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ACOUSTIC EMISSION AND SEISMICITY INDUCED BY EXTERNAL ENERGY IMPACT

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Abstract

The external energy impact on geophysical media is one of the active methods of influence on natural seismicity process for the purpose of its regime alteration and relatively weak earthquake initialization.

The paper presents the investigation results of both spatial & temporal seismicity structure associated with the electromagnetic impact by MHD (magnetohydrodynamic) generator and laboratory experiments on energy impact on model rock specimens.

According to the field experiment data, simulation is performed of the distribution of electromagnetic fields, currents, mechanical strength density and heat fluxes induced in the earth by the MHD-pulses allowing to adjust an important parameter of the analysis: the limit spatial scale of the seismo-electromagnetic interactions.

The electromagnetic impact induced seismicity is shown to me manifested by surplus earthquake flow of predominantly K=7 energy class in a local seismogenic zone that is spatially conjugate with the transmitter MHD dipole.

The fact is stated of comparable energy values of the electrical impact and the induced seismicity.

The laboratory experiments are performed on a lever-driving press under discrete axial load variation. Such loading provides a possibility to diverse in time the loading process and the energy impact stage. At ever discrete level of quasi-static axial loading, up to the destructive value, recording is performed of the induced acoustic response from different energy impact regimes. The experiments are performed on the zirconium dioxide specimens containing no piezoelectricity.

The report presents the acoustic emission temporal distributions under separate and combined impact of vibrational and/or two electromagnetic fields of various structure produced by two independent sources. The correlation is shown to take place between the acoustic emission activity and the external energy impact for both separate and combined impact by fields.

The acoustic response amplitude is experimentally shown to be higher under combined impact than the response superposition under separate field impact. The fact is stated of comparable energy values of combined vibrational and electromagnetic impact with the energy of the induced acoustic response.

The results of the field and the laboratory experiments indicate a possibility of system formation of external impact on natural seismicity process in order to alter its regime and to initialize the stored media elastic energy release in a form of relatively weak earthquakes.