

SCIENTIFICALLY-TECHNICAL SOLUTIONS THAT ARE CONNECTED WITH THE INCREASE OF SATELLITE TELECOMMUNICATIONS SIGNALS' NOISE IMMUNITY DURING SC'S SEA START

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With the purpose of noise-immune systems of satellite telecommunications creation, the analyses and investigations of plasma's environment that is formed around space craft's (SC's) corps during its orbit injection are carried out. Ionized high-temperature plasma's environment creates frequently-selective zone that disfigures and obstructs the reliable passage of radio-range electromagnetic oscillations. As a consequence, the information exchange between managing object- SC and flying management center is absent. However, for the chain of operative SC's management problems, it is necessary to provide the perpetual communication. Therefore, the provision of qualitative, reliable and perpetual communication is an urgent problem.

Carrying out the identification of SC's signals under uncontrollable receiving highway's and generators radiation, the task acquires oscillations' changing character parameters and highlight signs that are differentiate the oscillations of one generator from another.

Since mentioned radiations of heterodynes are harmonic oscillations, the amplitude, frequency and elementary phase are the parameters of mentioned signals. The most informative, with the aim of identification is the oscillations' frequency, and exactly, the character of frequency changing in the time. This changing is connected with non-stability of onboard generators' task frequency. The character of frequency changing depends on subclinical peculiarities of every onboard generator [1] that is the basic of SC's signals identification. It is necessary to mention that the process of identification can conditionally be divided into two stages: the first stage is connected with solving the problem of models and evaluation algorithms substantiation, and the second stage provides the classification of processing (evaluation) results.

Using with the purpose of signals' amplitude and initial phase identification cannot be possible due to the fact that transionospheric environment of radio waves spreading is essentially influences on mentioned parameters.

Communication signals' noise immunity with SC can be improved with organizing, energy and signal methods [1]. For instance, antennas with thermal protection with reduced sensitivity to the interaction with plasma of aerodynamic heating and also radio signals' strengthening, electromagnetic oscillations creation between plasma's membrane and artificially created agreed layer.

However, mentioned methods have certain drawbacks that are connected either with increased mass-clearances or with considerable energy consumptions or with worsened aerodynamic. It is necessary to separate the problem that is connected with the fact that ionospheric dispersals are able to cause the fading not only of general type, but also frequently-selective fading when the condition is executed.

$$\Delta f_0 \geq \Delta f_k, \quad (1)$$

where Δf_0 – is carrier frequency of the radio signal; Δf_k – is a strip of ionospheric communication channels ownership.

The implementation if mentioned condition of frequently-selective fading occurring can lead to the accidental fluctuations, to which not only amplitudes and phases of accepted with antennas signals will be inclined, but also its ferocious.

Mentioned fact causes the appearance of energetic losses during the radio signals processing that is connected with forms of transmitted signal with receiver reference signal inconsistency. As a consequence, the additional reduction of satellite telecommunications' noise immunity has occurred.

Perturbation of ionosphere causes narrowing of Δf_k , so, according to (1), ionospheric communication channels that are utilizing the signals with expanded spectrum are inclined to the most dangerous occurring of frequently-selective fading.

During last periods of time, noticeable progress has been reached in plasma's environment unbalanced mills that surrounds SC learning [2]. Innovated method of satellite telecommunications noise-immunity provisions is based on immediate influence on plasma's radio impenetrable membrane with the purpose of its density local reduction.

The disposition of quasi-neutral artificial plasma source near the SC's plasma membrane is accompanied with excited oscillations of compactness charge in it. Mentioned oscillations have their own frequency. This process of interaction has undulatory character and leads to free channels emergence in plasma with reduced density. Anodic (positive) section of discharge that glows, as a rule, is used as plasma source. But plasma with positive column, together with advantages, has one substantial drawback – it is necessary to have a considerable energy contribution that is connected with powerful and significant source for its getting. Since the weight of every functional element for the SC tries to minimize, this method is unacceptable.

In spite of the fact that plasma's with negative radiation intensity in comparison to plasma with positive column is considerably higher, and energy contribution in an unit of this plasma volume, lower, practical using of this plasma is much lesser than of plasma with positive column, as a consequence of its small sizes. With the purpose of mentioned drawbacks removal and the properties of positive plasma with negative radiation using, the reasons of ambipolar diffusion utilization and conditions that ensures its homogeneity in the whole negative radiation volume were investigated [3]. For unimpeded radio signals' passage through the plasma membrane it is proposed to generate low-temperature plasma with negative radiation around the antenna compartment that locally reduces ionized outer plasma's flow density, and therefore creates noise-immune communication channel. The process is happening without any interference into the outer SC's construction; it is rather energy-saving and depends only on geometry and plasma's electrodes type, pressure and gas origin. Artificial plasma owns the properties of stationary, quasi-neutrality; and insignificant energy contribution is necessary step for its creation. A special form of such plasma does not disfigure radio signal.

Firstly, the coplanar extraordinary disposition of anodes and cathodes that creates elementary glowing discharges and amalgamates into one general flow of negative radiation are proposed. Mentioned flow of elementary particles interacts with outer plasma and therefore creates local channels in plasma's cocoon for the unimpeded radio signals passage.

However, mentioned communication channels cannot exist for a long period of time, when they are opened, since plasma's film is not permanent according to SC's surface due to the large velocities. Besides that plasma has both positive and negative ions that are attracted to the negative radiation source. But this problem was also solved. It is soundly proved that impulse artificial low-temperature plasma's expediency production – is nearly 20 milliseconds. It is enough period of time to ensure reliable transmission and receiving of all the information. Thus, deducing the interference that the utilization of local plasma «clearing» operated method of high-temperature plasma's membrane around the SC will considerably increase the satellite telecommunications signals' noise immunity.

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