ABSTRACTS

**ВОПРОСЫ РАДИОЭЛЕКТРОНИКИ**

### серия

**ТЕХНИКА ТЕЛЕВИДЕНИЯ**

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*Lysenko N. V., Monchak A. M.* **Isomorphism of information models in a television system. Pp. 3-9.** The article considers a model of a television system taking into account the perception of the transmitted information by the consumer and his thesaurus. It is proposed to search for a model of a television system in the class of non-stationary discrete models with discrete time, finite operational memory, with a source with a controlled speed, noise of the information source, the target function of processing information a priori known to the consumer and a feedback channel that provides control over the formation of the information flow of the source. **Keywords:** television system, thesaurus of information consumer, isomorphism of information models.

*Ivanov S. A.* **Method of data routing in a communication network memory, failures and overloads. Pp. 10-21.** The article presents a method for routing data, the main difference of which is the implementation of the principle of step-by-step approximation of the «source» of the data flow to the final recipient. The method is based on the use of the memory of the devices of composite channels that provide information exchange of correspondents. The main differences of the proposed method from traditional ones are presented. **Keywords**: communication network, routing, metrics, memory, failures, overloads.

*Matveykin G.V.* **Functional model of a Special-Purpose backhaul network when exposed to Precision-Guided Munitions and targeted cyber attacks.   
Pp. 22-29.** The article presents analytical modeling of a special-purpose backhaul network operation when exposed to Precision-Guided Munitions and targeted cyber attacks. The study shows how the changes in the stability of a communications center functioning effect packet loss probability and latency while transmitting messages to destination route. **Key words:** Special Purpose backhaul network, stability, Precision-Guided Munitions, cyber-attack.

*Kamyshev A. L., Fedyay E. A., Matyushenko A. A.* **Determination of the stability boundaries of the approach and joint control system of space objects in the near zone. Pp. 30-39.** The problem of guidance in the region where the size and shape of the object's image in the focal plane of the photo-receiving device changes and the instability of the control system for the approach and docking of space object in the near zone is manifested is considered. The analysis of the size of the image is carried out, which makes it possible to determine the current distance between objects and the coordinates of the geometric center of the enlarged image of the object. An analysis of the stability of the optical rendezvous and docking system showed that for a certain combination of parameters of the system, there are limiting boundaries (distances), upon reaching which it loses stability. **Key words:** imageof an object, geometric center, stability of the rendezvous system, limiting distance, parameters of the rendezvous system.

*Bachevsky S. V., Dvornikov S. V., Dvornikov S.S., Tsarelungo A. B.* **Radio speed proposals. Pp. 40-45.** The main stages of the method for controlling the transmission rate in a radio link, depending on the level of channel noise and interference, are presented. The choice of indicators for evaluating the effectiveness of the proposed technical solutions has been substantiated. The results of the experiment are demonstrated, confirming the validity of the developed theoretical proposals. **Keywords:** control of the transmission rate in the radio link, measurement and assessment of the noise level, regulation of the bandwidth

*Dvornikov S. V, Golik A. M., Dvornikov S. S., Tolstukha Y. E., Vlasenko V. I., Ayukov B. А., Targaev O. A.* **Increasing dispersion in processed samples when implementing signal detection procedures. PP. 46–52.** Proposals for increasing the variance of the components within the interval of the processed sample containing the useful signal are presented. It is proposed to increase the level of variance, additionally process the cross-correlation functions. The order of the choice of the decision-making threshold in conditions of a high level of channel noise has been substantiated. **Keywords**: signal detection, cross-correlation function, decision threshold

*Dvornikov S. V., Dvornikov А. S., Tymoshchuk E. D.* **Time-frequency distributions in solving the problems of demodulation of manipulated signals*.* PP. 53–60.**The article presents an original approach to the demodulation of keyed signals based on the processing of the time-frequency distribution of their energy. The stages of the formation of signal energy distributions have been substantiated. The results of an experiment on demodulation of frequency-shift keyed signals are demonstrated. Proposals have been developed for the practical implementation of the proposed technical solutions.**Keywords**: demodulation of keyed signals, channels with additive noise, joint time-frequency distributions.

*Poljakov V. V., Dashkin E. R.* **Small-size detection technique space debris television system. PP. 61–68.**A technique is proposed to improve the quality of detection of space debris elements in the form of small-sized man-made space objects by a television system by taking into account the limitations of optical sensors in digital processing of television images, increasing the signal-to-noise ratio by using models and algorithms for digital processing of television images that fully take into account random components of processed television signals and their multilevel quantization. **Keywords:** near-earth space, small man-made objects, «space debris», optical-electronic system, adaptive signal detection, signal filtering

*Sechak E. N., Chistiakov A. A., Vakhrameev G. I.* **Development of a two-channel segmented mirror control scheme for a space telescope. Pp. 70-80.** The article considers a variant of constructing circuit solutions of devices for positioning segments of a composite mirror that provide monitoring of the state of the telescope mirror and correction of errors during operation in the visible wavelength range. Several types of control schemes for parabolic and spherical mirrors have been studied in the development of circuit solutions for adjustment subsystems. Based on the conducted research, a control scheme for a composite mirror during operation is proposed. **Keywords:** adaptive optics, segmented mirror, alignment, phasing, mirror control scheme.

*Rezvykh E. V.* **Analysis of computer platform hardware resources using device tree files. Pp. 81-87.** The role of device tree files in Linux operating system loading process on single board computer platform is reviewed. A mechanism of converting device tree files is reviewed. The analysis results of Altera Cyclone V system-on-chip device tree files are shown. **Keywords:** Device tree, Altera, SnK, Linux, FPGA

*Motyko A. A.*, *Morozova K. Y.* **Development of the algorithm for automatic correction of overexposed images.** **Pp. 88-91.** The issue of improving the visual quality of overexposed images is considered. The synthesis of an algorithm solving the problem of automatic correction of overexposed images is described. The results of the study are presented, as well as a comparative analysis of the developed algorithm with common traditional methods of improving image quality. **Keywords:** overexposed images, image quality improvement, neural networks.

*Siryi R.S.* **«Virtual pixel» method for formation of images in TV cameras. Pp. 92-95.** The analysis of the problem of joint selection of FP with objectives is carried out. There is a trend towards the use of photodetectors with an excessive number of pixels for subsequent analog and digital processing to improve the quality of the generated image. Comparative analysis of photodetector interfaces is carried out. A prototype of the "virtual pixel" method is proposed. **Keywords:** television system, virtual pixel, sensitivity, pixel size, resolution.

*Zubov I. G.* **Processing and analysis of video data in the control system of an automated vehicle**. **Pp. 96-99.** In the article, existing methods of analysis and processing of video data in the control system of an automated vehicle. It is shown that to assess the interaction of objects in the physical space of the scene, it is necessary to determine their three-dimensional trajectories, the basis for which is the pose estimation. The article presents a new cascade method for pose estimation of a car in a video data, which allows, with high accuracy and without large costs for manual data annotation and training, to estimation pose of a car in the image. **Keywords**: pose estimation, pattern matching, graph shortest path search, polar coordinate system.