

Magnetic device for experimental investigations

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ABSTRACT: This paper presents the results of research on the magnetic devices for experimental investigations. The aim of these research was to design a new device which provide information concerning the state of deformation, displacement and stress for characterise mining phenomena simulated by modelling materials.

The device is compose of two parts:

- the emission transducer that is a magnetic marker of 1 cm diameter,
- the receiver transducer that can locate the coordinates of the marker.

This system is capable to detect, process and analyse the microdisplacement data generated by geomechanical phenomena studied.

The experimental analysis using physical models contribute to the solution of practical rock engineering problems and to elucidation of rock mechanics' fundamentals.

The main parameters that characterize mechanical phenomena studied using the physical model are: micro displacements μ , deformations ε , stress state σ and pressure p .

There are many factors that must be taken into account when designing devices for measurement evolution of parameters: μ , ε , σ , p and system capable monitoring, processing and analysind the mechanical data:

- The size of these devices must be small as possible for not influence the manifestation of geomechanical phenomena,
- The signal transmission cable between the emission transducer and the detecting system must not exist because these cables can modify the kinematical mechanism of rock massif simulated,
- For a plane model the device of mechanic parameters must not disturb the displacement and deformation visualization,
- The robustness of the device must be important because of the technology used for physical model,
- A very good measure accuracy of the parameters ,
- The system must provide a means of obtain continuous up- to -date information and must allow more of data analysis to be performed on-line by the computer.

All these requirements imply the idea that these devices must be compose from an emission transducer, a source of energy that can be detected from distance, sensitive at the variation of mechanic parameters and a receiver transducer which take all the information about the variation of interested parameters.

The source can be an electrical, magnetical, electromagnetic fields, a radioactive sources, an acoustic sources, etc.