Министерство образования и науки Российской Федерации
Федеральное государственное бюджетное образовательное учреждение
высшего образования
«ТОМСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ СИСТЕМ
УПРАВЛЕНИЯ И РАДИОЭЛЕКТРОНИКИ (ТУСУР)»

НАУЧНАЯ СЕССИЯ ТУСУР–2017

Материалы

**Международной научно-технической конференции
студентов, аспирантов и молодых ученых
«Научная сессия ТУСУР–2017»,
посвященной 55-летию ТУСУРа**

10–12 мая 2017 г., г. Томск

В восьми частях

Часть 8

В-Спектр
2017

УДК 621.37/.39+681.518 (063)
ББК 32.84я431+32.988я431
Н 34

Н 34 **Научная сессия ТУСУР–2017:** материалы Международной научно-технической конференции студентов, аспирантов и молодых ученых, посвященной 55-летию ТУСУРа, Томск, 10–12 мая 2017 г.: в 8 частях. – Томск: В-Спектр, 2017 – Ч. 8. – 222 с.

ISBN 978-5-91191-353-3
ISBN 978-5-91191-361-8 (Ч. 8)

Материалы Международной научно-технической конференции студентов, аспирантов и молодых ученых посвящены различным аспектам разработки, исследования и практического применения радиотехнических, телевизионных и телекоммуникационных систем и устройств, сетей электро- и радиосвязи, вопросам проектирования и технологии радиоэлектронных средств, аудиовизуальной техники, бытовой радиоэлектронной аппаратуры, а также автоматизированых систем управления и проектирования. Рассматриваются проблемы электроники СВЧ- и акустооптоэлектроники, нанофотоники, физической, плазменной, квантовой, промышленной электроники, радиотехники, информационно-измерительных приборов и устройств, распределенных информационных технологий, вычислительного интеллекта, автоматизации технологических процессов, в частности, в системах управления и проектирования, информационной безопасности и защиты информации. Представлены статьи по математическому моделированию в технике, экономике и менеджменте, антикризисному управлению, правовым проблемам современной России, автоматизации управления в технике и образовании, а также работы, касающиеся социокультурных проблем современности, экологии, мониторинга окружающей среды и безопасности жизнедеятельности.

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СЕКЦИЯ 8

POSTGRADUATE AND MASTER STUDENTS' RESEARCH IN ELECTRONICS AND CONTROL SYSTEMS

(Секция на английском языке)

INVESTIGATION OF ULTRASHORT PULSE MAXIMUMS LOCALIZATION IN TURN OF MEANDER LINE WITH VARIATION OF ITS DURATION

R.R. Gazizov, Television and Control dep., 1 year postgraduate student
Head of research A.M. Zabolotsky, assistant professor of Television and Control dep., Ph.D.
Tomsk, TUSUR, ruslangazizow@gmail.com

Nowadays the tendency of minimizing the components of radioelectronic devices and increasing signal performance is observed. Some of these components are coupled lines, which are properly studied [1]. However, it is important to reveal and localize signal maximums because it may help determine places of possible mutual parasitic influences and interference, thus it would be possible to take necessary measures for providing electromagnetic compatibility (EMC) and information security.

It is effective to use computer simulation in such researches rather than measurements, as it is necessary to obtain waveforms at various points along each conductor of complex structures. The quasi-static approach is widely used for analysis of printed circuit board (PCB) interconnections. Theoretical bases of quasi-static response calculation for an arbitrary network of multiconductor transmission line sections are described in [2, 3]. Algorithms for calculation of time response based on this theory are developed [5] and allow to calculate current and voltage values only in network nodes.

Basic expressions and the algorithm of current and voltage values calculation, which allow to improve the calculation of time response at any point along each conductor of a transmission line section of an arbitrary network in TALGAT software, are implemented in [5]. This paper also contains an investigation of a two-turn microstrip meander line, whereas a one-turn meander line in a parameter range was investigated in [6]. However, the investigation of the one-turn meander line with variation of the ultrashort pulse duration has not been done.

The purpose of this work is to investigate the localization of the ultrashort pulse maximums along the turn of the meander line with variation of its duration.

The microstrip meander line investigated in [6] was taken as a structure for investigation. The meander line has one turn; each half-turn is 27 mm length (Fig. 1, *a*). 50 Ohm resistors are connected to the ends of the turn. Conductor width (w) is 0,535 mm, conductor thickness (t) is 0,1 mm, separation between conductors (s) is $s = w \div 2$, dielectric thickness (h) is 0,3 mm, $d = 2*w$, dielectric conductivity (ε_r) is 4 (Fig. 1, *b*).

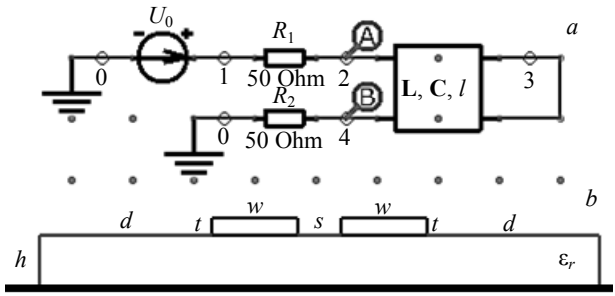

Fig. 1. Connection circuit (*a*) and cross-section (*b*) of the microstrip meander line

3 types of the ultrashort pulse each with the amplitude of 1 V are chosen as excitations in this work. All pulses waveforms are shown in Fig. 2. The first pulse (U_1) has durations of rise, top and fall equal to 1 ns, the second (U_2) – equal to 100 ps and the third (U_3) – equal to 10 ps, so the whole duration of the pulses is 3; 0.3; 0.03 ns.

