realized on typical triggers, elements AND, OR, for simplic-

ity it is designated only structurally. We'll notice that positive and negative working cycles can be displaced depending on the character of loading 12: at inductive loading the transition point of a current sinusoid through zero is displaced to the right and, accordingly, the unlocking moment of logic keys 15 and 16 is displaced as well. Condenser serves for compensation of input inductance.

If the network voltage exceeds the rating value, relays 14 and 8 will be on. Contacts 5 and 6 will open and contacts 4, 7 will close. Winding 11 of transformer 2 becomes voltage adding. Thus, the stabilizer carries out its function at fluctuations at network voltage both downwards and upwards from the nominal value. As the modulation frequency can be high enough, e.g. 1–12 kc, voltage pulses filtration of voltage adding does not represent a problem and is carried out by means of condenser of a small capacity and also due to dispersion inductance of transformer 2 designed for 50–60 cycles, i.e. is a typical stepping down transformer. However, it is necessary to note that in this case the transformer has alternatively two modes: the mode of an autotransformer when it is connected for a network and the mode of a current transformer when primary winding 3 is short-circuited by transistor. In the first mode the current in transistors and in a primary winding is equal to the magnetization current which is an additional advantage of the scheme and high frequency of modulation allows us to get rid of distortions. Semiconductor relay 14 is necessary to provide the high factor of return, i.e., the necessary accuracy of operation of relay 8.

Thus, the device offered provides high frequency of modulations with filtration of impulses of voltage adding by means of a condenser of small capacity and also due to dispersion inductance of a transformer. It allows us to exclude voltage distortion in a network.

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A SMALL-SIZED VOLTAGE STABILIZER WITHOUT SWITCHING CONDENSERS

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A small-sized voltage stabilizer without switching condensers in comparison with widely known analogue provides smaller mass parameters due to the application of a minimum quantity of semiconductor devices and more effective current loading of the device and a network as a whole.

It is necessary to recognize as a lack of many stabilizers comparative complexity and big mass parameters connection with the necessity of application of switching condensers.

In comparison with widely known analogues the offered voltage stabilizer [1] provides smaller mass parameters due to the application of a minimum quantity of semiconductor devices and more effective current loading of the device and a network as a whole. The device provides a combination of voltage adding transformer functions and functions of a compulsory locking thyristor device.

Let's consider the stabilizer operation (Figure) the network and loading voltage are smaller than a nominal level, i.e. at $U_s < 220$ V. It is assumed that in this case relay 6 is initially switched on and its contacts 5 shunt a primary winding of transformer 1, accordingly, the voltage at its secondary winding is also equal to zero. When thymistor 4 is off, the loading forms a series circuit with a secondary winding of transformer 2, which in this case acts as a reactor. Thus the most part of the mains voltage will be applied to a winding and loading voltage can be practically equal to zero. However it takes place only on the initial site of a mains voltage half-wave the duration of which is determined by the «break-down» voltage of stabiliton 9

$$\gamma = \arcsin \frac{U}{220\sqrt{2}} \approx 10 \text{ el.degrees.},$$

at $U_{cm} \approx 50$ V.

When the voltage reaches the specified level and stabiliton 9 in transformer 8 primary winding of galvanic outcome starts to conduct current, the in thymistor 7 control circuit will be increased and the latter will be on. Shunting of transformer 2 secondary winding by means of thymistor 7 will result in spasmodic change of the loading instant voltage up to the level of the network U_s voltage.

It is assumed that the automatic control and output voltage stabilization system functions according to the principle of output coordinate (U_o) deviation from a present value (U_p). The signal of a regulation mistake from an output of regulator 12 enters the input of pulse phase control device 11 which develops unlocking pulses for thymistor 4. The smaller the stabilizer output voltage, the smaller the phase angle of thymistor a control, the more the voltage adding which is delivered to the loading circuit by transformer 2 primary winding is connected to the mains voltage source, the e. m. being induced in the secondary winding, the phase of which due to the way of primary and secondary winding connection specified in the scheme coincides with the network voltage phase. As a result thymistor 7 is under the influence of the specified winding indirect voltage and is locked. Thymistor 7 locking out results in the fact that the loading instant voltage from the moment a up to the end of a half -cycle is determined by the sum of the mains voltage and voltage adding transformer 2 secondary winding voltage. Thus the effective value of voltage adding provided by transformer 2 during the period is in direct dependence on a regulation mistake and it provides a sta-

*Materials of Conferences***THE TOURSIM CLUSTER DEVELOPMENT
IN THE EAST OF KAZAKHSTAN**

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The East Kazakhstan oblast possesses all the necessary resources for both domestic and international tourism development. One can increase the efficiency of the available tourist potential utilization by means of ecological, cultural-informative, beach, Alpine skiing and business tourism development. It makes the basis of the creation of the tourist product competitive both in Kazakhstan and international markets.

