

**PRESENTATION OF SOFTWARE TOOL
FOR EMBEDDING AND
EXTRACTING HIDDEN MESSAGES IN
AUDIO FILES**

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DEFINITIONS

STEGANOGRAPHY IS THE PRACTICE OF CONCEALING MESSAGES OR INFORMATION WITHIN OTHER NONSECRET TEXT OR DATA.

STEGANALYSIS IS THE STUDY OF DETECTING MESSAGES HIDDEN USING STEGANOGRAPHY.

MESSAGE IS CONCEALED INFORMATION.

CONTAINER IS THE DATA USED FOR HIDING MESSAGES.

STEGO IS A CONTAINER CONTAINING A SECRET MESSAGE.

STEGANOGRAPHY APPLICATIONS

- **WATERMARKING**
- **FINGERPRINTING**
- **CAPTIONING**
- **DATA HIDING**

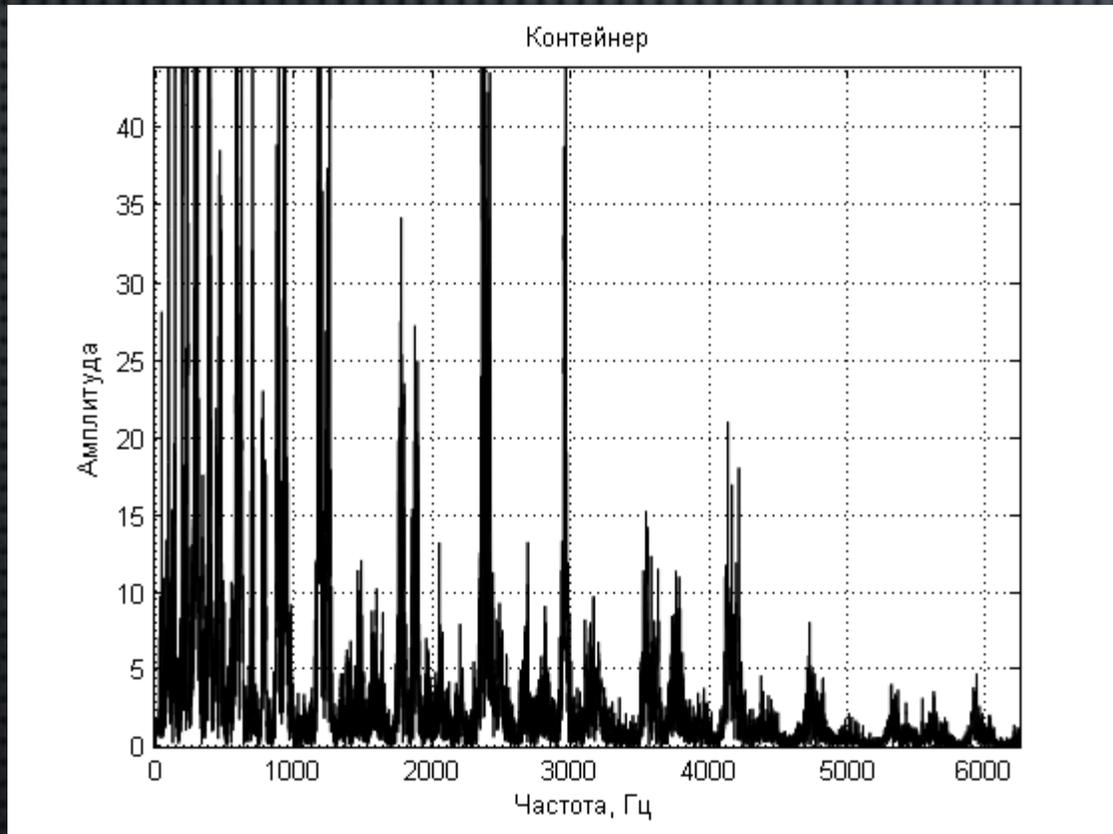
EMBEDDING ALGORITHM

DIAGRAM

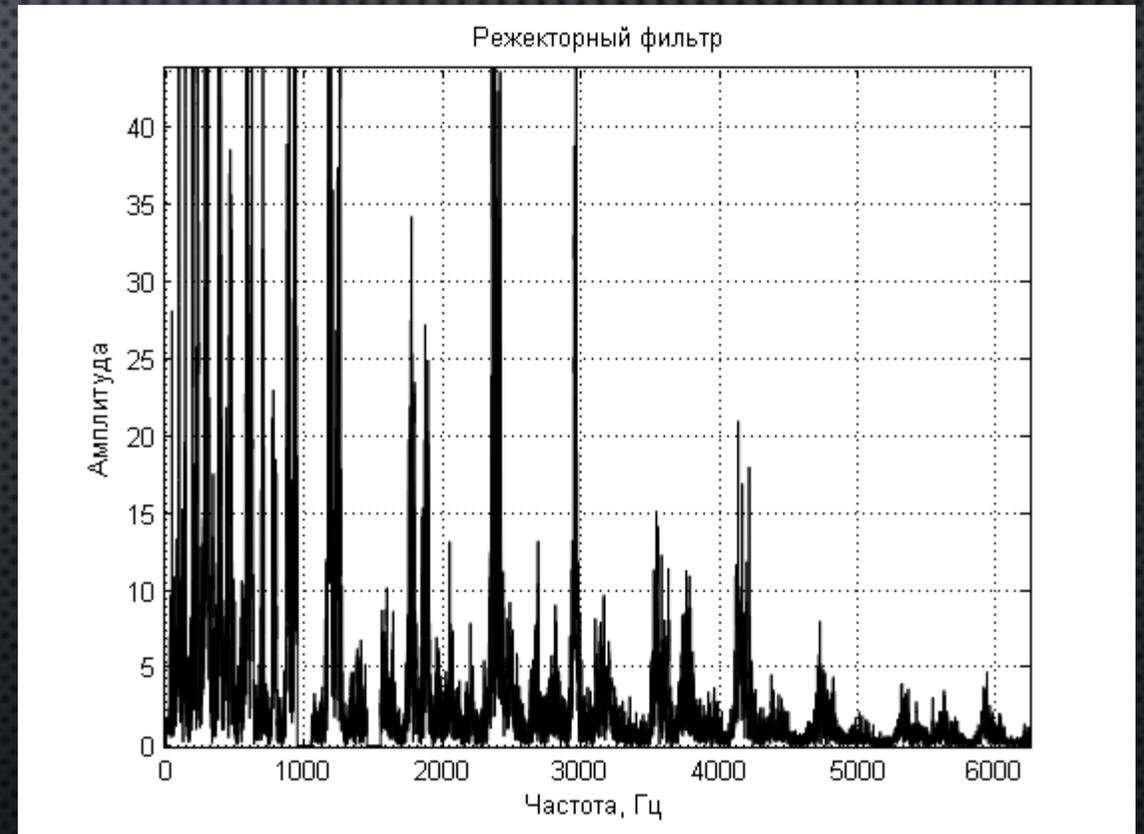


EMBEDDING ALGORITHM

NOTCH FILTER (950 – 1050 HZ, 1450 – 1550 HZ)



