

ABSTRACTS

Galenitsky A. V., Samorodov A. A. **The surface ships recognition by radar images with Fisher's linear discriminator in identification mode. PP. 3–10.** The technique of surface ships identification by radar images is proposed. The feature of technique is application Fisher's quasi-optimal linear discriminator, generalized to an arbitrary number of classes and using the invariant to shift and turn transformations informative features. The developed technique allows to carry out the naval target recognition in automatic mode and can be implemented for creation of onboard radar information analysing complexes. **Keywords:** ship radar image, informative features, Fisher's linear discriminant, recognition probability.

Sergeyev V. V., Pribylov Y. S., Sokolov V. A. **Evaluation of technical characteristics of the active underwater vision system under laboratory conditions. PP. 11-18.** A method is proposed for testing the active underwater vision system of autonomous uninhabited underwater vehicles in laboratory conditions without the use of an aquatic environment to verify the main technical characteristics of the system. Calculations of the attenuation of the light flux by the water medium depending on the observation distance and the relative transparency of the water are given. The method of obtaining the required illumination of the objects of observation during laboratory tests of the equipment without the use of an aqueous medium is described. A universal rotating round target for simulating the movements of observation objects is proposed. The results of laboratory tests of a sample of an active underwater vision system are presented. It is shown that the proposed test method allows you to check the main technical solutions, simulate and debug digital processing algorithms in conditions close to full-scale, and reduces the duration of testing systems in an aqueous environment. **Keywords:** autonomous and remotely controlled unmanned underwater vehicles, underwater television, underwater visibility, LED illumination systems, digital image processing.

Sagdullaev T. Yu., Sagdullaev Yu. S. **Varieties of technical vision in robotics and their information content. PP. 19-27.** Considered the principles and structure of building systems multi-spectral «vision» and their informativeness for distinguishing objects in tasks of visual and automatic image analysis. **Keywords:** formation of signals of multi-spectral images, distinctive information about objects, multi-spectral vision, information content of images

Tolstukha Y. E., Pogorelov A. A., Ayukov B. A., Golik A. M., Dvornikov S. V., Ustinov A. A., Ivanov R. V., Targaev O. A. **Compensation of structural**
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interference in the control channels of robotic systems. PP. 28-39. The stages of a technical solution to compensate for structural interference in control channels of robotic systems when working with signals with frequency shift keying are substantiated. The block diagram of the device is given, which allows to automatically detect and correct errors caused by structural interference. An analytical apparatus for evaluating the effectiveness of the developed approach is presented. Simulation results are shown. **Keywords:** channel noise immunity, frequency shift keying, signal recovery, structural interference

Ivanov V. G., Kamenev A. A. **Assessing the feasibility of using near-infrared quantum matrix photo receivers to observe space objects. PP. 40-47.** The capabilities of optical-electronic devices (OED) with non-cooled quantum matrix photo receivers (MPRs) based on InGaAs semiconductor compounds with a sensitivity area of 0.8... 2.6 microns for the detection and control of the technical condition of small space objects (SSO) have been assessed. Equipping the small-scale space plants OED with these MPRs will ensure the detection of solar-lit SSO with an area of ~1m² at a range of up to 500 km. The achievable the IR threshold sensitivity of these MPRs (at 0.1 K) will allow to determine the temperature of the SSO at the shadow areas in the near observation zone (up to 10 km), and the small photovoltaic inertia will ensure the registration of the radiation of the correction engines. **Keywords:** near-infrared, space objects, technical condition control, matrix photo receiver, detection, optic-electronic means