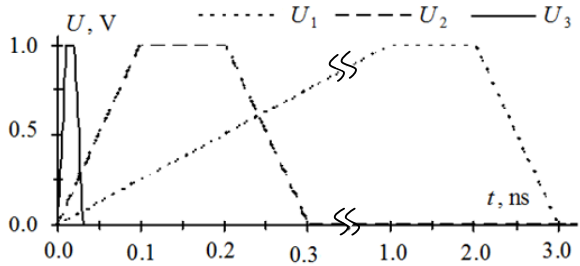

Fig. 2. Excitation pulses waveforms

Each half-turn from Fig. 1, *a* was divided into 20 segments and the voltage waveform was calculated in each segment. But only waveforms at the conductor beginning (U_b) and end (U_e) and also with voltage maximum (U_{max}) and minimum (U_{min}) values, appearing under each excitation, are presented.

The voltage waveforms calculated along each of half-turns under the excitation U_1 are shown in Fig. 3, *a*. The waveforms calculated under the excitation U_2 are in Fig. 3, *b* and under the excitation U_3 in Fig. 3, *c*. Let us consider the signal waveforms obtained in case 1 (Fig. 3, *a*). Under such duration the voltage maximum is 0.51 V, which is by 2% higher than the steady state level of 0.5 V, and it is located in the segment 1 of the second half-turn.

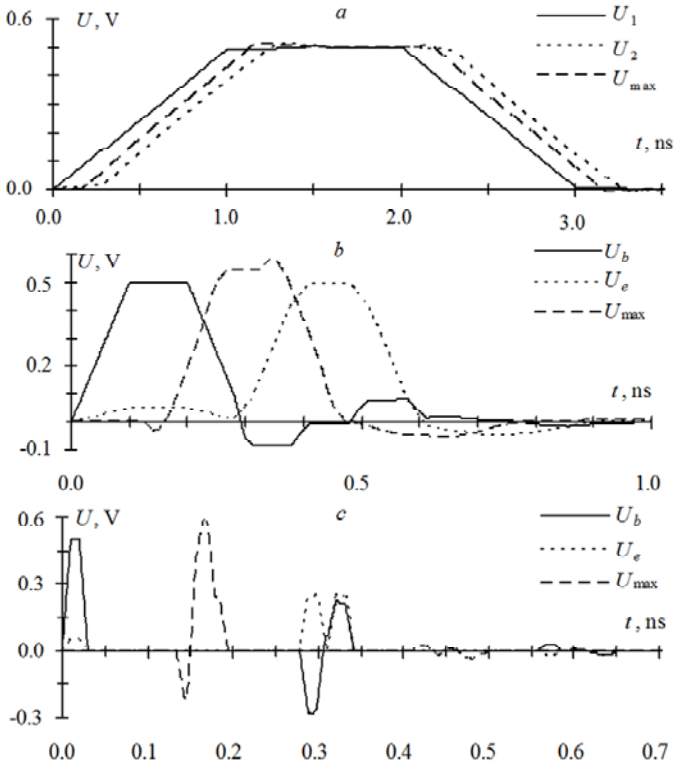

Fig. 3. Signal waveforms obtained under the excitations U_1 (*a*), U_2 (*b*) and U_3 (*c*)

In case 2 (Fig. 3, *b*), the voltage maximum is 0.57 V. It exceeds the 0.5 V level by 14% and is located in the segment 2 of the second half-turn.

In case 3 (Fig. 3, *c*) the voltage maximum is 0.58 V. It exceeds the 0.5 V level by 16% and is located in the segment 1 of the second half-turn.

The investigation shows some specific aspects of ultrashort pulse maximums appearance and localization in the microstrip meander line with variation of excitation duration. The greatest (as absolute value and comparing with the amplitude at the input) maximum value is 0.57 V and is observed under the excitation U_3. The obtained results show the importance of voltage waveforms calculation along the conductors of coupled lines and also the importance of signal maximum revelation and localization. In particular, the increase of the voltage level at the joint of the half-turns with the decrease of the voltage level at the ends is remarkable.

Simulation is supported by Russian Foundation grant No.14–19–01232 in TUSUR.

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MODELING AS THE BASIS OF MAKING EFFECTIVE MANAGEMENT DECISIONS

T.E. Grigorieva, postgraduate student of the department of modeling and system analysis (MSA)

Scientific adviser V.M. Dmitriev, head of the department of modeling and system analysis (MSA), DScTech, professor

Tomsk, TUSUR, tanya_grig_1991@mail.ru

At the present stage of market evolution crises, competition, and instability of the market situation have extremely negative affect on the development of small businesses. The most important criterion of viability of a company is the head's capability to make quick and high-quality decisions.

Today the process of modeling is used for business management, which allows to avoid difficulties, to improve the main aspects of a company significantly, to raise its competitiveness and to lower the expenses.

The process of creation of models consists of the following stages: definition of the task, creation of a model, check of the model reliability, check of the use of the model, analysis, and updating the model in the implementation process.

There are several types of models:

1. The model of the theory of queues (it is used for determination of the optimum number of service channels in relation to needs in these channels) [1].

СЕКЦИЯ 8
POSTGRADUATE AND MASTER STUDENTS' RESEARCH IN ELECTRONICS AND CONTROL SYSTEMS

(Секция на английском языке)

Председатель секции – ***Покровская Е.М.****, зав. каф. ИЯ, доцент, к.филос.н.;*
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Морозова Е.И.*, ст. преп. каф. ИЯ*