The backgrounds for such a product development are: favorable climatic parameters, availability of water and balneological resources, the variety of recreational landscape of the region, unique museum complexes of international importance (such as commemorative complexes of Abai, Shakarim, M. Auezov, F. Dostoyevsky) as well as distinctive historical cultural heritage, as a great many of civilizations are of Altai origin and valuable artifacts were found as a result of excavations carried out in the region.

The available potential implementation is possible on condition of the systematic approach to sorting out the *problems* hindering the tourism development, the most urgent of which are:

- a) administrative barriers (time-consuming procedure of getting the permission for entering frontier zones and registration of foreigners);
- b) inefficient tourist product merchandising in the international market;
- c) insufficient funding;
- e) absence of the tourist infrastructure meeting the international requirements;
- f) absence of coordination of intra- and inter-industry activities on tourism infrastructure development matters;
- g) inefficient utilization and rather low quality of tourism managers and professionals training.

The issues enumerated can be successfully sorted out by means of tourist cluster formation in the region. The advisability of such a cluster creation is backed by the fact, that according to the World Tourist Organization estimation, tourism influences 32 branches of economy either directly or indirectly and contributes to the infrastructure development both of the state and its regions, and each workplace created in the tourism industry causes from three to five workplaces appearance in other industries.

As the global experience shows, the potential of the cluster, which is a stable territorial industry-specific partnership of the interconnected organiza-

tions, due to the synergistic effect is higher than the sum of potentials of all its elements. Such increase appears as the result of cooperation and efficient long-term utilization of partners' capacities, combination of cooperation and competition. The companies benefit from the possibility to exchange experience and reduce capacity and circulation costs as well as to employ one and the same services and suppliers.

For the purpose of the tourist cluster efficient functioning and development, it is necessary to carry out the following *tasks*:

- to carry out the complex scientific research with the object of thorough inventory and economic estimation of the nature potential of the region, evaluation of the possibilities of the industry infrastructure development harmlessly for biodiversity in recreational areas;
 - to develop tourism infrastructure;
 - to enhance innovative component of the tourist companies activity and, therefore, increase of their competitiveness and efficiency;
 - to attract extra investments to the tourist industry for reconstruction of the operating tourist facilities and creation of new ones.
 - to develop entrepreneurship in the field of the tourism;
 - construction and reconstruction of museums, commemorative complexes, architectural monuments, putting in order the most frequently visited historical sites;
 - to carry out active advertising and informative campaign aimed at formation of the image of the oblast and merchandising of the tourist product in domestic and international markets;
 - to improve the system of training and re-training of the tourist managers having good command of foreign languages (English, Chinese, Turkish).
- These tasks will be successfully accomplished on condition of enhancement of the mechanisms of the tourist state regulation and support.
- The major priorities* of the tourist cluster creation in the East Kazakhstan oblast are:
- the development of the income tourism on the basis of the unique tourist recreational zones utilization as well as the factor of Eurasian historic development of the country, multinational, multi-confessional and multicultural character of the Kazakhstan society, its values, traditions, cuisine and arts;
 - the development of the domestic tourism by means of creation of inexpensive comfortable facilities able to meet requirements of the different categories of the domestic consumers of tourist services (Alpine skiing resorts, beach tourism development resorts), and also by advertising of history and culture of the Kazakh and other ethnic groups;

– overcoming of the unawareness of the tourist potential of the oblast by carrying out of the active image policy. For that purpose, it is necessary realize the development of the virtual tourism as the way to attract real tourists to the region.

The major participants of the tourist cluster are: tourist companies, companies providing accommodation and catering services, transport companies.

One of the main condition of the tourism development is road and driveways construction, providing accessibility of the tourist facilities of East Kazakhstan, creation of the roadside infrastructure including construction of the campings equipped with telecommunication devices. Herewith, it is necessary to focus all your efforts on the most popular tourist destinations and areas such as recreational areas of the Bukhtarma Lake, the Sibinskiye Lakes, the Alakol Lake, and the Katon-Karagay National Park.

Within the scope of the automobile cluster which is being created on the basis of «Asia-Auto» JSC, it is advisable to establish an off-road vehicles leasing company.

Taking into consideration the long distances from the oblast center and Semey city to many of the tourist destinations, and for the purpose of their transport accessibility, it is necessary to establish and develop small aircrafts companies. You don't need to construct new airports; it is enough to reconstruct those available in many of the rayon centers.

