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Disturbing effects in PVEP method

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Abstract

One of the ways in which the natural high electromagnetic impulses originate is the tension stress of the rock material. Several kinds of energy are released during the rock massive dislocating. The mechanical, thermal, elastic and electromagnetic energies are known. On the other side a lot of electromagnetic impulses are originating as the troublesome ones. We want to show some types of these impulses in this article. The knowledge of these events is important for processing and interpreting natural high–electromagnetic measurements. It is necessary for the measurement data to be prepared in such a way so that the useful signals only have remained to geological interpretation.

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Measurement of the natural high–frequency magnetic field (PEE) in the boreholes using the FJV99 selective picoteslameter

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Abstract

The measurements of the natural pulsed electromagnetic emission (PEE) help to solve many tasks of engineering geodynamics, ecogeology, engineering geology and mining. In this paper, we present a prototype of the PEE measuring device, selective picoteslameter FJV99, and discuss sensitivity analysis of the instrument.

One of the most interesting features of the PEE phenomenon is its rapid spatial variability. By moving the detector, by only ~ 0.1 m, the signal level can change dramatically although the wavelength of the detected radiation reaches up to 20 km. As a possible explanation of this phenomenon, the fluctuations of underground DC current is discussed.

The electric current field around a cylindrical hole and on this basis, the spectral density of the magnetic field inside the hole is calculated. The values and the spatial behaviour of the calculated AC magnetic field correspond to the measurements. Geochemical processes, atmospherically processes, and underground water flow are discussed as possible sources of the DC electric current.

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Electromagnetic emission from rocks – laboratory and field measurements

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Abstract

Measurements of electromagnetic phenomena that occur as magnesite and grey dolomite samples are subjected to heavy uniaxial loads are presented. The phenomena were registered during laboratory studies the aim of which was to estimate the electromagnetic emission (EME) preceding the failure of the sample. The EME values and character were compared and basic EME parameters were determined. Also the results of the measurement of magnetic field emission in boreholes in the SM2 Jelšava magnesite mine are reported. The magnetic field emission values registered in the boreholes are shown against the geological section.

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The sources of 14 kHz EM fields observed at geoelectrical measurements

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Abstract

Authors, motivated with results of geoeletrical measurements of magnetic component of natural electromagnetic field in the 14 - 50 kHz ranges, have analysed sources of observed electromagnetic fields. In the more detailed view on the problem more potential natural sources has been shown to cause observed EM fields. The sources that can be considered are regional sources, local conditions and processes in the near surface rock environment. Authors have discussed conditions for electromagnetic waves propagation and attenuation.

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Laboratory measurement of electromagnetic emission at rock samples deformation

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Abstract

Recently, new method for mechanic stress estimation in rock massive has been developed. Developed method is named PEE (pulse electromagnetic emission) or NHEF (natural high frequency electromagnetic field). It is based on the assumption that a deformation of crystal lattice of rock frame under affected mechanical stress leads to the elastic and electromagnetic emission. This phenomenon can be observed during landslide stability monitoring. Authors carried out the laboratory measurements at rock samples to study the EM emission characteristic at rock deformation. The aim of this experiment was to detect and evaluate electromagnetic emission if the rock samples were compressed in the press.

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Natural high frequency electromagnetic field on the Karolínka landslide

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Abstract

The new methods of landslide studying have been developed for many years. Especially the methods for the deformation monitoring and those for the observation of tension changes are of great importance. The observation of the emission of rock noise impulses and the high-frequency electromagnetic impulses are some of the new possible ways of doing it. Several stages of high-electromagnetic measurements were repeated in the Karolinka Landslide. On the base of these works we have been able to construct the contour lines of the high electromagnetic field. The changes of this field are discussed in this article.