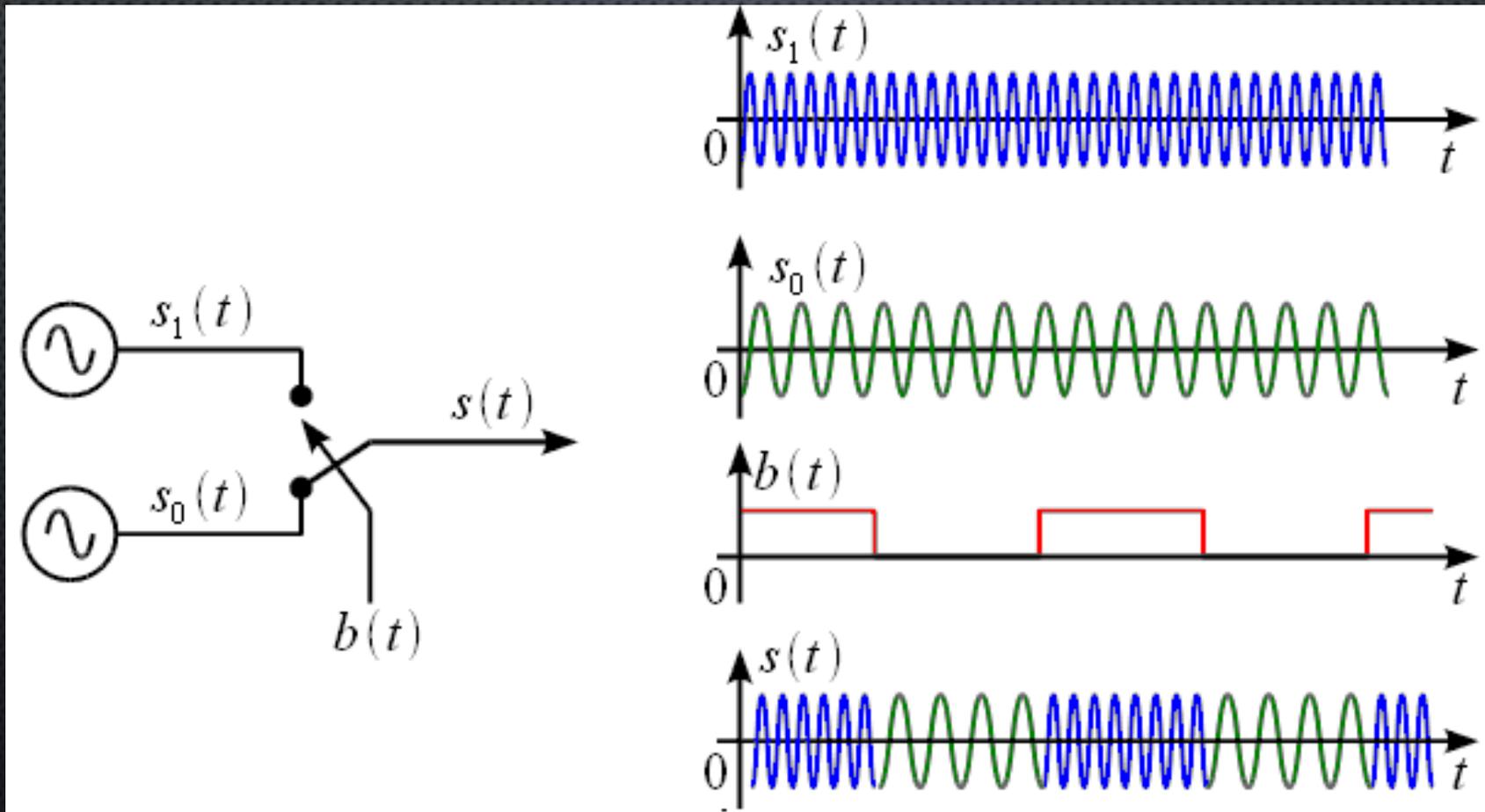
The spectrum of the original signal



The spectrum of the filtered signal

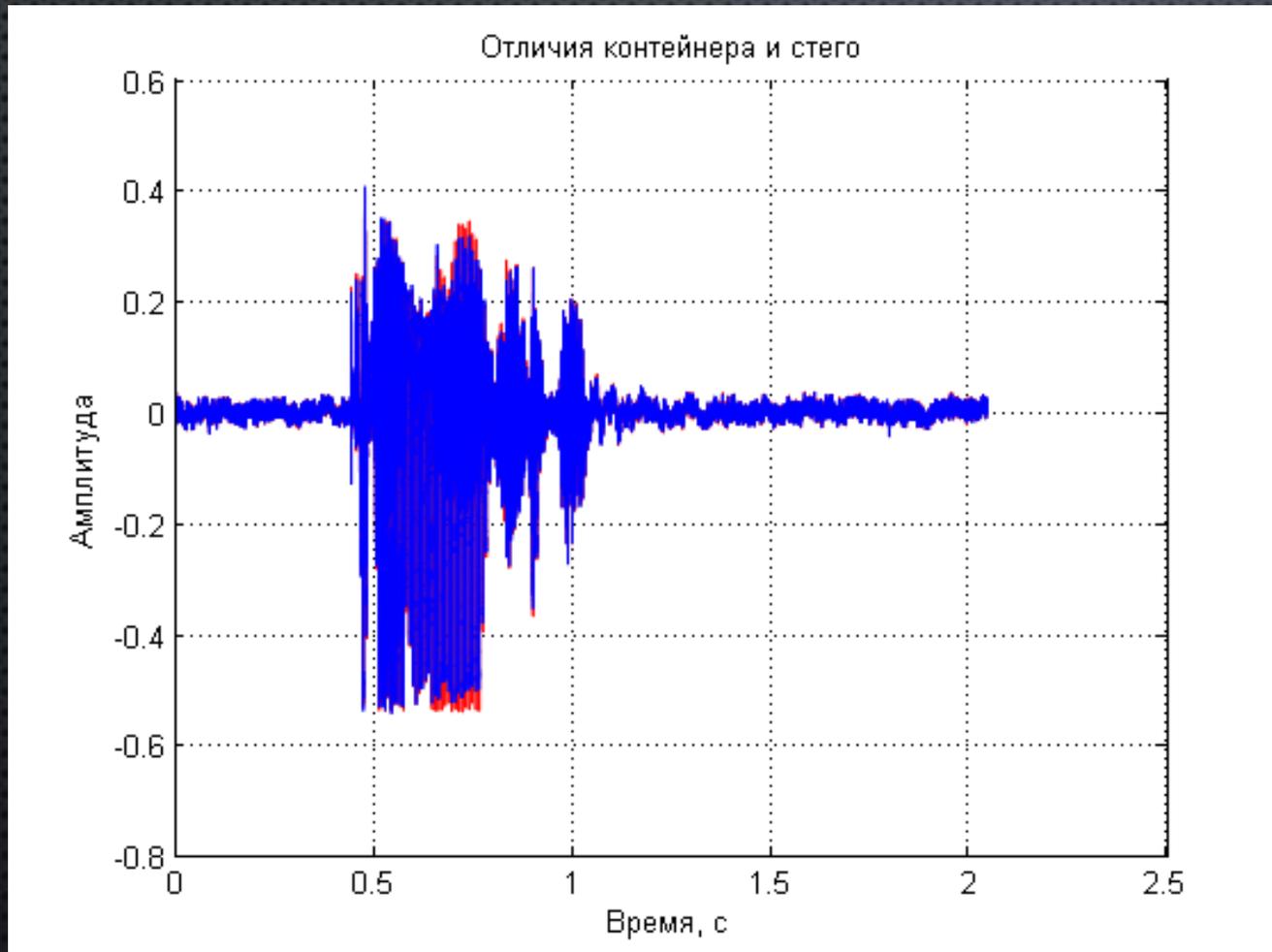
EMBEDDING ALGORITHM

BINARY FREQUENCY SHIFT KEYING



EMBEDDING ALGORITHM

RESULTING SIGNAL (950 – 1050 HZ, 1450 – 1550 HZ. SPEECH)

