CONTENTS AND ABSTRACTS

RADIO ENGINEERING AND COMMUNICATION SYSTEMS

Key words: antenna array designs, analysis algorithm, analytical and numerical calculations, unmanned aerial vehicle.

An algorithm has been developed for analyzing the directivity characteristics of antenna arrays (AA) used in target loads of unmanned aerial vehicles (UAV) from the composition of radio engineering unmanned aerial complex (UAC). The features of algorithm structure are revealed, physical and mathematical justification for each stage of its implementation is given with the selection of areas for analytical and numerical calculations.

Using the software for three-dimensional electrodynamic modeling CST MWS – Computer Simulation Technology Microwave, directional diagrams (DD) were obtained and directivity coefficients (DC) of vibrator arrays placed on metal cylinder of finite dimensions with dielectric coating were calculated.

The aim is to analyze AA structures with assessment of their DD and DC, placed on aircraft-type UAV of radio-technical BAC using electro-dynamic modeling software.

It was found that when a zero with the depth of – 20 dB is formed in side lobe of 7-element antenna array for design option № 1, directivity loss does not exceed 1,5 dB from initial value. With the decrease in the number of vibrators to 6 when considering the 2nd version of AA, its directivity was 8,4 dB, in the case of reducing the number of vibrators to 4 while maintaining the total length of grating, directivity reached 8,6 dB.

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Key words: likelihood ratio, signal reflected from rotating blades, F-distribution.

An algorithm for detecting a hovering helicopter against the background of clutter interference is considered.

The aim of the work is to synthesize and analyze the algorithm for detecting a hovering helicopter using airborne radar operating in high pulse repetition rate mode. The possibility of incoherent accumulation of the signal reflected from helicopter blades is considered. The influence of rejection and whitening algorithms for passive interference on detection characteristics is analyzed. The authors show that it is expedient to use a whitening filter. This ensures the persistence of false alarms and the gain in signal-to-noise threshold. It is also shown that the distribution of decision rule corresponds to F-distribution. The results of the simulation show that the use of a white filter provides a gain in signal/(clutter +noise) threshold ratio of up to 1 dB with a filter order of 8.

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MATHEMATIC AND SOFTWARE COMPUTER SYSTEMS AND COMPUTER NETWORKS

INTELLIGENT INFORMATION SYSTEMS AND TECHNOLOGIES

SYSTEM ANALYSIS, MANAGEMENT AND INFORMATION PROCESSING

PHYSICAL ELECTRONICS AND NANOELECTRONICS

Magnetic field is shown to have insignificant effect on radiation power.
The data on the insignificant influence of magnetic field on radiation power are given.
The effect of optical resonator length and mirrors transmission coefficient on beat frequency is studied. The authors show that beat frequency above 4 MHz can be obtained on short active elements with relatively high transmittance of output mirror, but at the same time radiation power decreases.

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Key words: chromatography-mass spectrometry, mass spectrum, identification methods, identification reliability, substance detection threshold.

The aim of the work is to study various methods for identifying substances in gas chromatography-mass spectrometry and to establish methods being optimal for automatic identification of toxic substances. Various algorithms for comparing spectra in library identification method, criteria for making a decision on identification, types of errors arising in this case, and criteria for identification reliability are considered. A comparative study of various algorithms for identifying small amounts of substances is carried out, taking into account the factors that distort mass spectra, such as statistical nature of mass spectrum formation as well as systematic and random background. Optimal identification criteria and detection thresholds for substances are determined.

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Key words: discharge delay time, exponential distribution, distribution parameter estimation, sample size, order statistics, parameter estimation devices.

Methods to compute the estimates of mathematical expectation and time displacement of ignition delay time when describing it by exponential distribution are considered. The aim of the work is to analyze methods for calculating statistical estimates of ignition delay time. Classical methods of calculating exponential distribution parameters – method of moments and maximum likelihood methodare analyzed. It is proposed to censor measurement results (sampling) of delay time in conditions of strong ionization on the left and to evaluate distribution parameters based on other, uncensored measurements. The article offers to calculate average delay time based on right-censored sample while investigating delay time in the modes when statistical delay time can be time-consuming. Various ways of estimating mathematical expectation of delay time based on order statistics are analyzed. The possibility of approximate estimate of average value based on a histogram is considered. The information about the devices implementing proposed methods of parameter estimation is provided. The accuracy of considered methods of computing exponential distribution parameter estimates is confirmed by statistical modeling.

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Key words: autonomous power supply system for low-power consumers, linear reciprocating motion generator, magneto-mechanical, magneto-electric processes, magnetic spring A mathematical model of linear generator for power supply of low-power devices that converts the energy of mechanical vibrations into electrical energy is constructed and investigated. The peculiarity of the model is that the law of motion of generator magnetic system is imposed by external conditions. The aim of the work is to study the influence of linear generator design features and the conditions of its excitation on output parameters.

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