ABSTRACTS

**ВОПРОСЫ РАДИОЭЛЕКТРОНИКИ**

### серия

**ТЕХНИКА ТЕЛЕВИДЕНИЯ**

**2019 вып. 4**

**To the 60th anniversary of the journal basis***.* **Рр. 3–8.**

*Ivanov V. G., Kamenev A. A.* **Estmating of possibilities for Far- infrared range detecting of space objects using BIB structure Focal Plane Arrays electro-optical systems. Рр. 9–18.** Physics principles of works of broadband highly sensitive infrared Focal Plane Arrays (FPA’s) on the basis of BIB structures photosensitive elements working in impurity photoconductivity mode with blocked conductivity in the impurity-band are considered. Such FPA’s are used by foreign multispectral electro-optical systems for space objects surveillance. Possibility of on-board electro-optical system using this FPA’s for Far- infrared range detecting of low-temperature geosynchronous space objet are estimated. **Keywords:**   
an infra-red range, focal plane arrays, BIB structure.

*Logunov S. V., Denisov A. I., Fedorenko D. S., Vyaznikov P. V.* **Possibility of observation of high-orbit satellites by ground-based optical means. Рр. 19–23.** The features of the observation of artificial satellites of the Earth using ground-based optical devices that have different limitations and require the fulfillment of the optical visibility conditions of the monitored satellites are considered. The criterion of the possibility of optical observation of satellites in high circular or highly elliptical orbits, when their surface is illuminated by a stream of solar radiation, ensures maximum efficiency of planning sessions for ground-based optical aids. **Keywords:** artificial satellite of the Earth, shadow of the Earth, ground-based

*Logunov S.V., Chernogubov A. V., Fedorenko D.S., Totrov O.S.* **Influence of space factors on the reflection spectra of external surfaces of high-orbit objects in the visible range. Рр. 24–33.** The influence of space factors on the change of solar radiation reflection spectra of materials of the outer surface of high-orbit objects in the visible range is investigated. The revealed features should be taken into account in the process of identification of artificial earth satellites by spectrophotometric methods, in particular, in the formation of a database of laboratory spectra of reflection of materials and coatings used as standards for comparison. **Keywords**: space factors, spectrum, spectrophotometry, artificial earth satellite, gas emission, ionizing radiation

*Sagdullaev V. Yu.,. Sagdullaev Yu. S.* **On the spectral selection of objects with a minimum number of registration zones. Pp. 34–41.** The problems of the formation of signals of different spectral images in the information-measuring systems of spectrozonal television using the minimum number of spectral sections (zones) of registration of the radiant (light) flux are considered. **Keywords:** spectrozonal television, two-channel systems, zones of registration of the radiant flux, spectral selection of objects

*Bobrovskiy A. I.* **Theoretical bases of synthesis of space adaptive video information systems**. **Рр. 42–46.** Theoretical bases of synthesis of onboard adaptive video information systems are systematized, which include principles and methods of adaptation implemented in algorithms of joint processing of video information in photodetector matrices and in digital processors. **Keywords:** adaptation, space video information systems, synthesis, principles, methods

*Chernogubov A. V., Denisov A. V.*  **Staping images by the method of connecting dots. Рр. 47–52.** A method has been developed for stitching images of the underlying surface of the Earth by scanner imaging from space. The technology of automatic determination of tie points by the polynomial method for obtaining a single image is implemented. **Keywords**: optical-electronic complex, tie points method, Earth remote sensing

*Dvornikov S. V., Yakushenko S. A., Zabelo A. N.,**Nguyen X. B.* **Assessment of the stability of a multichannel radiocommunication network under conditions of exposure to destructive factors. Pp. 53–58.** The paper shows the complexity of the network structure of multi-channel radio communications, the heterogeneity of its elements and their vulnerability to the effects of destructive internal and external factors. The mathematical model and the results of the network stability calculation are given, taking into account the morphological parameters and destructive effects. **Keywords:** multi-channel radio network, network stability, network structure, destructive factors optical means, phase angle, conditions of optical visibility of the satellite

*Pshenichnikov A. V. Gordeychuk A. U.* **Estimation of efficiency of functioning of interference-resistant links of radio communication with management of frequency-temporary resourcesPp. 59–66.**Theoretical approaches to evaluating the performance indicators of noise-resistant radio communication lines in the interests of transmitting video information have been developed. A generalized functional model of radio links based on time-frequency matrices is developed. An algorithm for the adaptive use of operating frequencies is proposed, on the basis of which the performance indicators of radio links are determined. The obtained results summarize the previously conducted studies in the field of building noise-immune radio systems. **Keywords**: radio link, time-frequency matrix, frequency utilization factor,performance efficiency

*Kuznetsov S. S.* **The model of the radio line channel «flight-lifting facility – ground point». Pp. 67–71.** The paper shows the complexity of the network structure of multi-channel radio communications, the heterogeneity of its elements and their vulnerability to the effects of destructive internal and external factors. The mathematical model and the results of the network stability calculation are given, taking into account the morphological parameters and destructive effects. **Keywords:** multi-channel radio communication, model of the channel; flight-lifting facility, interference, fading.

