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TIME IN MATHEMATICAL SIMULATIONS OF THE THEORY OF POPULATION OF OBSERVED FAMILIES OF SMALL BODIES IN NON-LINEAR DYNAMIC SYSTEMS

Abstract: *Time continuously controls the variability of the observed natural resources; time teaches by numerous observable examples; time controls the movements of numerous objects at different speeds. Time discards unnecessary stresses in families of small bodies in dynamic systems. It plays the role of a cleaner from excess energies in nature. It leaves only really necessary tensions. Time always starts on time and stops in time. The beginning of time coincides with the beginning of the birth of the Universe. The end of time coincides with the end of the Universe's lifetime. The observed centuries-old systems of birth and evolution of compounds of elements of both living and non-living forms of matter over a millennium, in the dynamic systems of the family of populations of small bodies are indicated as example.*

Key words: *Time; dynamic system; observation; evolution; families of small bodies; population, resonances*.

1. Introduction.

In mathematical modeling of populations and resonances in matter of families of small bodies, Hamiltonian dynamical systems are often used. The accuracy of the solutions of these systems is achieved by comparative Fourier analysis of solutions for a system of differential equations:

$$dp_j/dt = -dH/dq_j\ , \quad dq_j/dt = dH/dp_j\ , \text{(j=1,…n)} \qquad (1)$$

where p_j and q_j are impulses and coordinates, which can be represented as:

(p, q; t)= $(p_1, p_2, \dots., p_n; t, q_1, \dots, q_n; t)$; (2)

H- Hamiltonian of the system (1), t- Hamiltonian of the time.

All observed processes, phenomena, chaos and catastrophes are consequences, results and creations of various variability in systems and time stops. The observable Universe exists as a single self-governing dynamic system. It contains numerous similar self-governing dynamic systems. Both she and they have their own terms of existence, terms of variability, terms of evolution and terms of transition to other forms. All these systems and processes are located in the space of time. Hence the following axioms: 1. The process of variability of matter in the Universe is continuous. 2. The period of existence, t, of the observable Universe is - ∞ <t <+ ∞, in other words, the beginning and end of time can be in the time interval from - ∞ to + ∞. 3. The space of the Universe embraces all objects and all processes like a vessel without an angle and without boundaries.

2. The beginning of time coincides the beginning of the birth of the universe. The end of time coinces with the end of the universe

Time in observations indicates, shows populations, resonances and acts continuously. All observable and non-observable objects and processes have their own periods of existence in nature and in the Universe. Therefore, there is a saying: "Everything has its time." All types of matter adapt to the needs of changing time, internal and external environment. The emergence of the Covid-19 coronavirus was such an unexpected example of our time. It showed how Earth's capabilities are limited against changing patterns of natural resources. However, humanity has undergone such filtering many times. In nature, in dynamical systems with populations and resonances in families of small bodies, natural resources, forces, conditions, laws work according to ”the carrot and the stick” principle. They correspond to the optimal internal self-regulation of various stresses, time management by natural efforts. All this happens by itself. The law of balancing time and interactions is continuous. It should be remembered that the set of

correct rules is endless. In other words, random samples occur from an infinite set of processes, assessments and patterns. Natural and optimal selection, and the choice is realized by Time. Other factors, phenomena and processes play auxiliary roles. At the same time, the focus is always on the time. It interacts with all processes of nature through the variability of the evolution of matter. It seems that time is inactive, but in fact, it melts the bonds between the position, state and behaviour of matter. Their evolutions are formed over time and act in the form of regularities. All movements, forces, speeds, states and positions of matter are continuous constituent forms of actions in the Universe. Thus: Time rules, Time teaches and Time works. Therefore, there is saying: "Time is the head of everything. "It rules over all the resources of nature. It is not wrong. There is no place for accidents in it. Powerful changes in nature over time occur from the combined effects of the sum of weak, regular and resonant interactions [1-5].

It should be noted, that just as unfinished work and other anomalous phenomena dictate to their author each next step of the work, so time completes natural processes. In other words, all natural tensions dissolve by themselves over time, i.e. the law of inertia works, and the dynamic system supports itself. Thus, all dynamical systems always and everywhere are reduced to stable dynamical systems. Therefore, there saying: "Everything has its time." One such example is the geocentric dynamic system of the world. On earth, they appear and act as catastrophic processes: earthquakes, volcanic eruptions, landslides, numerous oceanic and atmospheric phenomena. They are inextricably linked with time and time ligaments [6-8]. Time simultaneously unites all movements and variability of matter in continuous, dynamic and cyclical processes.

Consequently, Time is a parameter and indicator of various processes that unite all continuous and cyclical patterns of variability in nature and in the Universe. At the same time, it discards unnecessary stresses in families of small bodies, in dynamic systems. It plays the role of a cleaner from excess energy in nature and leaves only really necessary stress. Therefore, they say: "Time will tell." Time always starts on time and stops in time.

Conclusion: Thus, time unites all observable, continuous and cyclical variations of matter in the Universe. Time discards only unnecessary stresses in dynamic systems. It plays the role of a cleaner from unnecessary energies and stresses in nature. It leaves only really necessary stresses. Time always starts on time and stops in time. The end of time coincides with the end of the Universe's lifetime. The beginning of time coincides with the beginning of its birth. In other words, time is a parameter of nature, indicating the period of existence of variability, both the internal structure and the external forms of matter in the Universe. As an example, both organic and in organic forms of compounds of matter variability during the evolution of nonlinear dynamical systems, in their populations and resonances in families of small bodies, observed for millennia are indicated.

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