ABSTRACTS

**ВОПРОСЫ РАДИОЭЛЕКТРОНИКИ**

### серия

**ТЕХНИКА ТЕЛЕВИДЕНИЯ**

**2018 вып. 3**

*Vishnevskij G. I., Chetvregov M. V., Vydrevich M. G., Popov A. G.* **Develop­ment and testing CMOS image sensors by AO «NPP «ELAR» and AO «NPP «SILAR»**. **PP. 3–9.** The group of the companies has developed, manufactured and tested CMOS image sensors. In this work the results of the testing have been presented and summarized results of work have been performed. **Keywords:** solid-state imager, CMOS, CMOS image sensors, foto-sensitive chip, manufacturing of the CMOS image sensors, development of the CMOS image sensors

*Devyatkin A. V., Tsytsulin**A. K., Gorshanov D. L., ChernogubovF. V.* **Polarimetric observations of geostationary satellites with MTM-500M telescope.** **PP. 10–18.** Trial polarimetric observations of geostationary satellites were made with MTM-500M telescope of Pulkovo observatory to investigate a possibility of detection of artificial satellites on star background. **Keywords:** Earth artificial satellites, geostationary satellites, observations, polarimetry

*Kamenev A. A., Zakutaev A. A., Beliavsky S. A.* **Model of channels of formation of realistic images of space objects by multispectral optical-electronic system of the small low-orbit satellite. PP. 19–26.** The model of channels of formation of realistic images of space objects by multispectral optical-electronic system with the modified optical scheme Korsha as a part of the small low-orbital information satellite with use of basic data on ideal brightness portraits is developed. When forming images in the channel of infrared range the noise caused by own thermal background of basic elements of optical system are in addition considered. **Keywords:** multispectral optoelectronic system, space object, picture, infrared

*Ivanov V. G., Kamenev****А. А.* Mechanisms of self and reflected radiation formation by construction materials in infrared range. PP. 27–34.** Based on consideration of the physical mechanisms of self and reflected radiation formation in solid state medium of the objects structural materials, analytical relationships have been obtained to calculate the effective emissivity of the object’s surface using in-situ measurements of the reflection coefficient in the infrared range. **Keywords:** emissivity, infrared range, reflection coefficient, solid state medium, surface temperature

*Hankov S. I., Kleymenov V. V., Dzitoev A. M., Lapovok E. V.* **Possibilities of observing from space of a small-sized high-temperature object near the Earth. PP. 35–41.** The values of the telescopes of the remote sensing of the Earth formed at the entrance pupil of the specific power fluxes from the radiation of small-sized high-temperature objects and the background radiation of the Earth are studied. The possibility of detecting such objects on the shady portion of the Earth in the short-wave radiation range is shown. **Keywords:** remote sensing telescopes, object detection from space, background radiation of the Earth, entrance pupil, solar radiation

*Khankov S. I.,* *Dzitoev A. M., Lapovok E. V.* **Restrictions of conditions of observation behind the Earth from Lagrange's point of L1, imposed by background radiation of the Moon. PP. 42–46.** The technique of determination of necessary length of the screen protecting an entrance pupil of the telescope observing Earth from Lagrange's point of L1 from a background flare of the Moon at her movement around Earth is offered. The restrictions for time of sounding of Earth from Lagrange's point of L1 determined by the admissible length of the screen are defined. It is shown that with a diameter of entrance pupil of 0,2 m and with a length of screen of 1,5 m only during two thirds of a cycle time of the Moon around Earth implementation of monitoring of streams of radiation of Earth is possible. **Keywords**: the space telescope, remote sensing of Earth, background radiation of the Moon, Lagrange's point of L1 of system the Sun – Earth, cyclograms of remote sensing of Earth

*Vargin P. S.* **Test image - Fresnel rings. PP. 47–59.** Mathematical models of discretization of test images in the form of Fresnel rings are obtained. Test images with sinusoidal and binary radial profiles are considered. Examples of synthesized digital images with various extraneous patterns (moiré), which are the result of discretization of images of Fresnel rings, are given. **Key words:** Fresnel rings, test pattern, sample discretization, mathematical model

*Perezyabov O. A.* **Evaluation of systematic error of measuring the machine vision system modulation transfer function by the** **multisinusoidal test pattern.** **PP. 60–65.** A theoretical model of a multisinusoidal test-pattern, which allows to measure directly the MTF of machine vision systems throughout the frame field is given. This model makes it possible to calculate the influence magnitude of several factors on the coordinates of the Fourier image maxima of the test object, evaluating thus the measurement error and use the values obtained to improve the accuracy of the measurements. **Keywords:** Resolution, Modulation transfer function, machine vision systems, multisinusoidal test pattern

*Tsytsulin А. K., Fahmi Sh. S., Zubakin I. А., Bobrovsky A. I., Cherno­gubov A. V.* **Trans­ferred videoinformation quality improvement. PP. 66–71.** Methods of improvement of quality of the transferred information is considered. Various ways of assessment of background information are given. **Keywords:** quality of information, dominant information, background information, noise information

