

# **THE TRANSFORMATION OF THE STRUCTURE OF INFORMATIONAL PROCESSES IN CONDITIONS OF OCCURRENCE AND DEVELOPMENT OF THE EMERGENCY EVENTS.**

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## **Keywords:**

Informational processes in the dissipative systems, hierarchical structure dissipative systems, emergency event, structure of the informational processes, emergency development in a dissipative system, specifics and rate of emergency events .

## **Abstract:**

The space-temporal localization of informational processes in the dissipative systems is considered. The dissipative systems acquire the hierarchical structure. The situation in every element of the particular level in the hierarchy of a dissipative system is reflected by its informational processes. The occurrence of the emergency event in a dissipative system is characterized by the local developments and particular structure of the informational processes that present the site and the reason of emergency occurrence. The emergency development in a dissipative system is described by the lapse (vanished) of informational processes on the lower levels of the hierarchy and their pass into higher levels of this hierarchy. The dynamics of the latter process and the informational process' structure transformation renders specifics and rate of emergency events in dissipative systems.

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## **Introduction:**

Emergency situations in the object are formed as anomaly. In the normal mode of functioning they are not peculiar to the object. Therefore recognition of emergency situations occurrence in object and the control of their development over time should be based on the system analysis of varied parameters of object functioning. This analysis should reduce all occurrence parameters of the most typical anomalies in object and dynamics of their development. Such analysis is based on the concept of information process. We understand process of any physical nature in object in which parameters the information on object condition or its local zones contain as information process. In our opinion, the structure of object information processes reflects structure of its construction as a system. Normal structure transformation of object information processes shows occurrence of anomaly in object. Anomaly characteristics in object and dynamics of its development can be established by comparison of the various object information processes.

## **Forms of object system representation:**

It is possible to allocate two various forms of object system representation.

In the first case the object is represented as complex complete aggregate of the interconnected and interdependent elements. This form of object system representation is peculiar to an engineer-designer. The designer considers object as the device consisting of complementary parts which parameters should be coordinated as much as possible between each other. Complementary parts of this device can have both artificial and natural origin.

In mining the coalmine extract place can be presented as complete aggregate of the following mine technical elements: a combine, conveyor, face support, mine workings, face part of the coal layer, mined out space, immediate roof, immediate ground, main roof and basic ground [1]. Mine technical elements parameters of extracting district and their interaction specificity are defined by the mountain-geological conditions of coal mining.

In the second case the object is represented as complex complete aggregate of the interconnected and interdependent processes. This form of object system representation is characteristic for a process engineer. The technologist considers an object as a system of interconnected and interdependent varied processes. The engineer-technologist should supervise and support the processes integrity and system unity. The interconnected and interdependent processes in object can have both artificial and natural origin.

Coal mine extracting district can be presented as a complete aggregate of the varied scale mountain-technological processes. These processes are stratified relative to each other. They are coordinated among themselves and collected in the sole system integrity by means of coordinating functions. The nature of these mining coordinating functions links to the different aspects of mountain pressure realization [1]. The characteristic parameters of mining-technological processes of extracting district identify the varied scale space-time lattice on which these processes are realized.

## **Information processes space-time lattice:**

In the object space-time lattice the object processes structure, their hierarchy and dissipative object realization character is reflected at. Parameters of the object space-time lattice are statistically steady in the conditions of a normal mode of its functioning. Therefore information processes reproduce the object space-time lattice, reflecting its structure and local zones condition features. Under the choice of space-time lattice scale the object local zone scale is identified.

Depending on the choice of space-time lattice scale of controllable information process at the coalmine extraction district control it is possible to identify a condition of various local zones.

If an information process, for example, methane concentration in the outlet stream of an extracting place, coal layer seismacoustic activity and others, is processed with the period comparable to the average period of the basic roof sink it will identify the basic roof sink step in the best way.

If the same information process is processed with the period comparable to one day duration at the best it identifies a face condition on its daily advance.

If an information process is processed with the period comparable with the period of coal extraction by strips in the clearing face at the best it identifies mine technical characteristics of the clearing face on its length.

If information process is processed with the period comparable with the period of short-hole drilling at the best it identifies parameters of pre-faced part condition of the local place clearing face.

### **Static interrelations in the information processes:**

The object as a system of the interconnected and interdependent processes is structured on the space-time lattice. As the space-time lattice has multilevel construction in this processes system exist both substructure and interlevel static interrelations.

Intralayer static interrelations are generated by multilevel averaging of processes parameters [2]. Identification of such interrelations in object is carried out on the basis of the functional attitude use:

$$S(X_i - X_{i+1}) \rightarrow (Y_i - Y_{i+1})$$

$X_i$  and  $X_{i+1}$  - variety of processes parameters on  $i$  and  $(i+1)$  averaging levels;  $Y_i$  и  $Y_{i+1}$  - variety of conroled processes parameters on  $i$  и  $(i+1)$  averaging levels.

The space-time scaling of processes stratifies processes in object. An own set of variables corresponds to each level of processes hierarchy by means of which it is possible to identify a corresponding level of object localization. Paying attention to the bottom levels of processes stratification we analyze and identify more small-scale zones of object.

The interlayer static interrelations are generated by power processes interaction of hierarchy adjacent levels. The processes in the object, despite of their obviously expressed isolability, cooperate among each other. The small-scale processes accumulating the effect induce the large-scale processes to realization and those, in turn, can influence on the small-scale processes.

