ABSTRACTS

### ВОПРОСЫ РАДИОЭЛЕКТРОНИКИ

### серия

### ТЕХНИКА ТЕЛЕВИДЕНИЯ

### 2020 вып. 1

*Maltsev G. N., Korobchenko I. P.* **Analysis of conditions for detection of high-orbit space objects by ground-based optical-electronic systems. PP. 3–12.** The energy potential of ground-based optical-electronic systems in typical conditions of observation of high-orbit space objects is considered. The possibilities of detecting space objects in geostationary orbit by ground-based optical-electronic systems with optical telescopes of the medium and large class at different levels of background noise, which varies within a wide range during the day, are analyzed. **Keywords:** observation of space objects, optical-electronic system, energy potential, detection conditions

*Ronzhin A. L., Sokolov B. V., Gao V. Yu.-D., Mironova E. G., Styskin M. M.* **Application of radio frequency identification technology to build a system for controlling the turnover of on-board kitchen equipment. PP. 13–20.** The formulation and experimental solution of the synthesis problem for the control system of on-board kitchen equipment, widely used in aircraft engaged in passenger transportation, is presented. To solve this problem, it is proposed to use radio frequency identification technology. The article discusses the technical and technological limitations associated with the features of the implementation of these technologies in aircraft and airports. **Keywords:** on-board kitchen equipment turnover control systems, radio frequency identification technology, auto-lifts, information system, telecommunication equipment

*Belousov Yu. I. Pantas Ya. S.* **Characteristics of the target-background model as the basis of information processing algorithms in electro optical electronic-optical systems**. **PP. 21–39.** Examples of the use of natural experimental data in theoretical recommendations for the development of algorithms for automatic processing of optical signals from television and IR direction finding channels obtained by the authors are considered. For detecting and tracking small targets near the sea horizon, quantitative estimates of the loss in the efficiency of the optoelectronic system are obtained if the signal processing algorithms used in it are not adapted to real scenes. It is shown that the form of the probability density function of the brightness of the background can be close to Gaussian, or significantly differ from it depending on the position of the line of sight relative to the horizon and on the angular dimensions of the field of view of the channel. **Keyword**: television channel, heat direction finder, probability of background brightness, horizontal background, threshold sensitivity

*Popov V.V., Tsytsulin A. K., Chernogubov A. V.* **Opportunities of stereo systems for detection and classification of objects. PP. 40–48.** The main characteristics of stereo systems that affect their applicability in the problems of detecting and classifying objects, the resolution of the range of observed objects, the main dependencies are given, taking into account which will ensure the correct presentation of requirements for stereo systems in the formation of their technical appearance. **Keywords**: stereo surveillance range, range resolution

*Ivanov S. A.; Starodubtsev P. Yu., Akishin A. V.* **Detection of unmanned aircraft on complex background. PP. 49–56.** The problem of detecting unmanned aerial vehicles over a protected object against a complex background is considered, by phased filtering of all detected moving objects by signs of attitude and living organisms (birds) and passive objects carried by air currents (leafing, paper, packages, etc.) A combination is used classical methods for detecting moving objects in the background, methods of analysis and meteorological conditions of the object, and studies of ultrasonic effects on living organisms. **Key words:** unmanned aerial vehicles, ultrasonic impact, meteorological conditions, moving objects

*Starodubtsev Yu. I., Zakalkin P. V., Martynyk I. A.* **Method of covert information exchange and evaluation of its effectiveness. PP. 57–63.** An innovative patented method of hidden information exchange is proposed, which allows to significantly increase the secrecy of information exchange without converting the original digital container file. An assessment of the effectiveness of the proposed method is presented. **Keywords:** stealth, bandwidth, noise immunity, method of covert information exchange, hidden communication channel, video information, digital file container

*Bobrovskiy A. I., Morozov A. V., Chepelev A. G., Pavlov V. A., Galanov V. V.* **Selection of architecture of neural network for space objects images' detection and classification. PP. 64–73.** An analytical review of existing neural network architectures for the tasks of detecting and classifying objects in a video stream is given; Based on the data obtained, a choice of the preferred architecture for use in space television systems has been made. **Keywords:** detection, classification, spacecraft, neural network, television system

*Burkov A.A., Turlikov A.M.* **An upper estimate of the spectral efficiency for systems with hybrid automatic repeat request with a restriction on the type of modulation. PP. 74–83.** A transmission system with a hybrid automatic repeat request is considered in the presence of slow Rayleigh fading. A technique is described for finding an upper estimation of the spectral efficiency for such a system with a restriction on the type of modulation. Estimation can be used in the analysis of developed and existing feedback transmission systems. **Keywords:** hybrid automatic repeat request, slow Rayleigh fading, spectral efficiency, upper assessment, error correcting coding rate

*Dvornikov S. V., Dvornikov S. S., Morozov E. V.* **Model of radiotechnical systems of unmanned apparatus under conflict. PP. 84–90.** The article presents a conflict model of radio systems from the perspective of system analysis. An approach to formalizing processes characterizing the performance of their constituent elements is proposed. Analytical expressions for probabilistic calculations are obtained. The results of analytical modeling, the dependence of the required efficiency on the technical capabilities of warring systems are presented. **Keywords**: noise immunity of radio communication lines, model of conflict of radio systems, system efficiency

*Dvornikov S. V., Pogorelov A. A., Dvornikov S. S., Ivanov R. V.* **Proposals for restoring signals in control channels of unmanned aerial vehicles. PP. 91–97.** The article presents a technique for reconstructing frequency-shift keying signals in control channels. The signs characterizing the errors in the control channel are substantiated, their influence on the signal structure is shown. The analytical apparatus of the methodology implementation is presented. A functional diagram of a device for recovering frequency manipulation signals has been developed. The simulation results are described. **Keywords**: channel noise immunity, frequency manipulation, signal recovery, simulation interference

*Dvornikov S. V., Ustinov A. A., Dvornikov А. S., Aukov B. A., Morozov E. V.* **Energy availability model OFDM-channels with BPSK-signals. PP. 98–103.** The article presents a model of the energy availability of radio systems in violation of electromagnetic compatibility conditions. The account of the level of subchannel noise is proposed. The dependence of the probability of a bit error for the considered conditions is shown. Analytical expressions for calculations are obtained. **Keywords:** energy availability model, bit error probability, subchannel noise, video transmission channel

Pshenichnikov A. V., Gordeychuk A. U. **Frequency-temporary resource management of interference protected radio links from the software frequency resistance software. PP. 104–108.** The article developed theoretical approaches to the formalization of the algorithms for the functioning of radio communication systems in difficult conditions of signaling and jamming conditions with software adjustment of the operating frequency in the interests of transmitting video information. An algorithm for the adaptive use of operating frequencies is proposed, on the basis of which the performance indicators of a radio link are determined. **Keywords:** frequency hopping mode, radio communication systems, time-frequency resource control algorithm

*Ivanov V. G****,*** *Kamenev A. A., Lapovok Y. V.* **Methodic for evaluation of parameters of non-stationary thermal mode of mirror surface during inert gas blowing**. **PP. 109–114.** Apparatus background reducing for focal plane arrays space astronomy telescope that significantly increasing its penetrating capacity is achieved due to the developed simulating of non-stationary cooling of mirror surface during inert gas blowing. Influence of substrate material parameters of mirror on cryogenic temperature cooling time of its external surface is described. **Keywords**: mirror, inert gas, convective heet transfer, space object, space astronomy telescope, non-stationary cooling process

**N. N. Krasilnikov’s memory**. **PP. 115–117.**

**B. I. Leonov’s** **memory**. **PP. 118–119.**