Logunov S. V., Kupriyanov N. A., Chernogubov A. V., Fattakhov R. R., Vyaldin D. M. **Taking into account the influence of atmospheric air mass during spectrophotometric observations of artificial earth satellites. PP. 48-56.** The differences in the spectral reflection coefficients of materials of external structural elements of artificial earth satellites of various types and the ratios between the sizes of individual elements, which lead to a difference in the spectra of the solar radiation reflected from them, are considered. An assessment of changes and differences in color indices of coating materials for artificial earth satellites is carried out depending on the observation conditions through the earth's atmosphere, which has a selective transmission of sunlight of various wavelengths depending on the thickness of the air mass. **Keywords:** artificial satellite of the Earth, color index, magnitude, spectrophotometric information, ground optical means

Kamenev A. A., Soluyanov A. A. **Signs of synthetic aperture radar spacecraft technical condition displayed in their infrared signature. PP. 57-64.** Connection of radiation power indicatrix and infrared signature of synthetic aperture radar (SAR) Earth remote sensing spacecraft with their technical condition was revealed on the basis of indicatrix and signature simulation. Results obtained of spacecraft signature parameters in different IR spectral regions for different SAR time intervals may be used for development of algorithms of spacecraft condition. **Keywords:** radiation power indicatrix, infrared range, spacecraft, electro-optical device, technical condition.

Demin A. V., Sechak E. N., Polishuk G. S., Denisov A. V. **A simulation test site for evaluating the parameters of an optoelectronic system for remote sensing of the earth's surface. PP. 65-75.** This paper presents an algorithm for

simulating an optoelectronic system for remote sensing of the Earth's surface at a simulated test site from an aircraft by viewing the activities of its functional blocks in various opto-physical and kinematic sensing conditions. The results of simulation modeling to determine the predictive estimation of linear resolution on the ground are presented. **Keywords:** optoelectronic system, remote sensing, simulation, polygon, optical-physical parameters, kinematics, aircraft.

Dvornikov S. S., Manosh Eli, Pshenichnikov A. V., Dvornikov S. V. **Analysis of the gauss wavelet energy and harmonic distribution during their period. PP. 76-81.** The article presents the results of structural differences between the Gaussian wavelet of the first order and a fragment of the harmonic from the standpoint of the distribution of their energy over the duration of the period. The behavior of the function of the difference in the energy distributions of the fragments under study is analyzed. Estimated values of the admissible narrowing of the boundaries of the reception band of the Gaussian wavelet, at which there is no significant distortion, are obtained. **Keywords:** structural differences of signals, energy distribution over the duration of the period, the function of the difference in energy distribution.

Dvornikov S. S., Manosh Eli, Fedosov A. Y., Dvornikov S. V. **Formation of phase-manipulated signal structures based on wavelets. PP. 82-89.** The article presents a method for synthesizing phase-shift keying signals based on first-order Gaussian wavelets for radio lines in the decameter range. The choice of the model for representing the resulting phase-shift keyed signals and the method of their formation by sequential concatenation from fragments of radio pulses corresponding to the modulating information symbols has been substantiated. **Keywords:** channel noise immunity, frequency shift keying, signal recovery, simulation noise.

Rasumov A. V., Onufrey A. U., Orlov A. A. **Experimental studies of the durability of switching devices in local computer network under the conditions of exposure to ultra-short electromagnetic pulses. PP. 90-97.** The article presents the results of experiments on investigating the impact of powerful ultrashort electromagnetic pulses on a switching device as part of a local computer network, which consisted in determining the functional dependences of the throughput on the parameters and frequency of repetition of electromagnetic pulses. An indicator is proposed that characterizes the resistance of typical switching devices to ultrashort electromagnetic pulses. The threshold levels of the values of the intensity of the electromagnetic field, at which there were violations in the operation of the local computer network, were obtained. **Keywords:** ultrashort electromagnetic pulses, bandwidth of a local area network, Ethernet, switching device, resistance, resistance index

Lykova E.M. **To the light of ultra-distant stars. PP. 98-99.** In 1991, the staff of the All-Union Research Institute of Television and the Special Astrophysical Observatory (Nizhny Arkhyz) was awarded the State prize for the creation of the equipment of the ultimate photon sensitivity «Kvant».