Researches of varied scale mountain-technological processes interaction establish presence of linear interrelation between capacity of realization of low-frequency and high-frequency components in various mountain-technological processes [1].

### **The reasons of emergency situations occurrence:**

From the physical point of view, the object represents the specific form of matter self-organizing which appears owing to ordering processes in object from aspiration of object to minimize inside of itself energy loss. In object we treat each emergency situation as occurrence of anomaly in it. Why does it appear?

The answer to this question contains in comprehension of the mechanism of self-organizing processes in the object. If we understand, how there is a self-organizing processes in the object we will receive also the answer to a question why it collapses or why there is an anomaly in the object.

It is known, that in each separate element of the future system appeared as the result of a substance and energy transformation process. This process is characterized as an individual for each element by statistically steady rate of realization. If there is no general for all elements of transport process with characteristic statistically steady rate of realization which can unite all physically diverse elements in a single whole the system will arise never. In the system all its separate elements are incorporated by transport process in a single whole in such a manner that the result of substance and energy transformation in each element of system is demanded on its other elements.

The situation when in any system element the rate of realization of process substance and energy transformation ceases to be coordinated with rate of transport process realization is treated by us as anomaly in system and perceived as an emergency situation. It is obvious, that for prevention of an emergency situation it is necessary to supervise and coordinate rates of transport processes realization in the system and rates of realization of process substance and energy transformation in its separate elements.

Liquidation of an emergency situation in the system is always connected with the use of reserves for the indemnification of essential deviations or in realization of corresponding transport process in the system or in realization of process substance and energy transformation in its any separate element.

### **Anomalies in mountain-technological processes of extracting place:**

Anomalies in mountain-technological processes of extracting district reflect the following:

- Infringement relative isotropy of extracting district constructions as systems of mountain-technological processes at the concrete level of their hierarchy;
- Inconsistency of rate of concrete mountain-technological process realization in a local zone of extracting district and rate of realization in it of corresponding transport process.

Infringement relative isotropy parameters of extracting district local zones can be tracked on change of many parameters of its mountain-technological processes. In the normal conditions of functioning parameters of extracting district mountain-technological processes are rather steady and subordinated to the normal law of distribution. In abnormal conditions of functioning relative stability of mountain-technological processes parameters is broken. It is evidently traced at the analysis of gas emission regulated volumes distribution from drilling and blasting works in mountain development in dangerous and in harmless zones of a coal layer. Gas emission as mountain-technological process in harmless zones of a coal layer is rather steadily realized on each cycle of dredging. In dangerous zones of a coal layer the stability of parameters of gas emission disappears.

Consequences of inconsistency of mountain-technological process realization rate in a local zone of extracting district and rate of corresponding transport process realization are shown in the pre-faced parts of layer. At a normal condition of the coal layer pre-faced parts a normal process of gas emission is carried out. At a jamming containing breeds the pre-faced parts of coal layer that is at its anomaly condition, transport process of coal layer gas emission is blocked, therefore in the local zone of extracting district collects gas and creates danger of coal and gas emission.

## **Development of emergency situations at the extracting place:**

In anomaly local zones extracting district conditions for accumulation of energy of their environment surrounding them are created. Therefore if we leave accumulation of this energy during functioning of extracting district without control and purposefully to not allocate it in time, an anomaly local zone becomes inevitable a core of future technogenic accident development. Laws of an emergency situation in local zones development of extracting district can be tracked on spectrum change of the acoustic signal registered during emission of coal and gas on the extracting place.

In the spectrum of the acoustic signal registered in the pre-faced part of hills high-frequency and low-frequency components [1] are allocated. The attitude of capacities of high-frequency and low-frequency components realization in the spectrum of an acoustic signal reflects interlayer static interrelations between small-scale and large-scale processes in the hills. Change of this attitude identifies process of an exchange by energy between small-scale and large-scale processes in the hills.

The prevalence of high-frequency components capacity over low-frequency components capacity testifies to accumulation about energy in fine local zones of pre-faced parts of the hills. This energy does not leave on formation of large-scale processes. Such phenomenon is observed before coal and gas emissions. During coal and gas emission high-frequency components in the spectrum of acoustic signal disappear and low-frequency start to dominate. It testifies that technogenic accident on extracting district starts to cover in the development larger zones of extracting district.

## **Conclusion:**

1. Emergency situations are formed as anomaly in multilevel system of object processes. These processes have an existential localization and hierarchical structure.
2. An emergency situation recognition in the object and supervision over its development should be carried out in the proper way using system analysis of the different spectrum of object functionality parties and based on the information process concept.
3. The information process concept is any natural process of object which consists information about its location zone.
4. All information processes of object in conditions of its normal functioning are realized on the space-time lattice. It reflects structure of object and specificity of its construction.
5. All information processes of object are characterized by presence of integral level and interlayer static interrelations.
6. Emergency situations in object arise in consequence of incoordination of processes realization rate in the local zones of object and rate of transport process realization connecting the local zones.
7. At the anomaly zone of object in consequence of intrelevel static interaction energy is collected. And this energy in case of the integral levels of processes realization rates incoordination leads to appearance of technological disaster in the object.
8. Development of technological disaster in the object is realized in the direction of scope of the increasing scale zones. Therefore it is important to reveal its local anomaly zones by means of the system analysis of object information processes, to supervise process of energy accumulation in them and to allocate purposefully it by means of artificial transport processes in order to prevent technological disaster in the object.

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