ABSTRACTS

### ВОПРОСЫ РАДИОЭЛЕКТРОНИКИ

### серия

### ТЕХНИКА ТЕЛЕВИДЕНИЯ

### 2020 вып. 2

*Makarov S. B., Bobrovskiy A. I., Pavlov V. A., Bezborodov A. K.* **Application of convolutional neural networks for tracking objects during observations from aircraft. PP. 3-18.** The application of the neural network algorithms for detecting and tracking a group of moving objects of complex shape on a sequence of aerial photographs is considered. It is shown that, to establish a one-to-one correspondence between moving objects from frame to frame, the Kuhn–Munkres algorithm should be used. To handle situations with the disappearance and appearance of objects in the field of view of the camera, it is proposed to use a comparison of color histograms of images of objects. The proposed approach showed high results compared to the TLD and IOU Tracker algorithms. **Keywords**: detection, identification, tracking, convolutional neural network, aerial photography

*Tsytsulin A. K., Bobrovskiy A. I., Morozov A. V.* **Synthesis of a space videoinformation system with a wide range of changes in the distance to the object. PP. 19-37.** The method of synthesis of a space videoinformation system based on limited a priori information, the core of which is the dependence of illumination and dynamic characteristics of space objects image in the lens focal plane when observed over a wide range of distances, is considered. The well-known formulas for the dependence of illumination on the distance, powered by two, and the relative aperture of the lens are generalized, a formalization of the dynamic characteristics of the image is proposed. The possibility of extending the range of distances at long and short distances by frame frequency adaptation is shown. **Keywords:** space videoinformation system, distance, large detail, horizon of a large detail, point object, illumination, speed of approach, adaptation

Ivanov V.G., Kamenev A.A. **Estimation of achievable contrast sensitivity of surveillance optical-electronic equipment when allocating dominant information on scene images. PP. 38-46.** The relationship of the concepts of the optical contrast of the object in the image of the scene and the «electronic» contrast, obtained using OEE (optical-electronic equipment) is considered. Formulas are obtained for calculating threshold values of the «electronic» contrast of an object, detected by a surveillance OEE with a matrix photodetector on a spatially inhomogeneous background. It is shown that threshold contrasts can be achieved in modern thermal imaging cameras, which are approximately two orders of magnitude lower than for a human visual analyzer. The factors affecting the achievement of maximum contrast sensitivity in vision systems are determined. **Keywords**: scene image, contrast, detection, object, radiation temperature, technical vision system

*Ivanov V. G****,*** *Kamenev A. A., Romanov V. A.* **Capability of electro-optical complexes of Space Surveillance System AMOS for measurement of space object infrared signature**. **PP. 47–54.**  Estimations on the basis of performed elaboration of AMOS modern technical characteristics are made of temperature and intensity of space object radiation when the IR detection and the IR signature measurement of space objects are possible. **Keywords:** space object, infrared range, focal plane arrays, electro-optical complex, signature.

*Krupsky K. A., Kudinov M. G.,* *Shavin A. S., Isupov A. A.* **Methodical approach to the solution of the problem of classification of the condition of space objects according to supervision by land measuring tools.** **PP. 55–62**. In this article is presented the methodical approach to the solution of a problem of classification of a condition of space object according to supervision by optical-electronic tools based on probabilistic and statistical methods. **Keywords**: states classification, space object, near-earth space, optical-electronic tool

*Stepovoy А. V., Capcov A. V., Gudaev R. A., Smirnov M. S.* **Functioning model of a dual-band radar system that classifies targets under the influence of interference and noise. PP. 63–73.** A functioning model of a dual-band radar system is proposed, in which the task of classifying rapidly fluctuating point reflectors as a complex target under the influence of narrowband-wideband active noise interference and white Gaussian noise is solved. The question of assessing the quality of work of this model, as well as fulfilling the requirements to ensure a given value of the probability of a correct classification of target is considered. **Keywords:** search, detection, measurement, tracking, object recognition

*Sagdullaev T. Yu., Sagdullaev Yu. S.* **Informational properties of black-and-white and color images. PP. 74–81.** The informational properties of black and white are considered. and color images generated by spectrozonal television systems to solve the problems of spectral selection and object recognition. **Keywords:**spectrozonal television, radiant flux registration, informational properties, black-and-white and color images

*Rasumov A. V., Onufrey A. U., Kurapin V. G., Orlov A. A.* **Model of information exchange of radio electronic and computing devices of the radioelectronic complex under the conditions of exposure to powerful electromagnetic radiations. PP. 82–89.** The article presents a simulation model of information exchange between devices of the electronic system when servicing the input information flow under the influence of powerful electromagnetic radiation. **Keywords:** powerful electromagnetic radiation, resistance, electronic complex, simulation model, throughput

*Dvornikov S. V., Michurin S. V., Dvornikov S S., Averyanov A. V., Fedosov A. Y.* **Suggestions for the formation of signals of square manipulation with increased properties of interference stability.****PP. 90–98***.* The article presents a method for generating a quadrature manipulation signal with an improved peak factor value. The main stages of its implementation are described. The calculations confirming the winnings are given. Recommendations on practical implementation in radio engineering systems are given. **Keywords**: quadrature signal synthesis, peak factor, channel noise immunity, quadrature amplitude manipulation

*Balykov A. A.* **Algorithm for adaptive control of parameters of permutation frequency modulation signals. PP. 99–106.** The issue of transmitting digital information over a channel with variable parameters using permutation frequency modulation is considered. An algorithm for controlling the parameters of this transmission method depending on the interference situation in the channel and the presence of fading is proposed. The results of evaluating the noise immunity of permutation modulation signals are presented. Recommendations are given on the use of the proposed method of transmitting signals of digital television formats. **Keywords:** permutation modulation, an algorithm for controlling the transmission rate, the probability of error of signals with permutation modulation.

*Dvornikov S. V., Pshenichnikov A. V., Dvornikov S. S., Averyanov A. V., Borisov V. V.* **Analytical model of cognitive demodulation threshold management for randomized flows. PP. 107–113**. The article presents a demodulator threshold control model is presented depending on the imbalance in the manifestation of characters. The transition to posterior probabilities for randomized streams is justified. Analytical expressions and graphs are obtained for the Gaussian channel. **Keywords:** signal demodulation, error probability, Gaussian channel

*Pshenichnikov A. V., Glukhikh I. N*. **Generalized model structural hidden signal structures. PP. 114–120.** The paper presents an approach to solving the problem of formalizing models of structurally-hidden signals. A geometric representation of structurally-secretive signal structures is developed, the main modulation parameters are highlighted. The regularities of the formation of signals with enhanced properties of structural secrecy are generalized, methods for their formation are formulated, a generalized assessment of the properties of structural secrecy is carried out. **Keywords:** structural secrecy, geometric representation, binary measurements.

*Dvornikov S. V., Michurin S. V., Dvornikov S. S., Averyanov A. V.* **Adaptive management threshold for decision-making demodulator results. PP. 121-126.** A method for controlling the decision threshold for signal demodulation with relative phase manipulation is presented. An analytical apparatus is proposed that allows, based on the results of demodulation errors, to calculate the level of corrective action for its adaptation. **Keywords:** signal demodulation, error probability, decision threshold control, structural interference

**V. P. Dvorkovich’s** **memory**. **PP. 127–128.**