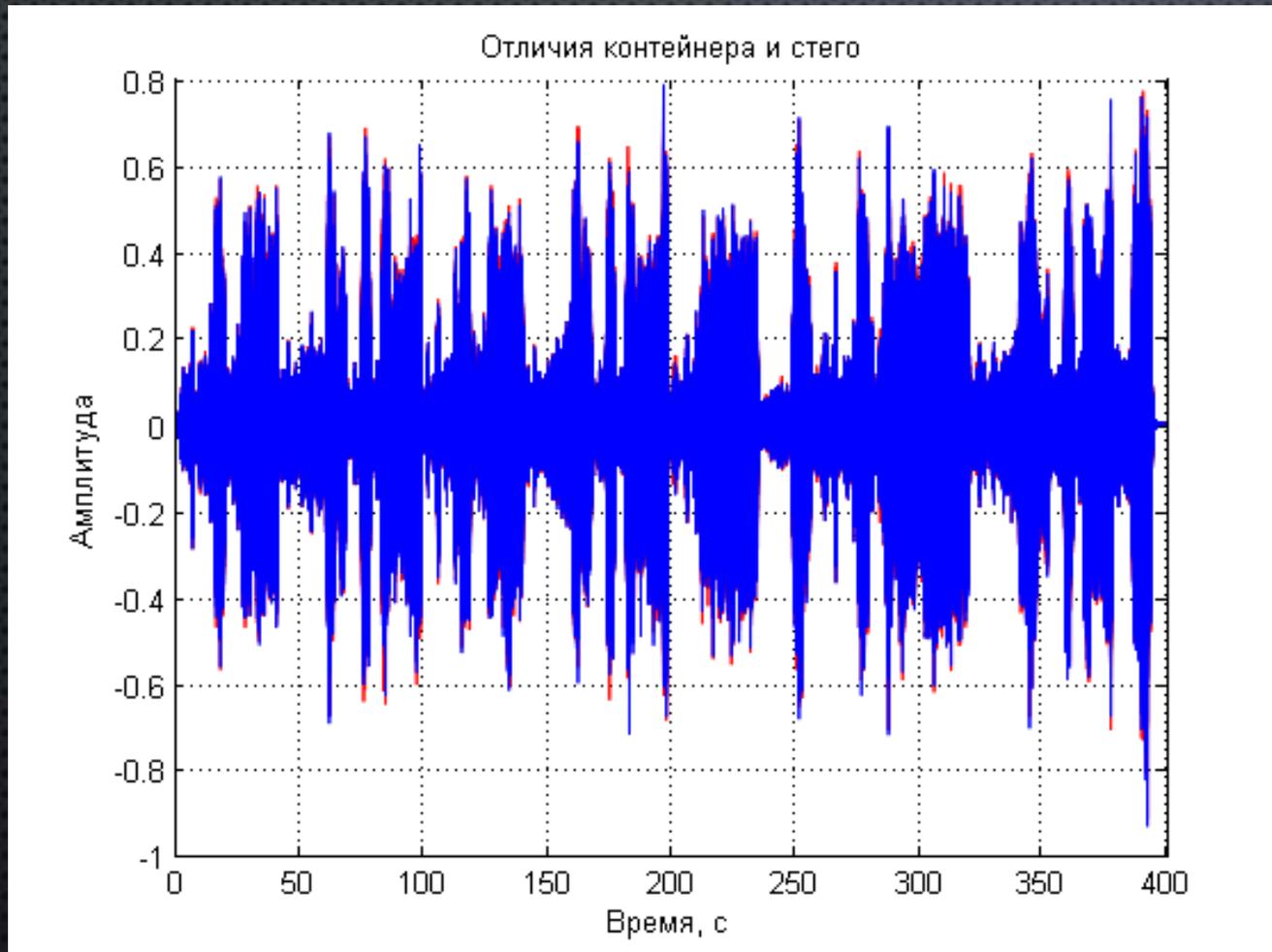


Original signal

Stego signal

EMBEDDING ALGORITHM

RESULTING SIGNAL (950 – 1050 HZ, 1450 – 1550 HZ. MUSIC)



