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CREATING OF LOCAL RADIO WAVES WITH A WAVELENGTH λ=160M AND FREQUENCY WITH 1600÷1835 KHZ MIDDLE-WAVE DIAMETER

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ABSTRACT - In the modern life everybody, the young, the adult, the old, the pupil, the student, the teacher, the professional engineer, the new learner are using telecommunication and information technologies, gadgets, devices, programming software, Simulink models. The main function of these technologies and softwares is providing regular technic interaction between mankind and digital world.

Television has already become main permanent using technology and habitual action for people all over the world. Basic technologic many functional gadget of television is an antenna. The antenna is used of detecting and correcting the errors in organization of waves and radio communication lines, providing quality and reliable connection between central radio stations and their baseband units. To provide the connection between television station and television set, it must know install antenna correctly and set needful frequency channel for television sets and television stations.

KEYWORDS - Channel, frequency, radio, antenna, waves, magnification, system, connection.

I. INTRODUCTION

Before setting up medium radius ranges local radio lines with a wavelength l=160m and frequency with 1600÷1835 kHz, firstly the radio systems in this range must be studied.

The central station radio waves of the mid-wave range include the "Transvir type" IC-107, operating at frequencies of 1500mHz-30mHz on the range of shortwave radios. For the radio station (radio transmitting device), the central station, established on the basis of the following scheme, should be centered in the center or distribute radio waves in one direction.

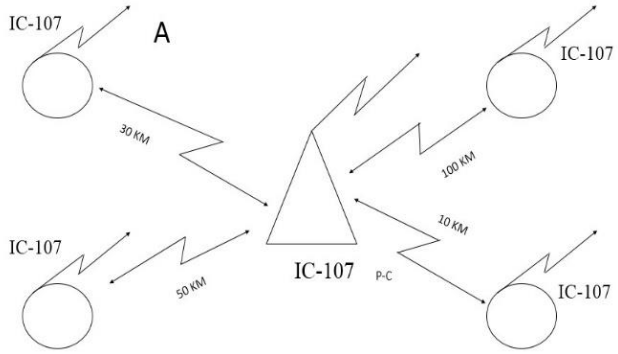

Figure 1. The radio network structure operating in mid-wave diapason.

II. THE ANTENNA TYPES

You can use a "delta loop" antenna for the central station. Delta loop is called Delta in the following sentences. Delta is a type of antenna or a "loop" based antenna type. The word "delta" is derived from greek language "d". The principal closed loop consists of three base points and the perimeter is in the form of a triangle L=l, which has equal wavelengths in most cases. This antenna was tested in the United States of America in 1925.

Here is a brief overview of the Delta antenna specifications:

1) Delta-based antennas. Plate is an enlarged variant of vibrator type.

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2) The magnification of the antenna increases as a result of the magnification of the parameters of the plate vibrator.

3) Antennas are classified as symmetrical antennas and can not be grounded, but at low frequencies, the antenna is connected to a ground with smaller frequencies less than wavelength.

4) The input resistance of the Delta antenna is approximately Z=100÷400 Ohm. If the height of the antenna is higher, the input resistance of the antenna may be reduced to Z=80÷60 ohm. In this case, the antenna can be connected without coaxial cables with Z=50÷75 Ohm.

III. DELTA LOOP ANTENNA DESIGN

Before installing and using an antenna, soil type of the ground must be checked up by specialists.

In modern life scientists and researchers use a Delta Loop calculator software in order to analyze an antenna's perimeters. In this program, a 75Ω coaxial transformation is used between an antenna and a feeder when the antenna uses a 50mm feeder (an antenna and its connecting device).

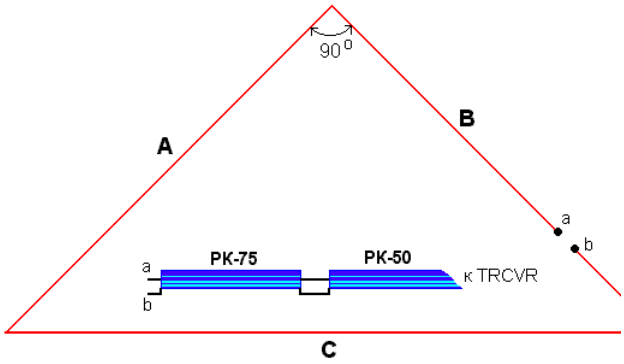

Figure 2. An image of delta antenna in Delta Loop calculator.

IV. CALCULATING THE ANTENNA'S ELECTRICAL PARAMETERS USING BY MMANA PROGRAM

MMANA is an acronym for Makoto Mori Antenna Analysis, modeling program for antennas, which named for its author. MMANA provides an intuitive graphical user interface supported by MININEC(Mini-Numerical Electromagnetics Code) simulation engine.

