

Initiation of the artificial sandstone sample fracture due to electrical current impact

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The fracture of artificial sandstone sample (sample #11) initiated by direct current impact was observed under laboratory conditions. Experiments were carried out by use of the lever press facility. Description of the facility and its characteristics has been presented in previous publications of the authors. The facility allows to realize the stage of quasistatic loading state when the load applied to the sample enable to vary within very limited interval only due to relaxation processes in the sample.

The loading level in the moment of direct current pulse beginning was 1.5 MPa. Duration either of the current pulse or time intervals before and after it was determined on the base of behavior of the sample in a process of loading, i.e. number and intensity of acoustic emission signals. The sample was saturated with 15% NaCl solution. Open porosity was almost 20%; this value is markedly larger than for other samples of such type. This fact determines further relatively low strength of the sample. Measured values in experiment are loading force, number and intensity of acoustic emission, change of longitudinal and two transversal (at opposite side surfaces) dimensions, electrical current and temperature at side sample plane. Duration of direct current exposure (current dencity was about $25 \cdot 10^{-3} \text{ A/sm}^2$) up to fracture moment was 720 sec. Therewith the outside surface temperature increased by 2.3 degree during this time. Such heating can result in considerable additional stresses within the sample and intensification of cracking. Additional experiments with similar samples are intended to carry out in order to check reproducibility of the obtained result.