The extra participants of the tourist cluster are sport facilities; cultural establishments; guides; various tourist instructors; souvenirs manufacturers; mass media; municipal and household services providing companies; trade institutions (stores, markets, leasing companies); communication and telecommunication companies.

The cluster mechanism of the tourism development requires complex development of the recreational areas. Thus it is necessary to stimulate the development of *the relevant participants of the cluster* – industrial and agricultural companies, producing food, clothing and all the other necessary goods.

The creation of the tourist cluster will lead to the formation of the competitive tourist recreational industry in the East of Kazakhstan, providing not only satisfaction of the demand of the Kazakhstan and foreign consumers for the tourist recreational services, but also significant contribution to the social economic development of the region by means of the revenue side increase of the local budget, investment inflow, the increase of the workplaces in rural and distant parts of the oblast, the population health improvement, preservation and efficient use of the cultural-historic and natural heritage.

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MANAGING STRATEGIC DEVELOPMENT OF INDUSTRIAL CENTER (monograph)

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Formation of «new economy» is the main idea of the development of Russia at its modern stage. A significant element of this process is structural improvements of industry that specializes in raw materials. It is especially typical for eastern regions of the country, where in terms of establishing free market conditions it obtained hypertrophied forms and scales. Economic system that is directed towards initial limits that produce products of low added value has been formed. It limits reproductive abilities of Far East and is provided by a shortening in its demographic potential. If such trends go on, geostrategic interests of Russia can suffer seriously, especially if we consider our neighborhood with densely populated countries with dynamic economy and rare raw materials.

A presence of price-raising factors with a trend to grow is an objective term of Far East. Therefore, an effective economy can ground on such recourses and production of such goods and services, which value in Russia and all over the world will grow. These are wood, minerals, fuel and energy, biological and spatial recourses as well as economic-geographic position of Russian Far East. However, these foundations can not provide for strategic sufficiency and growth in significant mass of residents. The point is that sectors of prospecting of the described recourses require specific workforce and can not provide a full employment and qualitative reproduction for the whole population. Therefore, an increase in scientific-technical level of the economy that is based on the development of innovative production is necessary. It is why the Strategy of social-economic development of Far East and Baikal region for the period up to 2025 sets objectives of full-scale technological modernization in production, development of new economic sectors that provide for deep processing of raw materials, and creation of enterprises of innovative direction.

Of course, not everywhere within far-east region terms for high-technological industry that define high speed in economic development, are provided. And not everywhere they are necessary if we refer to abilities to provide favourable terms for human reproduction. However, the fact that they are necessary in the South of the region is non-discussable. This very territory corresponds to the «criteria of favourability» in its climate conditions that are not best for life, but absolutely acceptable for the formation of human potential.

Industrial centers –areas of intense and diverse development that give impulse to neighbor regions must become organization-territorial mechanisms of industrial development of Far East. Studying this process – that creation of highly-effective and competitive industrial complex – is the main purpose of this book.

The object of the research is the approach towards managing the development of an industrial center on example of the city of Komsomolsk-on-Amur. Principles of strategic development lie in its basis. Processes of development of industrial centers of Far East, peculiarities and competitive advantages of Komsomolsk-on-Amur are studied; the mission and possible scenarios of its development are formulated; strategic goals,

aimed for main mechanisms of their realization are developed.

Strategic development of the city of Komsomolsk-on-Amur is considerably defined by geostrategic demands of the country and the region and is dependent on factors and terms of the outer order. It conditioned the usage of the system approach in link with the strategic plan for the regional development which is not, in our opinion, studied sufficiently in our country.

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*Materials of Conferences***SMALL GOLD EXTRACTION FROM HARDLY WASHING GOLD PLACER DEPOSITS**

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Maximum possibility of extraction of small and especially small gold is one of the basic problems at effective working off as ore as gold placer deposit. The preparation of a pulp for enrichment process, i.e. its intensive disintegration is the basic technological feature of hardly washing gold-bearing mineral raw materials. The screen vibrator-slucice which includes formation of a stream of a pulp by influence on mountain weight on a screen of water stream from the hydromonitor, which was directed against movement of the mountain weight, was brought into the scheme of a chain of concentrating complex devices. Influence on a pulp stream on a sluice by the screen movement, giving of rotation to a pulp in rug cells by the untwisting of a sluice round an axis of a perpendicular plane. Creation of a restored catching covering in the form of cells of a sluice rug with compulsorily untwisting streams of a pulp, deduction of heavy allocated parts by inertial forces from screen movement. The device for method of realization contains the hydromonitor the stream of which is directed against movement of mountain weight on a screen. It has additional washing away atomizers strengthened in walls of the bottom screen. The sluice supplied with a drive of circular movement in the plane and established with possibility of fulfillment of circular movements in the plane and with possibility of fulfillment of screen movement that's why this is rigidly fixed under a two-level screen. A suspension bracket which is looking like four cables or chains, suspended in a horizontal plane and providing an inclination of a sluice and screen [1].

