



New technique for measurement of rock sample permeability

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The new technique and equipment for precise measurements of rock sample permeability and its anisotropy in a wide range of values ($10^{-22} - 10^{-15} \text{m}^2$) at ambient and high PT-parameters were developed.

The modification of the pulse decay method is based on analysis of transient fluid flow through the rock sample. The technique is based on fitting of experimental data to analytical and numerical solutions of the filtration equations derived with regard to the variation of flowing gas properties with temperature and pressure. The technique permits to determine simultaneously the sample permeability for the condensed fluid and the Klinkenberg's constant from the single experiment. This approach increases substantially accuracy of the measurements at shortening of their duration.

The method of alternating flow shape is developed for simultaneous determination of axial and radial components of permeability tensor for anisotropic rocks with layered structure. With this method, both of the permeability components are determined from a single experiment.

The experimental setup and software for implementation of the new methods are developed and built. The setup allows to carry out the experiments at temperature up to 300°C, fluid pressure up to 50 MPa and confining pressure up to 50 MPa. A cell capable to produce temperature up to 600°C and pressure up to 100 MPa was specially

designed for microstructure investigations. For direct observation of a sample surface at high PT this cell can be placed entirely into a scanning electron microscope.

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