

INVESTIGATION OF THE PHENOMENON OF RADIO RECEPTION BLOCKING OF UNPILOTED AERIAL VEHICLES

Blahaia O.S.

*Faculty of Air Navigation,
Electronics and Telecommunications,
National Aviation University, Ukraine
E-mail: blolexandra@gmail.com*

ДОСЛІДЖЕННЯ ЯВИЩА БЛОКУВАННЯ РАДІОПРИЙМАЛЬНОГО ПРИСТРОЮ БЕЗПІЛОТНОГО ЛІТАЛЬНОГО АПАРАТА

Проведено дослідження на тему явище блокування радіоприймального пристрою БПЛА, маючи на меті дослідити явище блокування радіоприймального пристрою БПЛА навмисною радіозавадою для позбавлення його управління. Робота присвячена явищу блокування, оскільки воно найбільш доступне і найбільш легке в прогнозуванні та в аналізі для можливого застосування.

A study has been carried out on the phenomenon of blocking the UAV radio receiver, with the aim of investigating the phenomenon of blocking the UAV radio receiver by intentional radio interference to deprive it of control. The work is devoted to the phenomenon of blocking, since it is the most accessible and the easiest to predict and analyze for possible applications.

The relevance of the work is that among the possible technical ways of damaging the quality of functioning of the equipment of unmanned aerial vehicles are very effective, but very complex and highly valuable.

Therefore, such a method is relevant today, excluding the possibility of the operation of UAV equipment, which would be quite effective, but at the same time simple to implement.

The following tasks were set and completed:

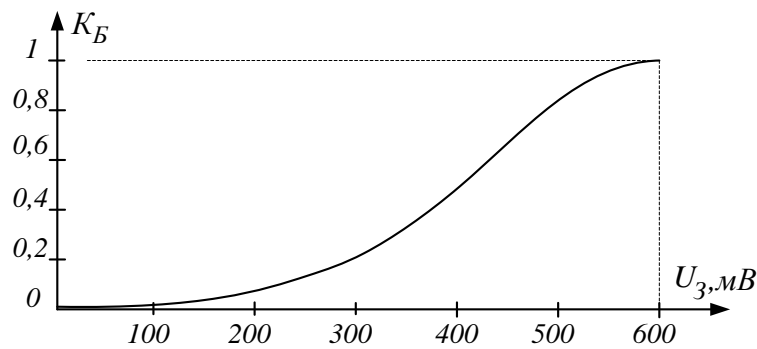
- 1) Carry out a literary review of UAVs, their equipment and a description of the phenomenon of blocking the radio receiver;
- 2) Analyze the known methods of deprivation of control and propose a method that would be effective, but not expensive;
- 3) Perform a physical simulation of the blocking phenomenon to identify its threshold.

The object of the study was the phenomenon of signal blocking in a radio receiver.

The subject of research is a method of blocking the UAV communication channel, which can be used in fleeting changes in environmental conditions.

In the course of the study, a theoretical and experimental study of the phenomenon of blocking a radio station in the meter range was carried out, which consists in reducing the gain of the input stage under the influence of interference. This is what will deprive the UAV of a control signal. Therefore, I carried out theoretical calculations and an experimental study of the dependence of the blocking coefficient on the level of interference.

The blocking of the input stage of the receiver occurs due to the movement of the operating point of the current-voltage characteristic in the direction of decreasing its steepness, as shown in the graph. After conducting research, we removed the dependence of the blocking coefficient on the level of interference. The graph is shown on the slide. Behind it, I determined that at an interference level of 600 millivolts and a useful signal of 50 microvolts, complete blocking of the receiver occurred, and at the level of 450 millivolts, the blocking factor reaches 0.7 with the maximum possible 1 according to the graph, which means it is almost impossible to process the received signal.



$$K_{\text{бл}} = \frac{U_{\text{с вих}} - U_{\Sigma \text{вих}}}{U_{\text{с вих}}}$$

Conclusion. It is proposed to use the phenomenon of blocking the radio receiver by interference as an inexpensive and fairly effective way to deprive the UAS of the ability to control. An experimental study of the phenomenon of blocking a radio receiver of the meter range of radio waves by radio interference was carried out, as a result of which acceptable values of its amplitude were obtained for the complete blocking of channels for receiving control signals of unmanned aerial systems.

References

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