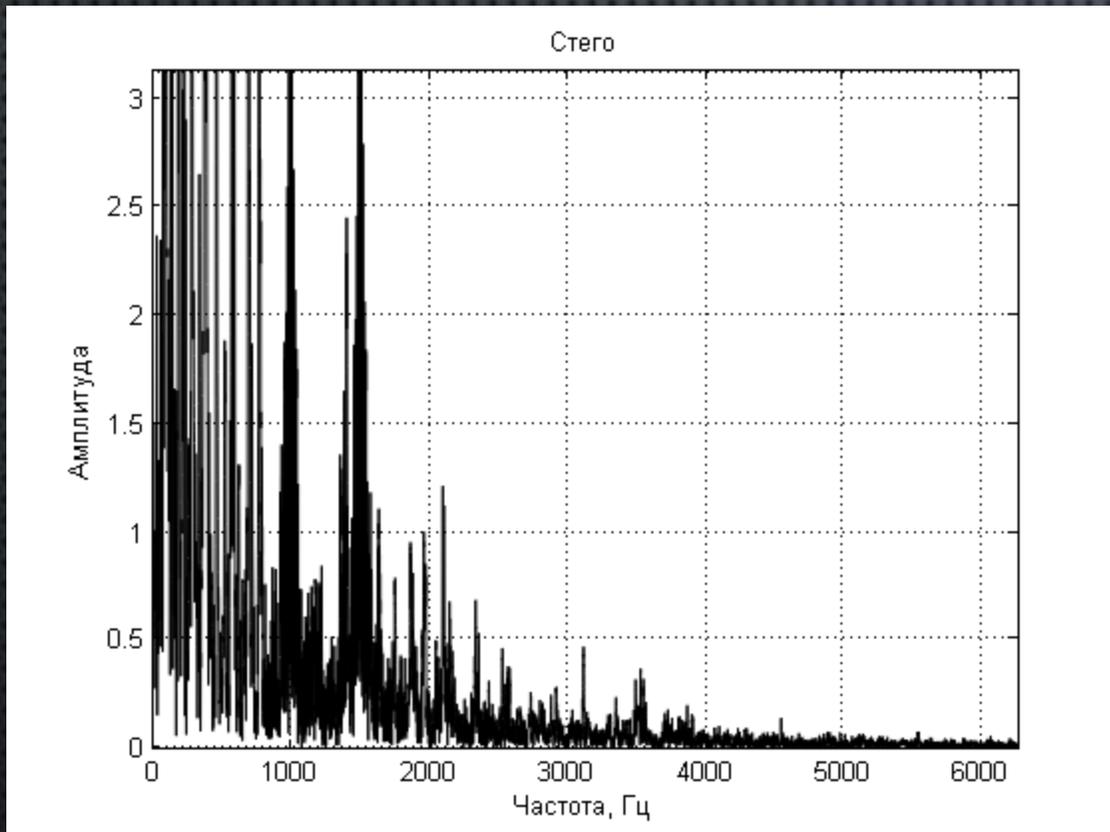
EXTRACTION ALGORITHM

DIAGRAM

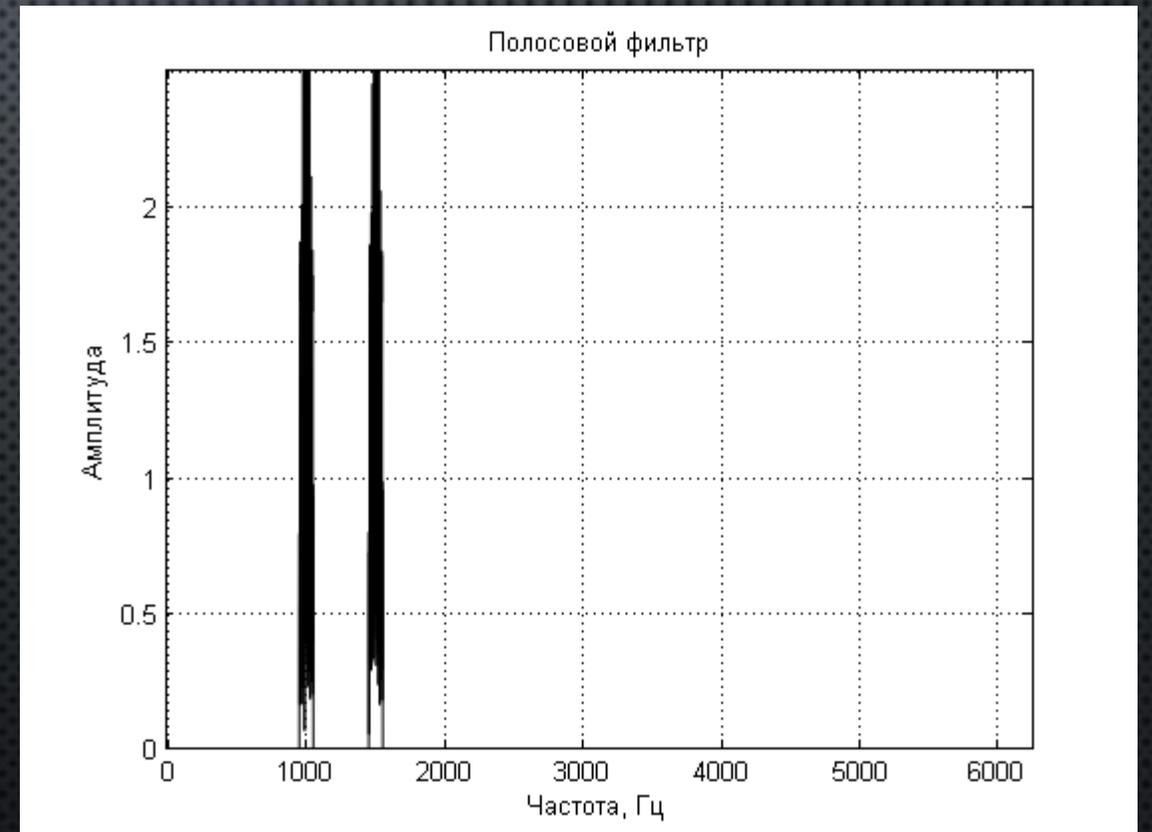


EXTRACTION ALGORITHM

BAND-PASS FILTER (950 – 1050 HZ, 1450 – 1550 HZ)