The necessity of increase in time of passage of gold for a technological cycle, inclusion of every possible control operations etc. inevitably develops with the reduction of coarse gold. The mechanical wash pan sluice was worked up with the purpose of increase kinetics of technological process inevitably grows as much as possible to take valuable heavy components in rather quiet weighed environment. It concerns to devices for allocation in a concentrate of thin heavy parts with creation of weighed heavy environment [2]. The way includes preparation of the initial material containing a considerable quantity of clay in the course of classification and

liquescency on a sieve by screen movement and water atomizers, pulp transportation on a platform consisting of the cascade of enrichment chambers. The working surface of each enrichment chamber consists of flat surfaces of the Siberian tray, conical surfaces of the Korean tray, an internal surface of the cylinder fixed on the flat bottom and with the second cylinder fixed on the bottom with concentric external surface and with splitter. The platform is exposed to circular movement. The pulp is exposed to the influence of centrifugal forces for pressing of thin fraction to conic spreading surfaces during the hit in deepening washing trays. The undivided material influence the water stream brought tangentially in a cylindrical part of a tray for untwisting of heavy fraction. During the carrying out of a technological mode, the initial material in the form of a pulp arrives on a sieve built in the top part of an inclined platform and executing screen function, than it is washed away from atomizers by water delivery from a highway for giving of transport water and pendent washing atomizers of a pipe of a descending water irrigation. The inclined platform has a suspension bracket in the form of four cables fixed on the welded basis for a suspension bracket of an inclined platform of a wash pan sluice. The suspension bracket provides a necessary inclination of a flat platform. The inclined platform has a box-shaped design of a wall which is chippers and a supporting element for all knots. The working surface of a platform is executed in the form of the compound combined trays carrying out a role of chambers of enrichment and established on cross-section channels of an inclined platform. The inclined platform is supplied by the inertial drive fixed on the bottom of a platform. The drive is executed in a kind of misbalance the shaft of which is resulted in rotation from a pulley of transfer by a friction. The enrichment chamber, in the form of the compound combined tray, consists of four flat surfaces forming deepening between a long surface, a short flat surface and two lateral surfaces. The conic surface leaning against an internal cylindrical surface in which concentrically located the external cylindrical surface is interfaced to flat surfaces forming a tray. Conic and cylindrical surfaces have the general vertical axis of rotation and the flat bottom. In a benthonic part of a cylindrical part of a tray the branch pipe of a supply of the untwisting water, located tangentially between an internal cylindrical surface and an external cylindrical surface is brought above, on a course of movement of an initial material. The branch pipe for concentrate dump is established vertically in the bottom and located before a branch pipe for giving untwisting waters. The branch pipe for concentrate dump has a branch

pipe of a supply of water for creation of the ascending stream, located above and on a course. The concentrate arrives through a hose into the capacity for the concentrate gathering, having a branch pipe. The amplitude and frequency of fluctuations is regulated by selection of misbalance and by number of turns of the electric motor. The drive also can be executed in a kind of the eccentric mechanism established motionlessly on the basis of a suspension bracket of a platform. The concentrate received on such way dump through a branch pipe in the bottom of a tray with the ascending stream brought to it. Concentrates from a screen vibra-sluiice and mechanical wash pan sluiice lead upon heavy concentrating equipment, in the scheme of a chain of devices by which the methods and devices for wet division of small materials on density in weighed concerning quiet environment are included [3].

The extraction of small gold and other valuable heavy metals and minerals effectively enough carried out in the developed installations, mechanical trays of the Siberian type. It became clear that the possibility of maintenance of heavy fraction in a suspension at quiet movement of a pulp, regulating amplitude and frequency of fluctuations in a horizontal plane, and also creations concerning

quiet ascending streams that promotes normal carrying out of an adjustable technological mode. The honing mechanical tray was used at processing of grey and blacksands in honing operations.

