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ПО МАТЕРИАЛАМ МЕЖДУНАРОДНОЙ НАУЧНО-ТЕХНИЧЕСКОЙ КОНФЕРЕНЦИИ СТУДЕНТОВ, АСПИРАНТОВ И МОЛОДЫХ УЧЕНЫХ
«НАУЧНАЯ СЕССИЯ ТУСУР–2020»
г. Томск, 13–30 мая 2020 г.
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The results of time and frequency domain simulations of the MF without resonators show that a USP decomposes into two pulses of equal amplitudes. The amplitudes of the first and second pulses decrease due to the presence of resonators; reflections are observed.

Thus, the paper presented the results of the analysis of how the response frequency of a two-wire MF can be changed by using a parallel oscillating circuit in the passive conductor. The resonators created with this method increase the insertion losses. Separation of the MF's passive conductor into segments has weak effect on the cut-off frequency. However, it allows for better attenuation at given frequencies.

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DATA IMPORT AND EXPORT MODULE OF THE EMC SIMULATION SOFTWARE

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This paper describes the process of developing the data import and export module of the EMC simulation environment and presents the results of creating the submodules. The developed module is implemented and tested in the TALGAT software.

Keywords: graphical user interface, electromagnetic compatibility, TALGAT, database, Qt.

Ensuring electromagnetic compatibility (EMC) is an important task in the development of radioelectronic equipment. This task is usually associated with expensive and time-consuming tests. Therefore, it is advisable to take into account EMC at the design stage by simulating it with specialized

software. Most EMC simulation systems contain databases for different purposes. Interaction with these databases is usually performed by special data import and export modules.

Domestic software TALGAT is one of the products that can solve a wide range of EMC-related problems; however, some system modules require improvements [1]. Deeper analysis of the TALGAT system revealed that one of such modules is the data import and export module that provides access to the databases of ready-made solutions and interfering signals [2]. However, the current version of the module lacks a convenient internal structure and, most importantly, an intuitive user interface, so it is not accessible to both developers and users.

The aim of this work is to design and develop the data import and export module of the EMC simulation software and implement it in the TALGAT system.

Module Development. In the development process, the C++ programming language and the Qt framework were used due to the fact that the TALGAT system is based on the use of these tools [3]. The graphical part of the module is based on the Qt Widgets technology.

The interface of the interfering signals submodule is presented in Fig. 1. The upper part of the window contains the list of signals from the database. When a user clicks on the element corresponding to the signal from the database, the editor table in the center of the window is filled with the data from the selected document. The form of the selected signal is displayed in the lower part of the window. The user can add and remove database elements through interaction with the buttons «+» and «–». When the user tries to delete a predefined database item, a security mechanism is activated. It prevents the selected database file from being modified or deleted and displays a warning window.

The process of creating a new database element consists of two steps. At the first step, it is necessary to enter the name of the element in the dialog box. After entering the element name, the system creates an empty document in the database directory of the software product, which at the same time is added to the list at the top of the submodule window. At the second step, the user can edit the database element by using the control buttons located in the central part of the submodule window. The user has two options for editing: automated (by importing data from an external text file) and manual (by filling out the table in the center of the window of the submodule). It is also possible to export data to a third-party file.

The interface of the submodule of the ready-made solutions is presented in Fig 2. The upper part of the window contains a table with database elements.

