MICROWAVE SHIELDS MADE OF NON-VOWEN FABRICS CONTAINING CARBON ADDITIVES AND GEOMETRIC SHAPES FORMED WITH ALUMINIUM FOIL

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The materials on the basis of non-vowen yarn to ensure shielding properties in a wide range of frequencies are praiseful if they are outlined by a high level of protection from the effects of external microwave fields, biological compatibility with biological objects [1].

Today there is a strong need for the materials that can be used to make protective shields from the microwave radiation produced by various electronic appliances. The most actual problem is to produce soft, breathable and cheap materials to ensure a sufficient degree of suppression of microwave radiation [2].

The experimental pieces of the needle-punched non-vowen fabrics containing carbon additives were produced of polyester with linear mass density 0.33 tex and 0.44 tex, polypropylene with linear mass density 0.33 tex, and wool with linear mass density 76 tex. As carbon additives we used carbon cellulose-hydrate filaments. The carbon cellulose-hydrate filaments were 65 mm long, with diameter of the fiber of 7–10 µm, with linear electrical resistance less than 20 Ohm·cm and electrical resistance about 0.024 Ohm·cm [3]. To ensure better reflective properties we attached geometric shapes formed with aluminium foil to the surface of the non-vowen fabrics.

To study the shielding peculiarities, we used a scalar network analyzer to measure transmission and reflection coefficients. The transmission and reflection coefficients of the experimental pieces were studied in the range of 0.3 to 17 GHz using scalar network analyzer. The microwave radiation transmission coefficient provided by the experimental pieces varies in the range of –7.0 to –15 dB and the reflection peculiarities vary in the range of –3 to –15 dB.

The main superiority of non-vowen fabrics containing carbon additives is a possibility to add it as a protective layer for the protective enclosures and clothing.

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HISTOGRAM-BASED ALGORITHMS OF LOW-CONTRAST IMAGE ENHANCEMENT

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Enhancement of image quality is an important task for the security systems based on image processing. Currently, there are a large number of methods for processing the noisy grayscale images, both in the spatial and in the frequency domain. Spatial image enhancement techniques are a basis of simple and more complex image processing techniques [1].

Three algorithms for processing the noisy grayscale images in the spatial domain were developed. The first algorithm for enhancement of low-contrast images is based on calculation of the normalized and cumulative histograms of grayscale images and the formation of the output image with a uniform histogram in a given dynamic range. The second algorithm is based on selecting the histogram of the output image, calculating the cumulative histogram of the output image, calculating the normalized and cumulative histograms of the input image and comparing the values of the cumulative histograms of the input and output images, forming the output image with the specified histogram. An iterative contrast optimization algorithm is based on the procedure of grouping low-contrast image histogram components into a specific number of bins according

to a selected criterion, redistributing these bins evenly according to the gray levels and the ungrouping procedure of previously grouped gray levels.

The simulation of the algorithms was performed in Matlab programming environment. The proposed algorithms have low computational complexity and can enhance the quality in 1.5–2.5 times. A comparative analysis of the results of processing the low-contrast noisy images and an efficiency evaluation of the algorithms were conducted. It has been found that the iterative contrast optimization algorithm is the most efficient algorithm for contrast enhancement.

References

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ACTIVE LEARNING FOR TRAINING SPECIALISTS IN THE FIELD OF WEB TECHNOLOGIES PROTECTION
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From a technical view-point, the web is a highly programmable environment that allows mass customization through the immediate deployment of a large and diverse range of applications, to millions of global users. Two important components of a modern website are flexible web browsers and web applications; both available to all and sundry at no expense.

Security assessment is the key for identifying issues with protection of components and spotting potential attack vectors. Penetration testing by modeling what a real attacker would do against the target system offers a powerful way to obtain such information. This approach provides an unbiased look at the true level of protection against attacks and shows whether a company's security solutions are effective in practice. Therefore, it is important to train specialists in the field of web technologies protection. The discipline «Protecting web resources from unauthorized access» is an integral part of master's training in the specialty 1-98 80 01 «Methods and systems of information protection, information security» and refers to the state component of the cycle of special education disciplines. The experts in the field of web resources protection should possess the skills to find vulnerabilities in web system and eliminate them. For example, laboratory work plan on the topic «Vulnerability of connection Client-Server» should include the active learning methods that the teacher can use to develop students' thinking. Methods «Five minute paper» is used for test of the student preparation to perform laboratory work. The teacher can use methods «Ten-Two Strategy» and «Brainstorm» for developing skills of working in a team, showing initiative and creativity in non-standard situations, proposing directions for improving and developing the used technical means and solutions. The main technology, which should use teacher, is virtualization. Virtualization makes it possible to deploy virtual labs without high-end equipment and resources. Thus, the use of all these active teaching methods will improve the quality of training specialists in the field of information systems protection.

FEATURES OF TEACHING THE SUBJECT «INTRODUCTION TO INFORMATION SECURITY» TO INTERNATIONAL STUDENTS
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The subject «Introduction to information security» refers to the component of the higher education institution «Belarusian state university of informatics and radioelectronics», to the cycle of general professional and special subjects. Subject is taught for freshmen students of the specialty 1-98 01 02 Information security in telecommunications.

As a result of studying the subject, the students should obtain the theoretical knowledge about:
– legal support of information security;
– potential and real vulnerabilities of information systems and networks;
– information security threats classification;
– organizational and technical methods to ensure information security;

The authors propose to use the following approaches to organize for freshmen international students the possibility of these knowledge obtaining.