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*Materials of Conferences***THE THREE – DIMENSIONAL
TECHNOGENIC ORIGIN
NANO-STRUCTURES**

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The special attention is focused on the low – rise building and the individual construction accelerating development, through the «Affordable and Comfortable Housing for the Russian Citizens» national project implementation, on the basis of the local and the inexpensive building materials, the factory production small – sized products. So, the building materials regional framework formation is created the preconditions for the scarce natural and the anthropogenic raw materials application, the energy expenditures and the economic costs reduction for its extraction and its further processing. Gradually, the complex – compound, the activated binding agents and the building materials on the basis of their wide – spectrum applications the production share is increased: the multi – layer constructions, the façade systems, the building envelopes of the low – rise buildings, etc. The significant amount of the industrial enterprises wastes is annually collected, that can be efficiently used, as the active admixtures and the supplements, including the nano-ingredients into the binding materials in the Samara region. Thus, this direction is quite different by its perspective, as such wastes sources are sufficiently a lot of in our region, and the wastes compositions, and the wastes compositions are met the main requirements, having laid to the components for the mineral binding materials receiving [1-3].

According to Kuster's, Tammany's, Haber's, et. al. researches results, it has been determined, that the crystals appearance mechanism is laid down, under the condition of its coexistence, in the equilibrium with the mother liquid (e.g. the solution), on the basis of the precipitations formation (e.g. sludges) [4]. So, the equilibrium is resulted in the certain ratio existence between the crystallines' sizes and the solution's supersaturation degree: with the supersaturation increase its size is reduced down to the minimum level, at which the atoms' smallest number is contained, sufficient for the crystalline cell construction. So, the resulting «primitive» crystallite, depending from the mother solution concentration, can either be grown, or be dissolved [4]. So, the Kuster's views subsequent development is contained in the Haber's work, and, namely, having put by him the presentations on the solid phase formation in the highly supersaturated solutions are presented the special interest, as he considers the

amorphous and the crystalline chemical precipitations formation [4].

The precipitations (e.g. the sludges) are divided into three main groups, according to the classification of Boehm – Niklassen, which has been laid into the basis for the theory of Haben [4, 5]:

1) the compounds, having had the comparatively high propensity for the ordering. These are – the crystalline deposits, having consisted in the divalent metals hydroxides;

2) the trivalent metals compounds, for which are characterized by the initial formation of the active metastable forms, having transformed into the active forms of the crystal structure;

3) the metals hydroxides, having had the low propensity for the structure ordering. These compounds, having isolated into the precipitation, are quite X – ray amorphous, and only after the long aging, the signs are begun to be shown the further transition to the crystalline state.

So, according to this classification, the carbonate and the sulfate sludge compositions, and also, as well as, the hydroxide ones with the predominance in the divalent metals composition are consisted into the first group. The carbonate and the sulfate sludge compounds may be the active ones in the fillings variety of the building complex – compound compositions (e.g. the cements, the mixed and the binding plasters, the concretes, the mortars and so on).

The sludge aluminate, the alumino-alkaline, and the alumino-calcium compounds are included into the second group. Their application is quite advisably in the ceramic materials compositions, in the multi-component binding ones, and etc.

The hydroxide sludges from the electroplating productions, the chromium, the nickel, the copper, the zinc and etc. are consisted in the third group. They are preferably to be used in the roasting technologies.

Thus, the sludges formation is the same, like the thin chemical technologies and the nanotechnologies, which can be attributed the sludges to the nanotechnogenic and the nano-anthropogenic raw material. So, the sludges overatom structure studies by the small – angle neutrons scattering method at the «Membrane-2» diffractometer (e.g. «The Saint Petersburg Institute of the Nuclear Physics» after B.P. Konstantinov, the Gatchina town) have been shown, that the particles size is made 40–80 nm. [7]. The sludges different nature fractal dimensions is found in the range of ~ 2,2–2,7 [1, 6-9]. So, the considered sludges main properties have been presented in the Table [3].

The mineral sludges, by the basic oxides content, may be divided into the groups with the predominance of: s-cations (e.g. Ca^{+2} , Mg^{+2}), p- and

d-cations (e.g. Fe^{+3} , Cr^{+3} , Al^{+3}). The sludges may be divided into the two groups, by the basicity modulus. The sludges, which are consisted, mainly, in the finely crystalline CaCO_3 , and also the hydroxide sludge, in which the CaCO_3 and MgCO_3 amount is

prevailed over the metals hydroxides content, are included into the first group (e.g. $M_0 > 1$). Then, the alumino-calcium, the alumino-alkaline sludges and the electroplating production sludges are related to the second group (e.g. $M_0 < 1$).

