СЕКЦИЯ 4
ЭЛЕМЕНТЫ И КОМПОНЕНТЫ СИСТЕМ ЗАЩИТЫ ИНФОРМАЦИИ

FLEXIBLE ELECTROMAGNETIC RADIATION SHIELDS OBTAINED BY CHEMICAL DEPOSITION OF COPPER ON THE SURFACE OF A FABRIC WITH A NANOSTRUCTURED FERROMAGNETIC MICROWIRE

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The samples of the fabrics with the ferromagnetic nanostructured microwire produced by Central Scientific Research Institute for Complex Automation of Light Industry (Moscow, Russia). The composition of the amorphous nanostructured microwire in glass insulation is a ferromagnetic alloy of Fe, Co, Ni and metalloids (B, Si, C). Its content was changed by alternating the weft threads with the microwire. The first sample was without microwire, the second sample was with the alternation of weft threads and microwire at 1:2 ratio; the third sample was with the alternation of weft threads with the microwire at 1:3 ratio and the fourth sample was with the alternation of weft threads with the microwire at 1:4 ratio. The investigation of the characteristics of attenuation and reflection of electromagnetic radiation by such samples was carried out in the frequency range 0.7–17 GHz.

The attenuation by the samples without magnetic particles was close to zero. The attenuation of samples with different quantities of a ferromagnetic microwire is 2…8 dB in the frequency range 2–17 GHz. The reflection coefficient of the samples radiation with different quantities of a microwire was –10…–5 dB in the range 3…12 GHz. While using a metal substrate placed behind the sample, there is a significant increase in the radiation (above 40 dB), which is due to the high (up to 99 %) reflectivity of the metal. At the same time, the change in the reflection coefficient of the radiation samples is up to –10…0 dB in the range 5…14 GHz.

These dependences are explained by the influence of the electromagnetic radiation interaction with the material of the microwire contained in the cotton polyester fabric. At the same time, the mass of the microwire and its shape affect the frequency dependence of the reflection coefficient in the range 2…17 GHz negatively. The chemical deposition of copper on the surface of the fabric fibers was carried out from an aqueous solution containing potassium sodium tartrate, copper sulfate (crystalline hydrate), sodium hydroxide. Formalin with the concentration of 40% was used as a reducing agent. The fabric was placed in this solution, kept in it, then it was washed, dried and stabilized on its surface by clusters of precipitated copper.

It was shown that the reflection coefficient of the fabric is –5…–6.5 dB at the radiation transmission coefficient of –5.5…–7 dB in the range 8…12 GHz. The chemical deposition of copper from an aqueous solution onto the surface of fibers of such a fabric results in decreasing of its reflection coefficient by 0.1…1.1 dB in the range of 8…12 GHz, and in decreasing of its transmission coefficient by 0.2…1.6 dB in the range 8…10 GHz and in increasing this parameter by 0.1…0.8 dB in the range 10…12 GHz.

It was shown that the values of the reflection coefficient of the fabric fixed on the metal substrate are –0.4…–1.2 dB in the range 8....12 GHz. The reflection coefficient of the fabric fixed to the metal substrate after the chemical deposition of copper from aqueous solutions onto the surface of its fibers are reduced by 4…6 dB. Decreasing in this parameter may be caused by the effect of interference damping of antiphase electromagnetic waves reflected from the surfaces of the fabric and the metal substrate.

INFLUENCE OF CHEMICAL COPPERPLATING OF TISSUE WITH NANOSTRUCTURED FERROMAGNETIC MICROWAVE ON ITS COMPOSITION

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The tissue with a nanostructured ferromagnetic microwire is characterized by the reflection and transmission coefficients of electromagnetic radiation in the frequency range 8…12 GHz of –5…–6 dB (at a thickness of less than 1 mm), which is due to the presence of silicon oxides (SiO_2, Si_5O_{10}), brucites ($D_{1,988}MgO_2$, MgH_2O_2), as well as iron niobate (F_6FeNb), characterized by magnetic properties. This determines its application in order to create flexible screens intended for electromagnetic shielding of areas of space in which radio electronic equipment is located.

In order to reduce the values of the transmission coefficient of electromagnetic radiation of such a tissue, its modification is performed by copper plating (including additional conductive components). It was carried out from an aqueous solution containing potassium sodium tartrate, copper sulfate (crystalline hydrate), caustic soda. As a reducing agent, formalin was used, whose concentration is 40 %.

Analysis of X-ray spectrograms of modified tissue showed the presence of copper precipitates on the surface of its fibers. To determine the appearance and composition of the surface of the initial and modified tissues, a Hitachi S4800 scanning electron microscope with an X-ray spectral analysis attachment was used. The relative error in determining the component composition is ±5 %. Analysis of the appearance indicates that after the process of copper deposition on the surface of individual fibers, copper deposits with a thickness of 5…10 μm and a length of up to 50 μm appear. Such results can be explained by the fact that in the implementation of the chosen method of copper deposition, the surface area of the tissue is uneven in area.

DESIGN AND DEVELOPMENT COMPLEX SAFETY SCADA SYSTEMS

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Capacity development for modern systems in light of recent developments in the world computer, especiallyin the time of the spread of various related technologies with applications that perform key functions in providing essential services (e.g., electricity, naturalgas, gasoline, water, waste treatment, transportation, and nuclear power plants) modern technological systems that support industry and services SCADA system (Supervisory Control and Data Acquisition). SCADA system is one of the most important systems in technological systems operating in many factories and big companies for control.

Many threats that exist in cyber space today that makes some SCADA networks potentially vulnerable to disruption of service, process redirection, or manipulation of operational data that could result in public safety concerns and serious disruptions to the nation’s critical infrastructure. Other factors that could lead to lack of availability to important information may include accidents such as power outages or natural disasters ready to restore services in case anything happens to your primary data centers will heavily reduce the downtime in case of anything happens.

For achievement fault tolerance in SCADA system and ability of a system to continue performing its intended function in spite of faults. Fault tolerance supports reliability, with successful operation. An important feature primary attributes for fault tolerance system are reliability, availability and safety. Other possible attributes include maintainability, testability, confidentiality, security.

BALANCE AND SECURITY FOR MESSAGING LAYERS

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The times we live is the age of technology, technical development, which arrived today to its highest level ever, and this development includes all walks of life, and perhaps most particularly communications world, which has provided the people a lot of time, effort and contributed to the rapprochement between the distances and reach out to others in the easiest ways thanks to modern means of communication. With the increase in telecommunications networks, they become continuously to failure, some of the links or nodes may fail in the network. It becomes important to find the best solution to accomplish the task of communicating the desired number of defects. The F5 Big-IP Global Load-balancing solution feature along. F5 Big-IP system delivers full seamless load balance methodology between different messaging layers to be considered in designing a fault tolerant communication network. F5 Big-IP setup will load-balance SMPP traffic/binds between content providers and Airgate as well as between Airgate and all SMSC sites. Fault tolerance and security are of paramount importance. Solution designs leverage cloud based messaging system architecture and will result in less traffic outages caused by link system failures and will add security layer to messaging system. F5 Big-IP can assign two different networks: one for external access and another one to communicate with messaging node only. In such setup F5 Big-IP will work as firewall to other elements.