

# **Existential laws of the mega-catastrophes' occurrence caused by influence of space, solar and geophysical transients**

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Conceptual basis for research of existential laws of mega-catastrophes' occurrence are the unity and connection of space and terrestrial energy processes and, in particular transients of solar and geophysical factors. Transients of changing the properties and characteristics of external space influences and an environment reflect energy of process of these transformations. The physical essence of influence of transients of changing the solar and geophysical conditions and parameters will be that, transient shows loading, which creates change of these conditions or parameters on concrete physical structure or system of the Earth. Changing each factor is accompanied by corresponding internal reorganization of the structure, which it influences. Accordingly, the first derivative of changing the factor will show speed of structure reorganization, and the second derivative - acceleration of structure reorganization. If the physical structure after the discontinuance of external influence can restore the former equilibrium position or create a new condition of balance it keeps the integrity. If is not present, it corresponds to irreversible structural changes which are shown as destruction or catastrophe of system. Thus, transients initiate start of processes, which can come to the end with catastrophe. Time and place of catastrophes are subordinated to laws, which can be determined by the mathematical analysis of space, solar and geophysical transients.

The analysis of transients of changing the solar and geophysical factors and time of catastrophes' occurrence has revealed the following laws theirs occurrence.

1. At extreme values of changing absolute size of solar and geophysical parameters 22-57 % of catastrophes are occur, at extreme values of the first derivative of the researched factor - 15-55 % and at extreme values of the second derivative of the researched factor - 15-53 %. At a combination of results analyzing each parameter and all taken into account events of the dangerous phenomena, connection between transients and occurrence of accidents is revealed 90-95 %.

2. Catastrophe arises not at once in 50-70 %, but after a while after extreme changing of parameters transient. Time of "delay" of catastrophes after extreme changing value of the influencing factor has statistical and mathematical law. It is possible to calculate and express it as a spectrum of spline-function of accident activation. The

spectral-temporal functions designed on the basis of processing the statistical data of last catastrophes, depending on a filtration of these data on energy or scale and a geographical binding, have global (the account of all earthquakes) and local (the account only of local earthquakes) laws. Spectral-temporal functions of accidents activation by the physical nature have similarity with display of effect FPU - return of oscillatory activity of mechanical system oscillators, investigated by the Fermi E., Pasta J. and Ulam S.

3. Cyclic spectral-temporal functions of catastrophes activation are calculated on parameters of changing the position of space system the Sun-the Earth-the Moon: synodical month duration of 29.53 days, cycle saros of 6585.33 days and recurrences of conformity of the Moon phases and day's year of 6794 days.

4. Each new extreme change of solar and geophysical conditions as external physical influence causes start of new internal cycles of dangerous processes activation in lithosphere, hydrosphere, atmosphere and biosphere and occurs on a background of the old dying away cycles caused by the previous extreme changes and, being summarized, with them, amplifies. According to the submitted approach, catastrophe is an irreversible reaction of structure to change of external influence and interaction of internal cyclic processes of the structure, which have arisen as reaction of the response to previous external influences.

The established laws of dangerous processes and catastrophes activation can be used for long-term, intermediate term and short-term forecasting the earthquakes, hurricanes, air crashes, ship-wrecks, industrial-technological failures and mass social disorders.