Dvornikov S. V., Pshenichnikov A. V., Glukhikh I. N., Fedosov A. Y. **Formation and evaluation of structural-hidden signal structures. PP. 72–77**. The article provides an overview of existing methods for assessing the structural secrecy of signals used to transmit video information. An indicator of a generalized assessment of the structural secrecy of signal structures is introduced, a criterion for the formation of structurally-secretive signals is developed. **Keywords**: radio communication line, time-frequency matrix, frequency utilization factor, radio-technical systems functioning efficiency.

*Gritskevich I. Y., Yerganzjiev N. A., Grigor’ev D. S.* **Realization local contrast equalization algorithm in FPGA. Pp. 78–83.** The paper proposes procedures for video images, the combined use hardware and software on the basis of FPGAs. **Keywords:** histogram equalization, image enhancement, video stream, FPGA

*Poljakov V.V., E.R. Dashkin V.V.***Studying the impact of digital filter parameters on the image processing quality. Рр. 84–90.** The dependences of the number of quantization digits of the weighting coefficients of digital adaptive filters on the parameters of the location situation and the requirements for the accuracy characteristics of the processing system are obtained. **Keywords:** digital filter, image processing, quantization level, space observations, object detection.

*Vydrevich M. G., Chetvergov M. V., Artemyev A. A., Popov A. G., Kirilenko O. I.* **Development of prospective of space-based CIS. Рр. 91–96.** The article presents the development of promising CIS and systems based on them. **Keywords**: CIS, CMOS image sensors, CDD sensors, remote sensing, astro-orientation

*Vydrevich M.G., Popov A.G., Artemyev A.A., Kirilenko O.I., Salash M. A.* **CMOS image sensor with pixel size 6.5×6.5 µm designed by «NPP ″ELAR″» and «NPP ″SILAR″». Рр. 97–102.** The group of companies has developed a new image sensor based on CMOS 0.18 µm process technology with a 6.5×6.5 µm pixel size. The characteristics of the test device are given, also the results of the development of previous years are shown. **Keywords**: CMOS image sensor, SMOS photodetector, design of CMOS image sensors, pinned photodiode, SD-ADC.

*Bakhshiev A. V., Popov A. V., Vlasenko V. M., Smirnova E. Y.* **Neural network algorithms for artificial underwater objects detection on television images. Рр. 103–110.** This paper discusses modern approaches to solving the problem of detecting underwater objects. The results of training neural networks trained to isolate pipes on the seabed are also presented. Identified and given examples of problem areas for the task of detecting underwater objects in neural network algorithms. **Keywords:** object detection, underwater objects, neural networks

*Andreev D. S.* **Segmentation of moving objects on the runway with background subtraction method**. **Рр. 111–117.** The paper covers the obstacles segmentation method for the runway. Simulation was performed on an full-flight simulator during landing approaches at various airports and under various conditions with the aim of generating test images and video sequences of landing of the runway in low visibility conditions. The estimation of methods of object segmentation is performed. **Keywords:** enhanced vision system, objects segmentation, background subtraction, runway

*Vaniev A. A., Kalitov M. A.* **Improvement of visual quality of differential spectrosonal images. Рр. 118–123.** The article discusses the differential spectral visualization method and its application in the restoration of artifacts. The methods of correction of the obtained images are analyzed in order to increase the convenience of visual perception. The results of processing differential images by contrast enhancement algorithms are presented. **Keywords**: spectral imaging, spectral visualization, contrast enhancement, CLAHE, image improvement

*Baranov P. S., Siryy R. S.* **Multi-aperture multispectral system for space survey PP. 124–131.** The importance of monitoring objects of artificial origin both from the Earth’s surface and from the spacecraft will increase every year. Due to the peculiarities of space monitoring, the observed objects can have an angular resolution comparable to or significantly lower than the angular resolution of a television camera (point objects). The application of widely known classification and identification methods to such objects is impossible. Therefore, it is necessary to develop new methods for the selection and classification of point objects in outer space. **Keywords**: multispectral images, FP array, space vision system, classification of point space objects

*Bystrov S. V., Boykov V. I., Denisov A. V., Karev P. V., Gafurov N. R., Kulgin S. P.* **Piezozators for compensation of inhomogeneity of matrix converters of the image. PP. 132–135.**The causes of noise in photodetectors based on matrix image converters during registration of static and dynamic scenes are considered and methods for their suppression are determined. Methods of compensating geometric heterogeneity of matrix transducers by dimming them with a piezoelectric gate are studied. **Keywords**: geometric noise, image sensor, piezoelectric shutter

*Ermolaev R.S*. **Video information system with feedback**. **PP. 136-138.** The work considers the principles of construction of video information systems with feedback, as well as the requirements for them. **Keywords:** video information system, feedback

**Memory V. P. Yakovlev** **PP. 139.**