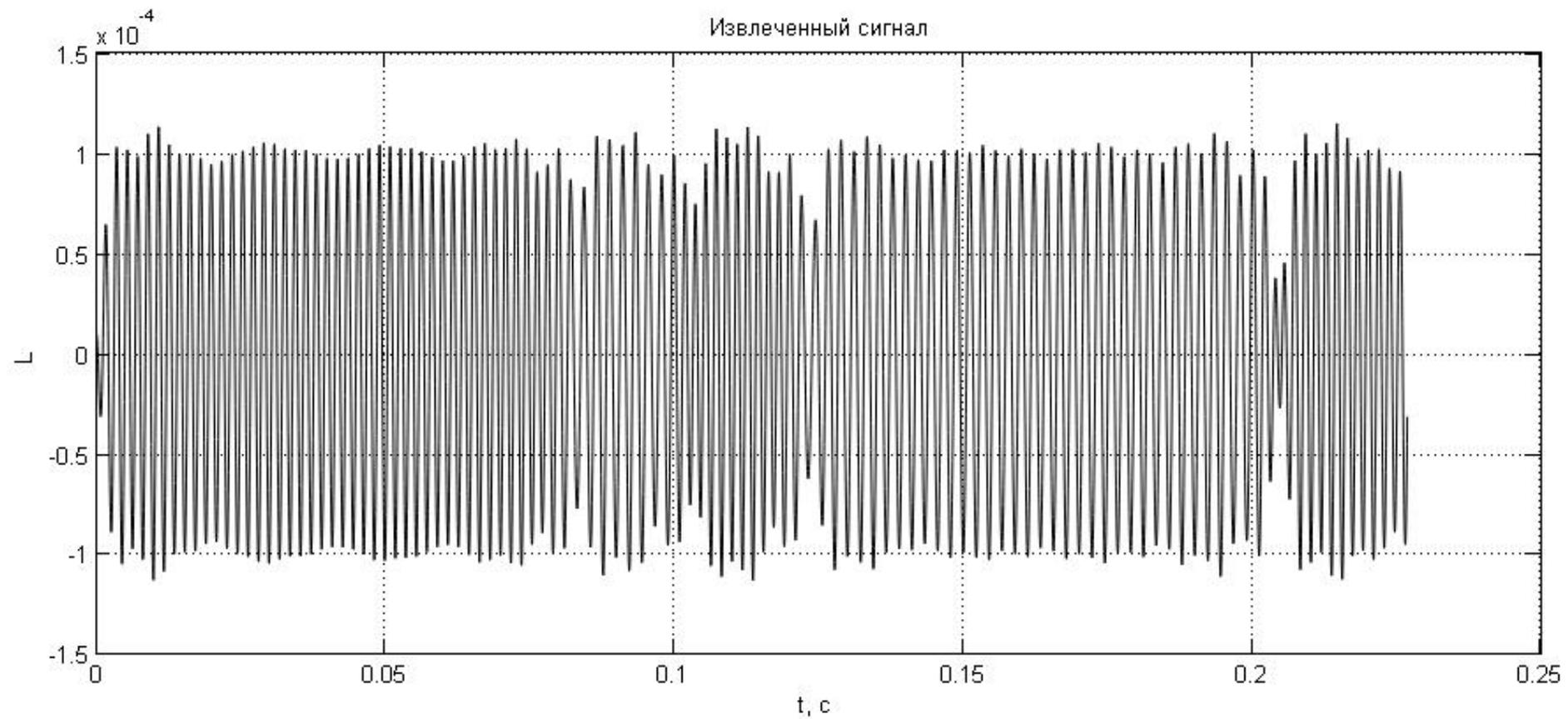
The spectrum of the stego signal



The spectrum of the filtered signal

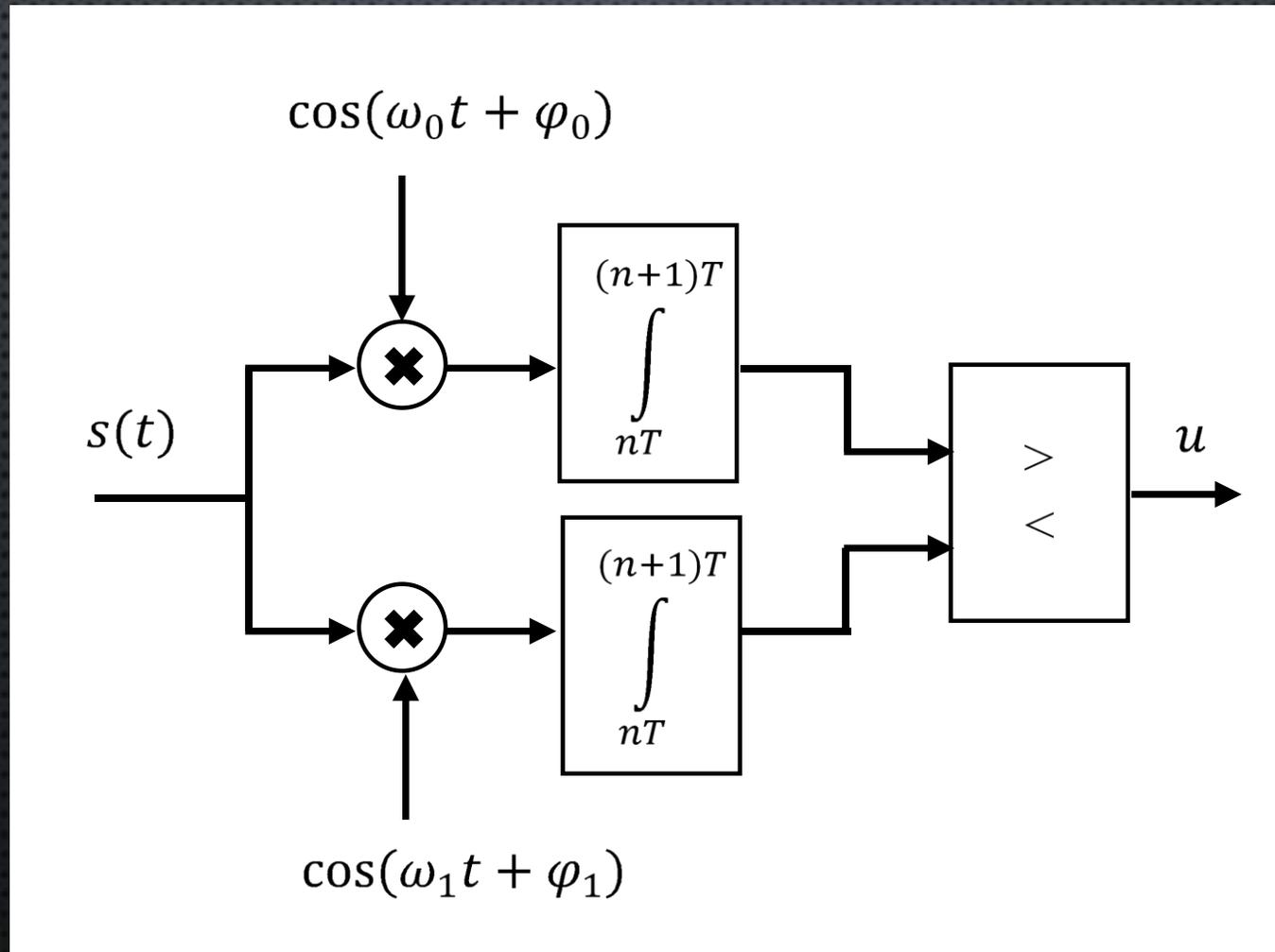
EXTRACTION ALGORITHM

EXTRACTED SIGNAL



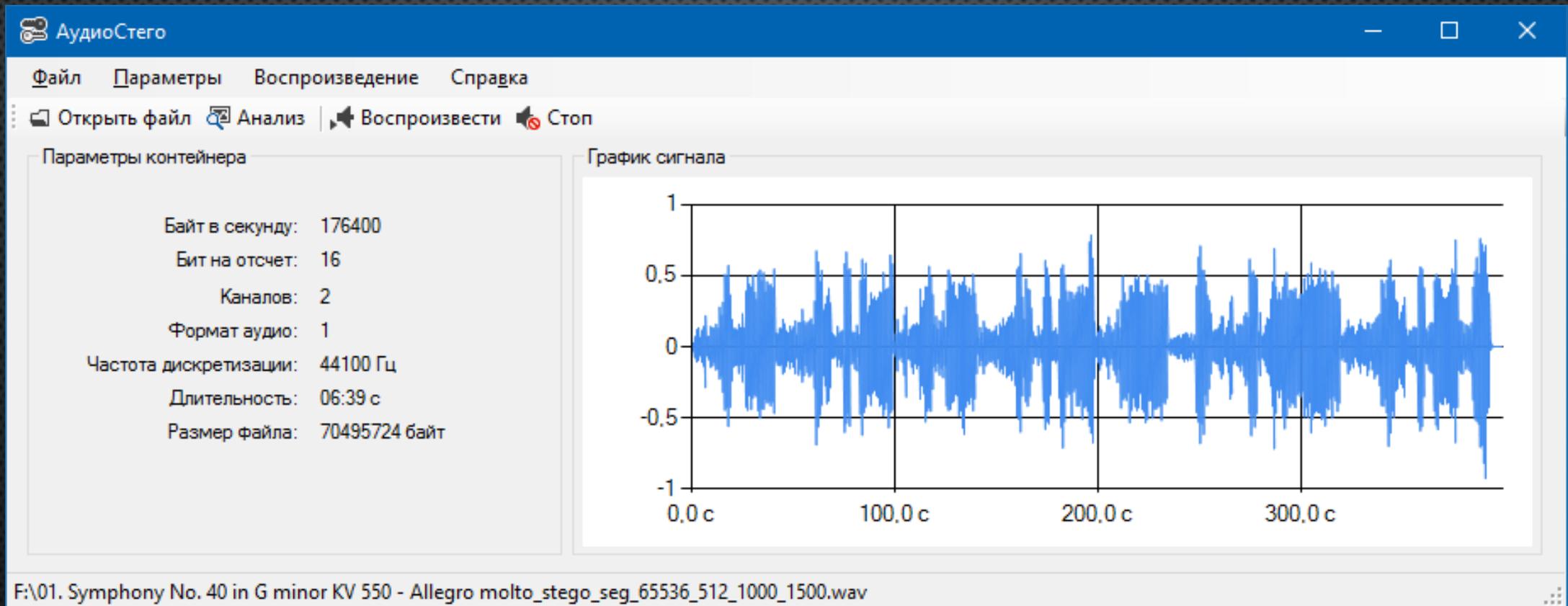
DETECTION AND READING

DEMODULATION



SOFTWARE TOOL

CONTAINER



SOFTWARE TOOL

ANALYSIS

The screenshot displays the 'Стегоанализ' (Steganalysis) software interface. The window title is 'Стегоанализ'. The interface is divided into several sections:

- Параметры (Parameters):** Contains four spinners for configuration:
 - Амплитуда (Amplitude): 0,0001 (range 0 - 1)
 - Частота 0 (Frequency 0): 1000 (range 0 - 22050 Гц)
 - Частота 1 (Frequency 1): 1500 (range 0 - 22050 Гц)
 - Отсчетов на 1 бит (Samples per bit): 512 (range 1 - 65536)
- Порог обнаружения (Detection Threshold):** A slider set to 50% with a value of 1,28E-06.
- Данные о встраивании (Embedding Data):** Summary statistics:
 - Общее количество бит: 34304
 - Количество бит без встраивания: 34072
 - Количество встроенных бит: 232
 - Количество 0: 90
 - Количество 1: 142
- Тестовый режим (Test Mode):** Performance metrics:
 - Правильно необнаруженных бит: 34072 (100,00%)
 - Правильно обнаруженных и различенных бит: 232 (100,00%)
 - Ложных необнаружений: 0 (0,00%)
