



Results of electromagnetic and seismic monitoring of the state of rock massive by use the approach of the open dynamical systems

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Rock massif is an open dynamical system. We did an attempt to show the relation of our received earlier results with the developed physical and mathematical theory of the research of the state of the open dynamical conservative and dissipative systems to which relate also rock massive which are in the process of outworking. That thesis is presented quantitative with use of the phase portraits constructed with use of the phase coordinates as the parameters of the integral and interval intensity for the zones of heterogeneity of the second rank and their difference analogue of the time derivatives, which are defined by the use of active induction electromagnetic monitoring data. We provided re-search, which are set on the development of criterions for estimating the stability state of rock massive, using the 6- years electromagnetic and seismic data on two mines. The results lead to such conclusions: by the outworking of the concrete block of the massif the whole massif of the mine field has a change of the stress-deformed and phase states from one explosion to another, - the amount of absorbed and returned energy is not equal and therefore in the massif we see the energy storage, - the process of the energy returning develops with a time delay and depends very much from the gradient of the absorbed energy from high energy explosions, - in the massif occur zones of dynamical calm. That zones we can observe by the data of seismological monitoring - after the end of the minimum of the calm we have during one or two weeks till the moment of the technological gob caving to provide the space-time active electromagnetic or seismic monitoring for revealing the unstable zones of the second rank, - that zones can be after the explosion the sources of high energy dynamical events. That paper is devoted also to the analysis of the morphology of structure peculiarities of the disintegration zones before the high energy dynamical event. During the regular cycle of electromagnetic research of the mine a mine shock occurs with energy 7 balls. 3 days before the mine's shock in the holes 3,4orts, situated 500m from the source of it in the geoelectrical cross sections occur sub vertical discrete structures, to which the zones of disintegration are joined. These structures occur in a resonance mode on different frequencies and only on one frequency for each hole. That event we saw earlier 24 hours before the mine's shock in the other mines. The appearance of such structures of vertical morphology we can regard as a precursor of a high energy dynamical event, however for defining of the place and magnitude of the event we need to have the information of the stability state and the ranks of stability of the concrete block of the massif. Thus the use of the complex passive and active geophysical monitoring, which is set for the research of transient processes of changing the distribution of stress-deformed and phase states can help to forecast and avert the catastrophic dynamical events by outworking of the deep rock deposits. The methods of the active geophysical monitoring must be set to the research in a frame of a hierachic heterogeneous medium.