*Tsytsulin A. K., Morozov A.V., Bobrovsky A.I., Baskova U. V., Pavlov V. A.* **PP. 72–80. A classification of space objects small-dimensional images by motion signs using a training algorithm.** A detection and classification algorithm of small-dimensional images of space objects by motion signs is considered, which uses a trained algorithm of Viola-Jones for primary detection of objects in the image. It is shown that the probability of correct detection is significantly enlarged in comparison with past realization, in which input image binarization with adaptive threshold is used. **Keywords**: objects detection and classification, tracks, training algorithm, star sky

*Berezin V. V., Fahmi Sh. S., Bobrovsky A.I., Chernogorov V. S.* **Performance of multicore systems on Intel-FPGA chip for videoinformation processing. PP. 81–88.** The characteristics of the performance of multicore computing systems for processing video information are considered. The results of experimental studies of processing speed are presented on the example of INTEL-FPGA system on chip. The boundary conditions for the expediency of increasing the number of nuclei are determined. For multicore systems for the element base INTEL-FPGA, a cluster organization of calculations is proposed. **Keywords:** multi-core computing, FPGA, memory arbitration, networks on the chip, reconfigurable systems on chip

*Fahmi Sh. S., Eid M. M., Kostikova E. V., Mucalo Yu. I., Kryukova M. S., Zaidullin S. M.* **The classification of vehicles in real time**. **PP. 89–94.** The article discussed the problem of vehicle detection and its subsequent classification into three classes is considered: passenger, semi-cargo and cargo. A new method based on a combination of viola-Jones detection algorithms, Eigenface and Fisherface recognition and classification methods is considered. The features of formation of the base for training of both classifiers are described and the results of testing of the proposed method for the detection and classification of vehicles are obtained. **Keywords:** detection, classification, vehicles, Eigenface, Fisherface

*Fahmi Sh. S., Eid M. M., Kostikova E. V., Gavrilov I. A., Kryukova M. S., Zaidullin S. M*. **The method and algorithms to detect road signs.** PP. 95–100. The method and algorithms for automated detection and recognition of road signs in the video stream, using the method of polygonal-recursive method of structuring and representation of road signs. A comparison of different approaches to create a training base, their advantages and disadvantages. The results of modeling in the processing of images of different formats. **Keywords:** detection, recognition, road signs, feature vector, classification

*Sagdullaev Yu. S., Smirnov A. I.* **Display and fixing of the selected telemetry information in television images of spacecraft**. **PP. 101–107.** Features of mapping and archiving of the extracted symbolic telemetric information in television images of space vehicles for monitoring dynamic processes are considered. **Keywords:** spacecraft, television images, telemetric information, signal processing, data mapping and archiving

*Gomtsyan S. G., Badalyan B. F., Gomtsyan H. A.* **Analysis and compression of signals using wavelet functions.** **PP. 108–115.** Fundamentals of Fourier and wavelet analysis, their main advantages and disadvantages are considered. In the MATLAB command mode the corresponding programs were compiled that determine the efficiency of Fourier and wavelet transformations when signals are restored and their local features are detected. Optimal methods for compressing two-dimensional signals in the graphical environment of the Wavelet Toolbox V4.11 package are proposed. Keywords: basic function, fast transform, local features, decomposition and reconstruction, threshold processing, spectrogram

*Dvornikov S. V., Simonov A. N.* **Polarization deployment of interfering radio emissions of sources of mobile television. PP. 116–122.** The article presents the results of a study on the possibility of polarization direction finding of radio emissions of mobile TV sources under interference conditions. The fundamentals of the use of polarization as a coordinate-informative parameter are described. The prerequisites for discovering the property of the visual selectivity of polarization direction finding are shown. The graphic features of the interference pattern are illustrated. Proposals on the prospects of using the interference stability property for the realization of polarization direction finding are formulated. **Keywords:** polarization direction finding, radio emission, interference

*Bestugin A. R., Dvornikov S.V., Kryachko A. F., Okov I. N.; Kochetkov A. O., Rusin A. A.* **Investigation of subchannel noises of signals formed by technology of orthogonal frequency multiplexing. PP. 123–129.** The results of the study of subchannel noises OFDM signals are presented. The threshold value of subchannel noises due to the mutual influence of their «lobes» of the spectrum on each other is justified. The value of the noise background introduced by phase-shifted oscillations is calculated for modulation of subcarriers. Proposals to reduce noise components are formulated. **Keywords:** subchannel noises, OFDM technologies, orthogonal channel multiplexing

*Bystrov S. V., Boikov V. I., Karev P. V.* **Piezomotors application for low-orbital systems. PP. 130–136.** Considered the usage of ultrasonic piezo motors in micro-scanning systems for low-orbit systems. It is shown that microscanning technologies are successfully implemented in space technology. **Keywords:** piezoelectric motor, ultrasonic piezo-motor, piezomotor for space, piezomotor for vacuum operation, LEO systems

*Korolev V. O., Logunov S. V., Kolesnik D. Yu., Gel V. E.* **Method of analysis of electromagnetic compatibility of radio engineering complexes during reconnaissance work. PP. 137–144.** The approach to definition of electromagnetic compatibility of radio electronic facilities and radio engineering complexes at a choice of a place of dislocation. **Keywords:** radio engineering complexes, radio electronic facilities, electromagnetic compatibility

*Ivanov V. G.* **Review of the book V. P. Ponomarenko** **Quantum photosensory. PP. 145–147.**

**Memory L. I. Hromov**. **PP. 148–151.**