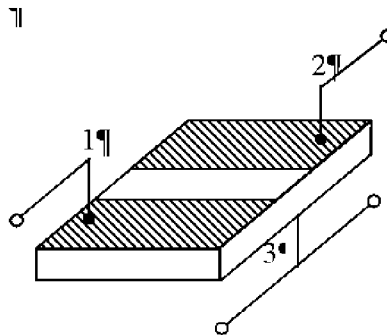


PIEZOELECTRIC TRANSFORMER

A piezoelectric transformer is an electrical device in which a direct and reverse piezoelectric effect is used to convert electrical energy or a signal. The purpose of this conversion may be a change in the amplitude of the voltage or galvanic isolation, and also depending on the direction of the polarization vector and the direction of propagation of the excited oscillations, piezoelectric transformer divided into transverse-longitudinal, transverse-transverse, longitudinal-longitudinal and longitudinal-transverse.

Electromagnetic transformers differ from piezoelectric transformers by converting energy: to electric, acoustic, electric, which leads to a significant simplification of the design of the piezoelectric transformer, in where there are no wires or windings, that helps to better operation and reliability of the device. The piezoelectric plate in the simplest case has two pairs of electrodes forming (Fig.1) the exciter and the generator. Using the reverse piezoelectric effect, the exciter creates a mechanical deformation in the plate, covering the entire volume of the piezoelectric element in the form of an acoustic wave. In the generator section of the piezoelectric transformer, as a result of the direct piezoelectric effect, an alternating signal is generated, that is galvanically separated from the input voltage.



1, 3 - exciter section; 2, 3 - generator section.

Figure 1 – The simplest layout of the piezoelectric transformer.

Different types of piezoelectric ceramics are used as a working material for piezoelectric transformers, since it is the piezoelectric ceramics that allows structurally to combin in one plate both elements of the piezoelectric transformer – the exciter and the generator. This is due to the technological possibility of differentiated orientation of the piezoelectric polarization vector in the manufacturing process of the corresponding monoblock ceramic piezoelectric elements.