Table 1

The Physico-Chemical Properties of the Mineral Sludges

The Sludges Groups, in accordance with the Mendeleev Periodic Table	The Indicators of the Surface		PH	
	The Adsorption, g./100 ml	The Surface tension, erg./ cm ²	The Initial value	After stabilization
The Carbonate sludges of the Bezymyanskaya TPP (s-elements)	4,2	61,70	10,9	11,4
The Alumino-calcium sludges after the aluminium tape processing (p- and d-elements)	5,90	58,50	10,2	11,5
The Hydroxide sludges non-ferrous metals machining (p- and d-elements)	4,50	59,88	10,8	11,4

The filtered sediment humidity is made up 40...70%, larger part of which has been presented by the adsorptionally- and the chemisorptionally bound water. According to V.I. Roldugin data, the adsorption on the solid surfaces is not only resulted in the adsorbent material deformation, as the whole substance, but it can also be changed the solid phase surface structure [10]. So, the atoms and the molecules adsorption, as the physical one, well as the chemical one, can be changed the surface stresses value, which is caused the surface layers restructuring. This reconstruction is resulted in the surface area increase of the solid particles and their activity. The high adsorption capacity of the sludges, in relation to the water, is given them the structural and the rheological properties complex. The sediment, as well as every colloid system, has the high structure – forming ability, as the water part is gone into the bound – colloidal state, and it is given the plastic – connectedly structure to it. Thus, it can be stated, that the complex and the diverse processes are undergone at the sludge formation: the chemical ones (e.g. with the new substances formation), the physico-chemical ones (e.g. the adsorption, the coagulation, the micro-aggregation), the physico-mechanical ones (e.g. the compaction, the units and the solid particles thin grinding).

Their self-organization, having influenced upon the fractal structure formation is taken its place at the stage of the sludges formation (e.g. the waste water – the sediment). The uniformity coefficient has been adopted, as the self-organization measure in the studied area, that having determined the solid particles packing quality in the cement systems at the stage of their structure formation. So, it is quite well – known, that the self-organization processes are associated with the particles motion, and they are depended on their density, size, the ability to the collision, and their interaction with the other particles. So, the light and the variable moving sludge

particles are passed through the non-equilibrium state into the quite stable one, which is determined their randomness high degree and the ability to be organized themselves at the formation stage. So, and this fact is conditioned by their homogeneity high final degree. This group filters are possessed the energy excess supply, the ability to the chemical interaction and the contact zone formation between the cement and the aggregates with the high adhesive strength. For example, having based on the M.M. Sychev, V.I. Solomatov, A.N. Bobryshev, A.N. Proshin, P.A. Rebinder and the other scientists' and the scholars' studies, it is noted in [6], that the structure-forming participation and the nano-dispersed filters modified influence is the result:

1) of the mechanism, having associated with the nano-sized particles chemical involvement possibility in the hydrated compounds phase-formation heterogeneous processes (e.g. it is determined by the chemical and mineralogical composition of the particles and by their surface specific area increased values, and by the specific surface energy). The crystallization cohesion contact strength of the solidified glue joint is the chemical interactions function in the contact zone;

2) of the mechanism, having associated with the nano-sized particles catalytic role, having acted, as the crystalline priming powders;

3) of the hardening zoning structure mechanism by the nano-sized particles. The formed crystals are epitaxially built up on the surface, and, thus, they are increased the bonded surfaces contacts area;

4) of the molecular forces action mechanism, having conditioned by the water presence and by the dissolved and the adhesive substance sizing agent oriented dipolar molecules «chain» formation;

5) of the mechanism, having provided the system packing density increasing. The applied industrial and the technogenic wastes nano-dimension is allowed them to be easily distributed in the binder

matrix, that it is provided the high fullness composition;

6) of the complex physical and the chemical processes are resulted in the formation in the crystals «cement – sludge» hardening system with higher activity, which is contributed to the contact zone hardening.

So, in the sediment, since its inception moment formation up to the dehydration process completion, simultaneously, the two processes are occurred – the stabilization (e.g. the composition averaging) and the physical and the chemical properties change of the sludge (e.g. the aging). So, the last phenomenon is most inherent in the sludges of the second and the third groups, which are the amorphous ones, and, eventually, they are grown old. This process is accelerated at the precipitations finding in the open air and under the heat action. Over some time, the amorphous compounds structure and properties are form-modified.

The material with high dispersion has the fractal structure. It has been found, that the carbonate sludges – are the water purification and the water – softening products at the thermal power plants (TPPs) – are presented themselves of the great practical interest, as the micro-dispersed fillers in the construction composite materials for the various purposes. The results of works, having carried out at the «Building Materials» Chair of the Samara State Architecture and Engineering University for many years have been shown, that, depending on the formation, the composition and the properties conditions, the sludges (such as, the carbonate, the alumino – calcium, and the alumino – alkaline ones) can be used, as the mineral glue at the structure and the properties formation, on the basis of the multi – component raw material mixtures, practically, almost in all the materials of the general building purposes (e.g. the heavy, the light, the cellular concretes, the ceramics, the masonry and the plaster solutions, etc.) [1-3, 6-9].

