For a system with common reserving, with 3 undersystems working parallel the effect is much greater. In the traditional approach the reliability calculation has a 12 time reliability increase during $z = 4$ (fig. 7), and for the alternative approach (fig. 8) the reliability increases by 2.800 times, for $z = 5$ by 9.000 times.

This may stimulate the developers to overcome the earlier highlighted difficulties, which are connected with the transference of systems with a common reserving to systems with z units of individual reserving.

Let's shortly characterize these difficulties. In the hydraulic system, which consists of 2 identical undersystems, the pipe-line gap or one of the aggregate's core gaps leads to the loss of the entire hydro-liquid undersystem. The second undersystem remains intact and will provide the entire hydro-system's function execution. The changing of a systematical scheme, which would lead it to z units of individual reserving, deprives it of such protection. The undersystems are joined into one and the loss of liquid in one branch of the system's z-part will result in the loss of liquid in the whole system; this is inadmissible. Here it is possible to apply some of the blocking measures. In each branch of the z-part of the system, an expenditure measuring unit should be installed; in the beginning of a system a shutdown valve should be installed, and at the end of the system a reverse valve should be installed. During some flight time there is no liquid loss in the system. Such loss is displayed as pressure loss. The expenditure gauge sends a signal and the shutdown valve closes. The reverse valve eliminates the liquid expenditure. The shutdown valve blocks itself during the functioning of the usual consumers, which have some liquid expenditure during their functioning.

For electric systems the labor saving provisional system is much simpler. There are two kinds of malfunctions in the electric system: it is unnecessary to block the circuit in one of the z-part branches. It stops working and the entire load is transferred to a parallel branch of the z-part. In order to block the influence distribution of short-circuiting on one of the z-part branches on previous system parts, in the beginning of each z-part branch it is necessary to have a network protection device (a fuse).

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THE INFLUENCE OF CONDITIONS FOR PASSING GLONASS AND GPS SATELLITE RADIO NAVIGATION SIGNALS ON THE ERRORS OF DEFINING RELATIVE COORDINATES

The influence of the conditions for passing GLONASS and GPS satellite radio navigation signals on the errors of defining relative coordinates is overlooked.

Keywords: signal delay, multipath propagation, error, frequency, navigation spacecraft.

Preliminary analyses show that a significant source of error is the reason for differences in the conditions for the of GLONASS and GPS signals passed on to navigation spacecraft (NSC).

It results in the difference of signal delay that could lead to an additional systematic error in determining relative coordinates.

The differences in signal delays could be caused by several different reasons. The first reason is the influence of the ionosphere and the troposphere. The radio navigation equipment sometimes installed in places where a signal delay impact from the ionosphere and the troposphere can be distinguished. This difference is of random nature but if the distance between the antennas is increased, the error will also increase consequently because of the fact that the ionosphere and the troposphere properties will change. When the distance between radio navigation equipment antennas is more than 100 kilometers the difference in an atmospheric error signal transmitted from a navigation spacecraft could reach several meters.

Another significant factor of measurement error is one caused by interference in the receiving end. This signal phase measurement error is caused by interference at the receiving antenna of the main signal or signals reflected from local items. This error component is often called a multipath error. Multipath errors depend on specific radio navigation equipment operation conditions, and typically can not be predicted. In most cases, this error could be considered as a random low-frequency component.

There is a difficulty in error measurement estimation of signal parameters caused by multipath transmission because of the instability of interfering signals. The presence of objects near the antennas with a large effective reflecting surface such as metallic constructions can generally make it impossible to calculate the results with abnormally large errors of phase measurement. When measuring the distance code delay the error could comprise tens of nanoseconds under difficult conditions.

For radio navigation equipment that performs measurements in a phase of carrier frequency of navigation spacecraft signal the impact of a direct signal and reflected signal interference can be unacceptably high. This can completely destroy the phase information on the signal delay (incremental delay) and lead to the disability of phase algorithms for the determination of navigation parameters.

Thus navigation spacecraft signals could be taken with sufficient signal to noise ratio that makes solving the navigation problem difficult and a necessity to apply a weight signal processing to reduce the negative impact on interference errors. Considering this fact the phase equipment of GLONASS and GPS systems should be provided with conditions for receiving that guarantee the absence of intense return signal. It is obvious that this is a serious limitation, reducing the possible application area of phase radio navigation equipment.

The value of multipath error is affected by the form of directional diagram of radio navigation equipment antenna and the presence of side and back lobe directional diagram. It is important to control the form of the directional diagram not only in the co-polarization (right-hand circular polarization), but also on the return (left) polarization because of the fact that the reflected signals only have return polarization.

Control methods over the given error component are refusal of work with navigation space vehicle signals, having low angles of elevation (reduction of directional diagram), forming of a directional diagram with a small level of side lobes and back lobes, optimal installation of antennas on the object, minimizing the hit of reflected signals in the mouth of directional diagram antennas [1–3]. A perspectives for the given error controlling is an integration of radio navigation equipment with additional independent sources of navigating data, for example inertial sensors.

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RESEARCHES OF HYBRID TECHNOLOGY OF THE NONCONTACT ACOUSTIC CONTROL

This work is devoted to the results of experimental research concerning noncontact acoustic control of products. An advanced method of ultrasonic vibrations excitation in materials is offered. Design features of an electromagnetic acoustic converter for radiation – acoustic control are described.

Keywords: noncontact generation, cathode ray, ultrasonic vibrations, signals record.

The provision of high and stable quality of special engineering products, including aerospace equipment, is now one of the basic technological problems. Efforts of many scientific-research and design-technological organizations are put into its solution.

One of the primary factors influencing quality of products are defects of internal structure. The majority of refusals arising during tests and exploitation of products are related to manufacturing defects not found out earlier. Therefore a nondestructive test (NT) plays an important role both in the production process and in the process of technological development of products. The form of the construction, the presence of many inaccessible and out-of-the-way places for traditional devices of NT together with the requirement of maximum sensitivity and high resolution as well as special conditions of manufacturing make heavy demands on used methods and devices of NT, and often limit the application of many traditional methods of control. In this connection the creation of essentially new methods and devices of NT is extremely urgent.

One of the most widespread test method in industry is crack detection by means of acoustic waves. The necessity of acoustic contact creation in overwhelming majority of ultrasonic (US) devices makes it practically impossible to carry out NT in vacuum or controllable environment, at considerable levels of radiation and high temperatures which is typical first of all for beam technologies. All this has caused and stimulated the intensive development of researches of new noncontact methods of acoustic control based on optoacoustic and radiation-acoustic (RA) methods of ultrasonic vibrations generation in materials.

Increase of NT reliability is directly connected with the solution of the problem of acoustic contact stabilization. In its turn it has caused the development of noncontact methods of ultrasonic control. In particular, the use of vibrations of pulse compact electron accelerators for excitation of US vibrations provides the formation of short acoustic signals of nanosecond duration with sharp edges, which is extremely important for measurement accuracy increase. Besides, the radiation