Geosystems of Transition Zones, 2018, vol. 2, N 3, p. 245–251
Геосистемы переходных зон, 2018, т. 2, № 3, с. 245–251
http://dx.doi.org/10.30730/2541-8912.2018.2.3.245-251

Full text RUS
https://elibrary.ru/title_about.asp?id=64191

Features of the critical stage of fracture process of deformed heterogeneous materials

E. E. Damaskinskaya[1]
I. A. Panteleev[2]
D. I. Frolov[1]
N. F. Vasilenko[3]

[1]*Ioffe Institute, Saint-Petersburg, Russia*
[2]*Institute of Continuous Media Mechanics of the Ural Branch of RAS, Perm, Russia*
[3]*Institute of Marine Geology and Geophysics of the Far Eastern Branch of RAS, Yuzhno-Sakhalinsk, Russia*

Abstract

Laboratory investigations of deformation of heterogeneous brittle materials (rocks) by acoustic emission (AE) and X-ray computer microtomography (CT) have been presented. Quasistatic tests of cylindrical samples of Westerly granite have been carried out under conditions of uniaxial compression. Totally, 11 loading-unloading stages and tomographic surveys have been carried out. The defect structure evolution have been considered in the framework of the concept of self-organized criticality. It has been found that the type of the energy distribution function of AE signals can be used as an indicator of the deformed material state and transition to a critical fracture stage. An exponential distribution function points to a noncritical state of a deformed material, and a power-law function indicates that the defect accumulation has passed to a critical stage. Similar results have been obtained in the analysis of acoustic emission monitoring data at the operating mining enterprise.

Keywords

Acoustic emission, X-ray computer tomography, Energy distribution, Defect, Rock, Prediction

References

For citation: Damaskinskaya E.E., Panteleev I.A., Frolov D.I., Vasilenko N.F. Features of the critical stage of fracture process of deformed heterogeneous materials. *Geosystems of Transition Zones*, 2018, vol. 2, N 3, p. 245–251. (In Russian). doi:10.30730/2541-8912.2018.2.3.245-251