 - Ложных обнаружений: 0 (0,00%)
 - Ложных различений: 0 (0,00%)
- Textual Representation:** Two text boxes, both containing the text 'Это пример скрытого сообщения' (This is an example of a hidden message).
- Buttons:** 'Битовая карта' (Bitmap), 'Отмена' (Cancel), and 'Выполнить' (Execute).
- Status Bar:** 'Обработано сегментов: 268 из 268 (100%)' (Segments processed: 268 of 268 (100%)).

SOFTWARE TOOL

ANALYSIS

Стегоанализ

Параметры

Амплитуда: 0,0001 (0 - 1)

Частота 0: 1000 (0 - 22050 Гц)

Частота 1: 1500 (0 - 22050 Гц)

Отсчетов на 1 бит: 400 (1 - 65536)

Порог обнаружения

%: 50

Значение: 1E-06

Данные о встраивании

Общее количество бит: 43684

Количество бит без встраивания: 43391

Количество встроенных бит: 293

Количество 0: 119

Количество 1: 174

Текстовое представление встроенного сообщения

ЮьNrАню!Шу~Щръ_лщыЮнь0>уOp07Нт

Тестовый режим

Правильно необнаруженных бит: 43389 (100,00%)

Правильно обнаруженных и различенных бит: 118 (40,27%)

Ложных необнаружений: 2 (0,00%)

Ложных обнаружений: 63 (21,50%)

Ложных различений: 112 (38,23%)

Текст сообщения для сравнения (29 из 5460)

Это пример скрытого сообщения

Битовая карта | Отмена | Выполнить

Обработано сегментов: 268 из 268 (100%)

CONCLUSIONS

In work results of development of a software for embedding, extraction, detection and reading of messages in audiofiles are provided. The methodology of work and program implementation belong to a steganography - one of the main directions of information security.

The methodology and software are a basis for steganography systems with frequency hopping (FH) and with a variation of prosodic parameters of the speech creation.

MONOGRAPH

TECHNOLOGY OF EMBEDDING DIGITAL WATERMARKS IN AUDIO



In our work developing the ideas presented in the book "Technology of embedding digital watermarks in audio" (Gurin A.V., Zharkikh A.A. Plastunov V.Y.).

Various aspects of technologies of embedding of digital watermarks in an audiosignal are presented in the monograph. The general principles of embedding of digital watermarks are given. Embedding in audiosignals is considered. Therefore physics of a sound, physiology of perception of a sound by the human, the principles of digital-analog and analog-digital transformation of signals and some formats of audiofiles are presented. Technologies of embedding are presented by known and new methods. Feature of the monograph is that the majority of the given methods are based on scientific publications of authors.

THANK YOU FOR YOUR ATTENTION.