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*Materials of Conferences***MONOCITIES SOCIAL POLICY**

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An importance of studying the problem of monocities is defined by the fact that such cities are a special form of territorial organization of regional economic systems. Lack of diverse production mono-sectoral character of development of a town is a widespread phenomenon that is typical for different countries and causes a number of negative consequences. Among those are: dependence of population on local authorities, the holder of enterprise that forms a town; uniform professional structure of population; low social mobility of residents. Obviously, a closure of the main enterprise can lead to the collapse of the whole city. According to the data of independent scientific-educational fund «Expert institute», in Russia 332 settlements of town type and 467 towns can be referred to the number of mono-profile objects. We can conclude that here we speak of 25% of the whole urban population of the country that equals 24,5 millions of people and 49% of gross regional product of Russian Federation.

New solutions in field of social policy in terms of monocities are necessary. First of all, we speak of modernization of a mechanism of interaction between different subjects: federal center, regional authorities, local self-government, corporations, institutions of civil society. At the national level a state policy on monocities, corresponding long-term federal target programme, macro-tools, aimed for improvement in regional investment climate must be developed. Regions ought to form action plans on preserving and developing specific mono-profile cities and define a complex of regional preferences. Local authorities are obliged to realize corresponding anti-crisis programmes with all necessary attraction of enterprises that form towns, and their strategies must imply tools to minimize possible social threats.

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ANTHROPOLOGICAL PROBLEMS OF MODERN CULTURE

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One of the main peculiarities of the modern society is impetuous development of informational technology and system of communications. World-

wide informational web by becoming characteristic trait of civilization is transforming modern space, changes channels of transmission of social cultural experience and abilities of adaptation to new conditions. In such surroundings interaction and behavior of a human does not limit with search, processing and transmission of information, acquisition and translation of knowledge. In the general informational surroundings occurs whole spectrum of human activities and one of the main of them is communicative action. Changes of communicative interactions are mainly shown through their principal interactivity. It opens for humanity new perspectives of development which concise plurality of opportunities and his involvement in them.

To this point analysis of informational technological type factors is becoming high topical which rise questions of humanity and his interaction with his self-made culture. Beside vivid achievements we can notice consequences of such impetuous involvement of huge massive of technical means to human life.

If before surrounding influenced of a human's character of activity, now it becomes possible to form actively surrounding according to individual requirements. If an industrial economics and its culture oriented on 'middle consumer' of uniform material benefits and entertainment, then modern digital economics and its informative culture makes possible for consumer individually form set of business and entertainment information and to define individually what and where to listen and to watch. If earlier a person was limited in acquisition of new information, than today with the help of fast and easy access to numerous massive of information our consciousness gets wider opportunities to choose meanings, visions and sounds which he creates according to personal preferring by which he creates new psychological phenomena.

Therefore it would be difficult to find a person who has never thought about modern informational culture and those radical changes which happens with individuals and with cultures. Bit for all that one blesses this phenomena and claims that this the beginning of the new era, and the others regards to them with beware underlining that these changes makes humans' life complicated and take people to symbolic world which far from real life. The third group recognizes both opportunities and perspectives which are gained by informative technologies and dangers which are possible to forestall.

Let's consider in a nut main problems of transformation of cultural special dimension of a human under pressure of developing informative communicative culture.

At first for situation of modern informative society the key factor is contradiction between these things: knowledge and information are the main factors of development of a society but at the same

time modern informative technologies are not directed to development of individuals.

At second in spite the fact that informational technological processes made great leap in development a human still stays alone though level of his communication has been increasing.

In third in conditions of modern informational communicative reality had increases significance of subjective potential, either power; either business can not avoid conversion to it. However by being included in the system of informational technology a person loses his significance of individual qualities.

In fourth in conditions when a human constituent becomes defining in all spheres he becomes passive and aloof contemplator of occurrence.

Original refraction of listed problematic peculiarities are included in the roman of V. Pelevin «Generation «P». Let's quote some examples from his work: 'When the TV is switched off he become object number one. It's just a box with mirror wall to which we are free to watch or not. But when it's switched on from object number one it turns to object number two. It becomes absolutely another nature phenomenon. For televiewer TV vanishes as material object. TV viewer begins to feel like he is in another area. The issue is just in its presence. May we say that it is televiewer? Mat we say that a person watches TV really watches it? A person does not even have a chance to ask about his real nature...» [1, p. 103-113].