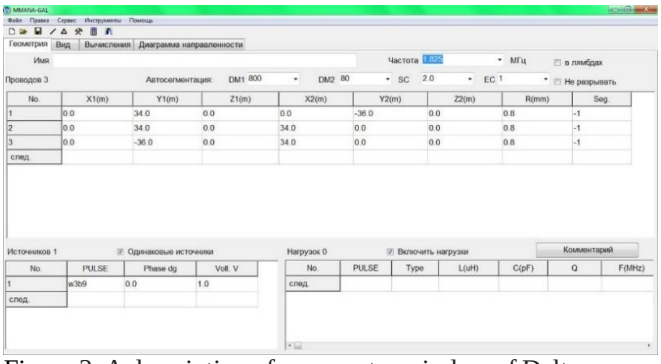

Figure 3. A description of a geometry window of Delta Loop antenna in MMANA program.

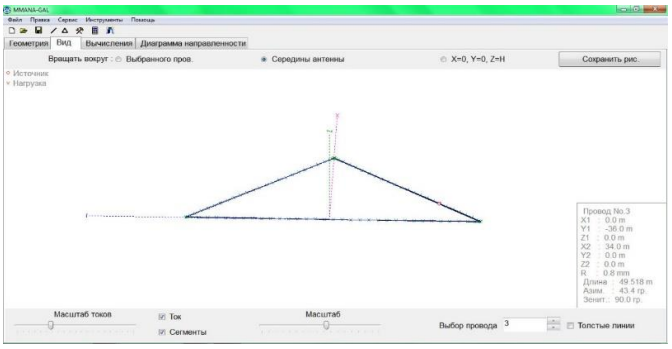

Figure 4. The image of Delta Loop antenna in MMANA program.

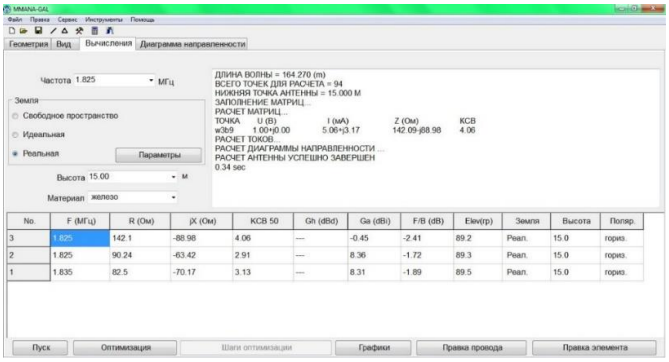

Figure 5. Image of Delta Loop antenna in MMANA Vicisleniya pane.

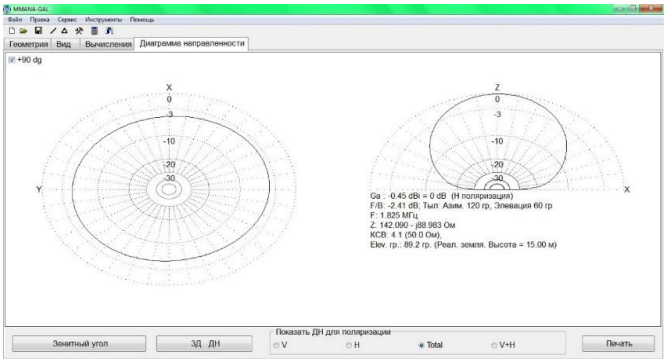

Figure 6. The schema of Delta Loop antenna in MMANA

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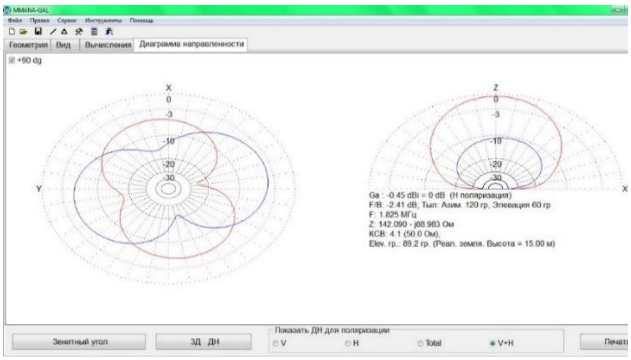

Figure 7. Vertical and horizontal wave propagation in the schema window of Delta Loop antenna in MMANA

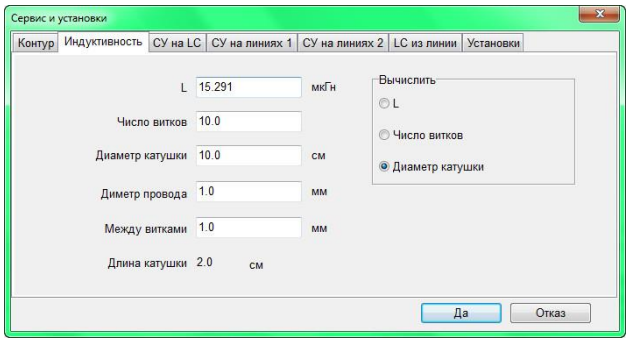

Figure 8. 3D view of Delta Loop antenna in MMANA schema window.

