UDC 681.3

MODEL REPRESENTATION OF VIBROACOUSTIC CHANNELS OF SPEECH INFORMATION LEAKAGE

Hasani Ahmed Nezar Salih, Master Student

Belarusian State University of Informatics and Radioelectronics, Minsk, Republic of Belarus

Vrublevsky I. – PhD

Annotation. The vibroacoustic channel of speech information leakage in the protected room is considered. It is shown that the spectrum of speech signals can overlap with a set of a number of natural resonant frequencies for the enclosing structural elements.

When considering the vibroacoustic channel of speech information leakage in the protected room, it was assumed that the source of information is a person, and the propagation medium is air. The speech signal is created by the human voice, which causes vibrations of the air environment in the form of acoustic vibrations [1–3]. In the calculations, the speech signal range was taken to be 300–400 Hz.

The mathematical description of the process of spreading speech information behind the enclosing structural elements was built using an approximation in the form of a rectangular plate for such structures as a wall, floor, ceiling. By solving the differential equation in partial derivatives of the transverse vibrations of a rectangular plate, the frequencies of natural vibrations of the plate are determined for the case of gypsum blocks of given sizes and characteristics.

It is shown that the spectrum of speech signals can be overlapped by a set of a number of natural resonance frequencies for the enclosing structural elements. As a result, an acoustic wave with speech information is generated, which is excited by the reverse side of the enclosing structure. Thus, the vibrations are unevenly distributed throughout the structure. There are certain areas with maximum values of natural vibrations. Such areas with maximum natural vibrations of structures must be localized by placing a vibration transducer to generate an interference signal.

References:

1. Dvorjankin S.V., Harchenko L.A., Kozlachkov S.B. Estimation of security of voice information based on modern technology for noise reduction // Voprosy zashhity informacii. – 2007. – No. 2 (77). – P. 37–40. (In Russ.).

2. Horev A.A. Technical protection of information: Uchebnoe posobie dlja studentov vuzov. – M.: NPC Analitika, 2008. – Vol. 1. –436 p. (In Russ.)

3. Davydau H.V. et al. Method for protecting speech information // Doklady BGUIR. – 2015. – Vol. 8 (94). – P. 107–110.