These changes and influences are so significant that people began to speak more frequently about formation of new symbolic (virtual) reality which does not exist as part of a nature or social world but which has its qualities of essence for consciousness of an individual.

Symbolic character of virtual reality is shown through its picturesqueness, and these figures usually have high level of reality. Mode of a 'virtual human' supposes transformation of processes of intercourse and communication, transfer of accent from activity to game forms of activity, realization of a person not in objective conditioned but in subjective conditioned reality.

How can happen personalization on a virtual reality and what consequences can we meet in this situation?

The first thing which give virtual reality is that self affirming person in a society can live several lives. And if a real life gives only one chance for choice of act, then a virtual life give possibilities for changes. For example, a man can live several lives in different time directions, to realize unused opportunities and chances in past, correct his past and as result to change self-appraisal and attitude to himself. It is also possible trying on of actual roles and situations, trying of yourself in new conditions form which can be resulted new self-vision. It'd be possible to see future and project own way. In a virtual life these kinds of attempts can be numer-

ous and each time a person can begin from the very beginning.

According to its specifics virtual reality creates for a person unbelievable opportunities which's realization can change seriously person's consciousness. Today there data which proves that modern virtual informative reality destabilize distribution of status and social structure in whole and partially vanishes borders between work and home, between public and personal area. A person's idea of time and his presence in time process may change and by this he as if fell out fro time stream and his behavior may be inadequate which influence on personal identity. A person by entering to a virtual reality relieves from himself necessity to subdue to definite laws and norms. All these leads to change of idea about himself and later to change of him.

Surely from one point this kind of possibility has a psychological assist for a man by helping to stimulate process of self realization. But all kinds of lies are drained as first or last it will stop to satisfy growing needs. And then it's appeared need in creation of new illusion.

One of the founders of informational computing communications E. Gornii in his work 'Ontology of virtual personality' listed several characteristic traits which are peculiar to 'virtual personality':

- immaterialness, reduction of individual to its semiotic manifestations (i.e. to texts in its widest meaning);
- anonymity, at least its possibility. However anonymity in this case should be understood not as lack of name but as free relation between 'real' and on-line' personalities;
- broadening of possibility of identification, freedom to own individual with any set of characteristics;
- plurality, opportunity to have several different virtual personalities in one time or one by one;
- automation, opportunity wholly or partially stimulate activeness of virtual personality by using computer programs [2].

Thereby it's created new type of social subject which is less conditioned with physical peculiarities of individual and his group belonging. In virtual expanse occurs limitation of social role and individual of his performer which leads to disruption of social stereotyped masks by which society provided definite performers. Web demonstrates instability of all identifications provided by society and finds out whom wants to be this or that subject in reality according to his choice. In virtual life is 'switched on' absolutely new 'level of freedom' which gives virtuality absolutely specific 'vitality'. It becomes element of free formation which totally excludes any parameters given in advance and which is directed at this time only by lows of individual fantasy.

Therefore, forming under influence of virtualization of man activity new traits of a man could not not to influence on changes of human thinking's

character at all. In another word virtual-informative reality simultaneously offers an opportunity for individual to develop his individuality and at the same time it deprives his individualism because of machinery world vision; simultaneously it opens an opportunity for extension of new ways of cognition but at the same time threatens by pernicious influence on consciousness and physics of a man.

Concluding above mentioned, 'a virtual man' experiences changes of expanses of cultural meanings and values, an ability of adequate perception of world, mixture of real and game world, which leads to social destruction and alienation. These peculiarities of changes of subjectivity of personal informational culture were already considered by E. Fromm. He described alienated man from other industrialized man as necrophiliac who is mostly attracted by mechanisms artifacts of all alive: '... passion to technical tools constitutes its real interest to life and absolves a man from all wide set of abilities and functions by which he was provided from birth» [3, p. 351].

Thereby we may say that virtual reality by being fruit of a human consciousness considerably influence on the process of his formation, newly puts accents to its parts and sometimes even goes out of control by inflicting practical attacks which leads

to deformation and modification of an individual consciousness of modern man. Appearance of a 'virtual man' which has an ability of dynamic turn from real life to virtual life and conversely indicates new opportunities and new dangers in formation of individual.

Actively entering in sub consciousness by using symbolics which has support in deep subconscious, informative culture combines conscious and subconscious influence by creating and extending social myths, this peculiar cultural form of description and explanation of reality which got new specific essence in XXIst century.

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