**Makarenko Vladimir, Spivak Victor. (NTUU "KPI").**

**THE USE OF SIMULATION PROGRAMS TO STUDY COURSES IN RADIO ENGINEERING**

During studying disciplines that address the complex signal conversion with the transfer of spectrum from one frequency to another, the conversion of spectra in the process of processing and separation of signals is very difficult to explain to students what physical processes occur during these transformations. The notion of spectra for many of them remains some abstraction that he could not associate with the shape and frequency of the signal.

The improving the perception of educational material with a clear demonstration not only signals represented in frequency domain and time, but also electronic devices that implement various transformations, using simulation using spice-simulation.

To illustrate the operation of devices and signal transformations the article discusses the functioning of the simplified circuit of a super heterodyne radio receiver. In such receivers, there are specific interference when receiving signals in the so-called mirror channel. If the input filter uses a simple oscillating circuit, the noise at the image frequency can be substantial. In the study of super heterodyne receivers very often, students do not understand where mirror a hindrance and what must be does to reduce it.

The article shows how by modeling the process of frequency conversion by using the simulation program NI Multisim is possible to investigate the influence of the characteristics of the input filter and the value of the intermediate frequency of the receiver to the interference level SLR. Spectrum analysis of the signals at the mixer output using a virtual spectrum analyzer for different values of intermediate frequency illustrates the influence of intermediate frequency on the efficacy of reducing interference mirror.

The characteristics of the simple input filter is illustrated by measuring the frequency response of this filter and study the spectral components at the mixer output when exposed to the input of the receiver additive mixture of useful signal and interference mirror. The choice of simulation program for analyzing the circuit design from the point of view of functionality and its cost, the promising application of simulation programs in the study course electrical engineering and electronics.

Keywords: simulation, spice simulation, NI Multisim, signal conversion, spectrum, analysis, research, and measurement.