Possible directions in seismoelectrics research

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In this paper we consider possible directions of research of seismoelectrical phenomena associated with interaction of fields of different nature and with nonlinearity.

In the field, we investigate parametric phenomena arising in rocks as a result of seismoelectrical transformations. The geological environment, in which periodic seismic oscillations are excited, acquires properties of a parametric electric oscillatory system.

It's gave special consideration to investigation of amplification of secondary electrical oscillations and formation of combinational frequencies. It is proved that under certain conditions there is a possibility of parametric resonance due to transfer of elastic wave energy into the energy of an alternating electric field induced in the earth.

We assume that parametric electric response to elastic wave can occur not only due to seismoelectrical effect of the second kind (SEEf2) – excitation of the secondary electric field as a result of elastic vibration. The cause of electrical responses can also be a seismoelectrical effect of the first kind (SEEf1) – a change in electrical parameters of medium under elastic vibration.

The observed phenomena of occurrence and amplification of parametric oscillations at seismoelectrical transformations can be called, by analogy with SEEf1 and SEEf2, "seismoelectrical parametric effects".

In laboratory conditions, we investigated simultaneous effect of two excitation seismic signals. We used non-contact current measurement for definition of secondary electric field. It minimizes impact of contact phenomena. Violation of additivity at double excitation may indicate nonlinear nature of SEEf2.

Further study of the described phenomena can give new information about processes of energy transformations of different fields in real geophysical environment.

The reported study was carried out under the state task for the Schmidt Institute of Physics of the Earth, Russian Academy of Sciences and was funded partially by RFBR according to the research project № 18-35-00698 (laboratory investigation of nonlinear mechanoelectrical transformation with non-contact current measurement).