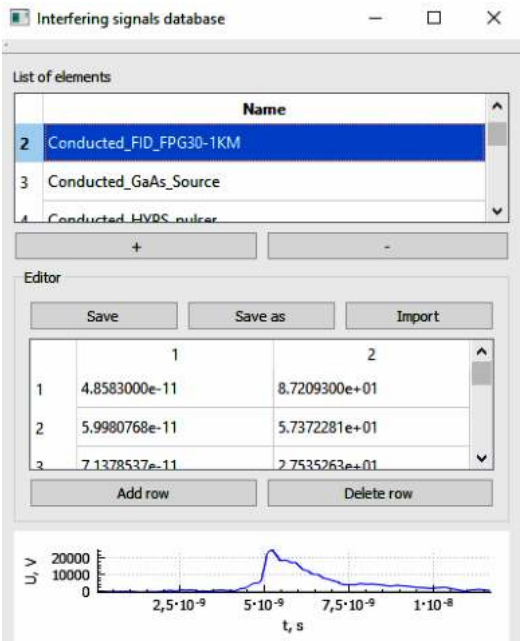

Fig. 1. Interface of the interfering signals database submodule

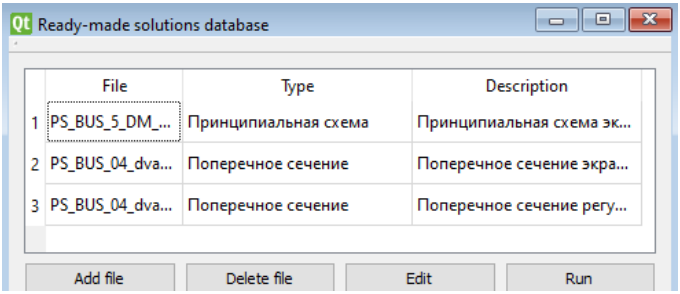

Fig. 2. Interface of the ready-made solutions database submodule

The table shows the name of the file, its type (circuit diagram, 2D-configuration or script) and its description. To open a file from the database, the user needs to select the appropriate row in the table and click the «Run» button. In the main window, the user can add a new database item, as well as delete and edit existing items. The user can change the filename, change the file type from the three options implemented in the drop-down list and add a description to the file. Additionally, a security mechanism that prevents editing of predefined database elements was implemented.

The submodule for automated preparation of reports was developed based on results of calculations performed in the TALGAT system. In order to open the export subsystem, the «Export data» button is added to the window of the dynamic visualization of the localization module. When this button is clicked, the export submodule automatically generates a report based on the performed calculations, which includes the maximum and minimum values of the normalization parameters, portraits according to the N_1–N_5 norms, signal extremes at the nodes and time responses at these nodes, as well as at the input and the output of the circuit [2]. After that, the data is displayed in the preview window of the report. The preview window is presented in Fig. 3.

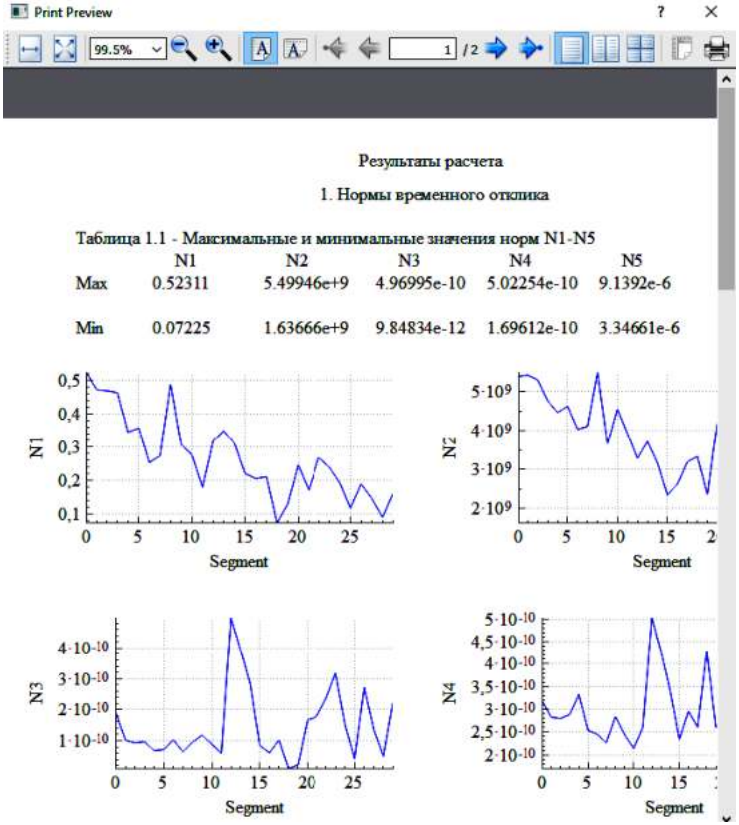

Fig. 3. Preview window of the data report submodule

Thus, the developed module can be used to simplify the process of filling the databases of ready-made solutions and interfering signals. Be-

sides, it automates the process of preparing reports on the required templates based on the results of calculations. The data import and export module was successfully integrated and tested in the TALGAT system.

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PLANIFICATION OF 2G CELLULAR NETWORK

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This work is an introduction to cellular network planification performed using the RadioMobile software.

Keywords: cellular network, RadioMobile, GSM.

This article is an overview of the project under development. The goal of the project is to design a GSM network for Tomsk (frequency band from 880 to 960 MHz); it allows coverage of the city with a field level ≥ -74dBm, equivalent to an indoor coverage. A radio-relay system (from the project under development) for every base station is then proposed in the frequency band from 12.5 GHz to 13.25 GHz. For this purpose, a computer program RadioMobile was used, which allows simulating radio wave propagation and coverage areas for various wireless networks. Also, RadioMobile can be used to calculate the coverage areas of a base station, repeater or other radio networks. The goal of this work is to explore GSM coverage in Tomsk.

Analysis of the links between base stations. Tomsk was considered because it has the best coverage opportunities due to the presence of 6 base stations (Fig. 1).