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### THE OPERATING REGIME INFLUENCE UPON THE AEROSPACE PURPOSE LOW-SIZED PUMP TYPE CHOICE

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The low – consumed hydraulic systems (LCHS) with the working substance pump feed have already been found their large – scale and the wide application in the aerospace purpose energy complexes. They usually use the liquid coolants, having circulated in the LCHS pipelines in the flying vehicles with the heat – generating equipment, having situated in the untight chambers, for the heat large quantity transmission on the isolated radiant heating surface, or the heat removal (heat supply) from the high power sources. So, the following pumps types are being used in them: the scapular – centrifugal and the vortex ones, and also the friction – disk pumps. The above – indicated types are being permitted the high – circulating electric drives application by the general industrial measures, that it is being promoted the construction dimensions decrease in the radial – circular plane. Their miniaturization is being provided the calculating operating regimes concordance possibility with the system hydraulic characteristics. The  $D_2$  rotor wheels outer diameter is not exceeded  $50 \cdot 10^{-3}$  m, in the range of  $n=(3...10) 10^3$  rpm.

The centrifugal pump type has a number of its advantages inside of the low – sized pumps group. The main ones from them are the following:

- **The Work Resource.**

The “Molniya” space vehicles (SV) have been become the first generation of the Soviet communications satellites. The temperature control system (TCS) in these SV has been carried out by the pump – circulation scheme. So, the preference has been given to the rotary gear pump at the pump type choice for the “Molniya” first model TCS (e.g. at the end of the 50 – es), by that time, it has been shown itself to a good advantage in the missiles steering engines composition. Thus, the TCS work resource of the first “Molniya” SV with the rotary gear pumps has been appeared to be inadmissibly low, in the process of its operations and the maintenance. Therefore, they have begun to employ the centrifugal pumps, having permitted to be increased the work resource up to several decades thousand hours in the all subsequent “Molnilyakh”.

- **The Work Economy in the Regime Parameters Wide Range.**

The low – sized centrifugal pumps with the  $\varphi \leq 0.1$  discharge coefficient are being functioned with the efficiency acceptable level in the  $n_s=40...200$  spe-

cific speed values range. This range is considerably narrower for the low – sized pumps another types. It is made up  $n_s=10...30$  at the vortex pumps, and it is made up  $n_s=30...40$  at the disk ones. The centrifugal pumps reasonable application field has been become dominating with the following number of revolutions increase up to  $n=10,000$  rpm, for example, on the field of the temperature control (TC) LCHS needed regimes.

At the present day, the centrifugal low – sized pumps are the supercharger main type of the low – consumed hydraulic systems in the aviation and the space technology and the engineering, owing to better combination of the energy, the mass overall dimensions and the resource characteristics.

Let us consider the requirements to the centrifugal pump rotor wheel flowing form, having designed for the functioning in the temperature control LCHS with the following parameters:  $\Delta p_{hs}$  hydraulic resistance of the LCHS circulation tract is being changed in the range of  $\Delta p_{hs}=(0.03...0.2)$  Mpa, and the  $\dot{V}$  working substance consumption is not exceeded  $300 \cdot 10^{-6}$  m<sup>3</sup>/s. Thus, we shall find out the  $n_s$  specific speed, having regulated the  $D_1/D_2$  ration of the scapular pumps rotor wheel, having accepted all these indicators, as the pump’s output parameters and, moreover, having taken into consideration, that the electric drives are being employed with the  $\omega=(314...1047) \cdot c^{-1}$  angular frequency of the shaft revolution in the LCHS.

The  $n_s$  values bounds are being kept within the  $n_s=40...80$  values range, having satisfied all the really possible combinations of the working substance combustion and the LCHS circulation tract hydraulic resistance. The  $n_s \leq 80$  interval is meant, that the centrifugal pumps, having related to the low – speed class, are needed for the LCHS with the working substance active circulation.

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### INTELLECTUAL EDUCATIONAL SYSTEM IN THE PROFESSIONAL TRAINING

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The existing system of education unable to provide the necessary level of professional training of information security specialists using basis types of educational and methodological provision, in the modern information society. This fact causes the need of elaboration and using of infocommunicational educational technologies, providing the formation of high competent information security specialists, using the institutes of intellectual educational systems at the educational process.

The analysis of Russian and foreign works allows to make conclusion that intellectual educational systems (IES) as new educational technologies are able to provide the new experience of education for future information security specialists in consideration of raised requirements for their training level all over the world. The specificity of IES consist in educational process modeling using dynamically developing knowledge base and automatic selection of efficient strategy and personal individual education trajectory, automated registration and analysis of new information entering in the database. In addition, intellectual educational systems allow to resolve the local problems of self-education of students and control the level of their professional skills. These systems can manage the student's education, resolving problems that they will meet in their further professional activity and controlling unassisted student's work.

Thus, the main task of present-day professor consist in the choosing of optimal and valid organization forms of education and using such a innovation techniques and methods in the educational process, that will provide efficient mastering of professionally significant knowledge, skills, acquirements necessary for future specialist at any professional activity. Using of intellectual educational system as the methodical guide of unassisted student's training doesn't just provide efficient mastering of professionally significant knowledge, skills, acquirements necessary for future specialist at any professional activity, but transform the professor's mission into the mission of organizer of student's educational activity, possessing the efficient tool that allow to achieve nice results in education's quality.

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**APPLICATION OF COMPLEX METHODS TO SOFTWARE PRODUCT PROTECTION FOR ILLEGAL COPYING**

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The problem of illegal usage of software products cropped up in 80 of XX century simultaneously with the appearance of personal computers, due to some specific features of this type of computers. It has happened as a result of hardware standardization and mass distribution of personal computers without any software.

Software-technical method is the most efficient method used nowadays. At the stage of development a program includes a fragment of code that checks conditions of the program usage and blocks it's execution in case of inconformity to the determinate terms of agreement.

Nowadays there are several types of software-technical protection, but each of them has its own disadvantages. For example one serial number could be used on some computers.

There're sufficient reasons for using a combination of several methods to achieve the most efficient software product protection. One of the most secure combinations is consolidation of cryptographic protection of executable code and external hardware acting as electronic key and external computation module that execute necessary computations for the software. Given method doesn't run the danger of such software attacks as disassembling, debugging and analysis of the memory dumps by reason of the protection of executable code by resistant cryptographic algorithms. Electronic key fulfills just computational functions therefore interception of passing information between the computer and the electronic key won't give desirable result for an intruder.

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**MATHEMATICAL MODELING OF THE PROCESS OF WATER - SOLUBLE SALTS WITHDRAWAL FROM PIGMENT ORGANIC SUSPENSION BY DECANTATION**

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The main qualitative attribute of pigments and coloring agents is dyeing concentration that depends on many factors, the main of which is presence of water-soluble salts in the finished products paste, generating at the process of synthesis. Water-soluble additive withdrawal is one of the effective way to increase the qualitative attribute of pigment.

Among the diversity of methods of water-soluble salts withdrawal from sediment the following can be pointed out: repulping, washing by filters, decantation.

Decantation is the easy and gentle cleaning method towards the pigment crystal structure, implying the process of hard and liquid phase's separation by means of sedimentation

Aiming to define the quantity of cleaning cycles necessary for archiving the desired concentration of water-soluble salts in pigment paste the mathematical model of the process of water -soluble salts withdrawal from organic pigment suspension was developed.

When developing the mathematical model the following assumptions are taken into consideration: the mass of water-soluble salts is less than mass of water and hard particles; during the sequence period (mixing together with sedimentation) the gradient of