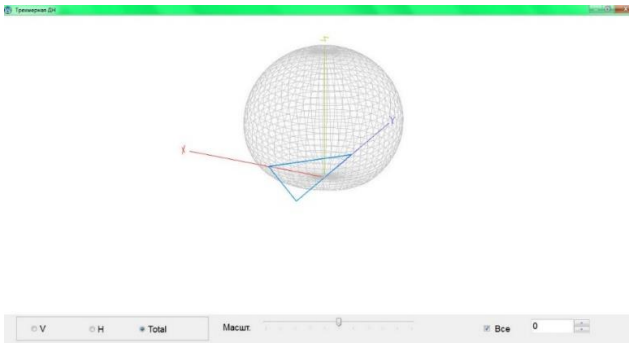

Figure 9. A connector for Delta Loop antenna, G-symmetrical Adjustable Inductive Roll Parameters tab.

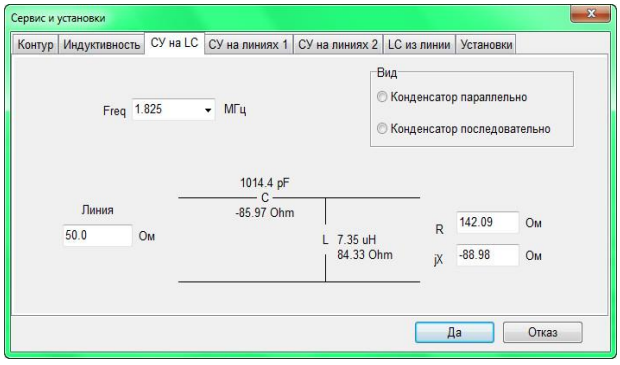

Figure 10. Delta Loop Antenna Adapter Parameters

V. T SHAPED ANTENNAS

The location of radio station of subscriber and constructive report of the antenna subscriber stations are planned to be stationary (indoors) on projects, but stations can be installed in a vehicle body. Radio stations can be radio transmitters with type IC-107 or short-wave transmitters. The experiment shows that T-shaped G-symmetrical antennas can provide good results in a 160-meter diameter wavelength with its simplicity of construction, electrical parameters. For T-cells, T-shaped antenna is available. T shaped antenna was tested by American radio-amateur Loven Windom in the 30s of the last century and achieved good results. That's why the name given to the antenna was named "WINDOM". In the 40s and 50s of the last century, it was called "American". One of the advantages of "T" shaped antenna, it can be used with different type of antennas, also on small antennas. In these cases, the feeder can be connected to the antenna by a wire (in the classic version), the access point of the feeder determines the input resistance of the antenna. By changing the port, we can adjust power of the transmitter connected to the antenna. It is considered the construction of the "T" shaped antenna. The design of the "T" shaped antenna is not so difficult. The length of the antenna is initially L, the distance to the point of the feeder connected to the antenna is determined by X0. The length of the antenna is Lk. The length of the antenna signal is measured by the antenna length L. below:

$L = 0.95*\lambda/2 = 0.475*\lambda$ (1)

Here:

l-Antenna cable length (m)

λ-Wavelength of Propositional Frequency (m)

Antenna's feeder port is determined by experiment. The probable connection point is determined by the following figure.

$X0 = 0.17l$ (2)

The wavelength range ranges from 160 to 1860 kHz for radiocouples ranging from 160meter to about 1960 kHz.

Radio frequency spectators are allowed to experiment with the frequency range 1840-1960.

$l(m) = 300 / (F)$ (3)

we calculate the frequency wave length for 1.840kHz.

l (m) = 300 / 1.840 kHz = 163.04 m

Antenna length L

L = 0.475 * 1 = 163 * 0.475 ~ 80m

The distance to the antenna point of the feeder

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X0 = 0.17 * l = 0.17 * 80 = 13.1µ13m

The resulting "T" shaped antenna looks like this.

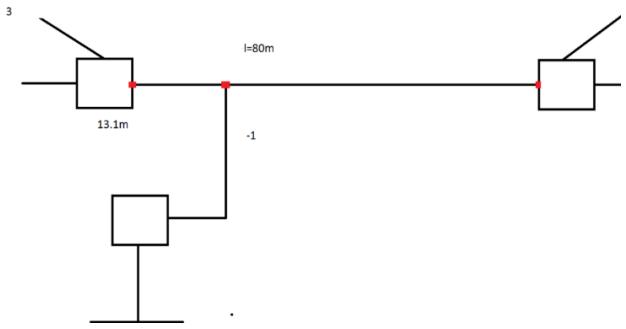

Figure 11. Designed T-shaped antenna's constructive look.

VI. CONCLUSION

In conclusion, it can be said that these studies and information can be used and taught as experimental training on "Radiolocation Systems", which is in "Telecommunication Technologies". Also bands used in radio systems can be used in mobile and television standards. MMANA program is one of the best modeling software for teachers, students, engineers and radio-amateurs. Nowadays MMANA program is widely being used all over the world to model real world technic objects and situations in computer Simulink, which help engineers, researchers and scientists to make abatement measures any technic errors.

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