

At the present moment in aerospace it's technically possible to realize only the jet propulsion or use the inertial forces (for an example Tolchins' or Savelkaevs' inertial machines). But they are non-efficient and slow methods. (We'll pay no attention to exotic methods of propulsion: the space sail-ship based on the Sun-wind etc., because they are not promising enough.) The jet propulsion unit or inertial machines need on-board energy source, which is limited. That is a problem for aerospace systems.

The first simple and rough illustration of the new principle of motion is a small experiment. Let's take a piece of soap and press it in the palms strongly. Incidentally, if the pressure of the palms is even, the soap will be left in the state of immobility. If the pressure

is not even the soap will slip out of hands with a high speed. It is most important to understand that the soap will not spend any energy. We can press and press it as long as we wish, and the soap will keep slipping out.

The aerodynamic (hydrodynamic) force is the analogous example. It's a **reaction of environment (the space) on the shape** of a moving wing. The appearance of a rarefaction above the wing creates the lifting capacity. It should be noted that environment creates the force itself and the wing doesn't expend any energy except for the translation motion.

The third example is an appearance of the buoyancy in water. It's also a **reaction of environment (the space) that depends on the density of an object's matter.**

Time is a Mystery of the Universe



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Milleniums pass, but we still do not know, what is time. We hardly have another such notion, which has so different and even alternative conceptions. Here are some widespread conceptions of time:

- *There is no time; it is a subjective sensation.*
- *Time is an objective reality, which is a form of matter existence as space.*
- *Time is only a comfortable method to describe the motion of bodies and processes, which take place in the World.*
- *Time is a cause of motion of bodies and passing processes.*
- *Time is absolute, it does not depend on anything and it is similar for all systems.*
- *Time is relative, it is own for every system.*
- *Time is a measure of strictly periodic (cyclic) processes, which are realized in stationary systems only.*
- *Time is a measure of changeability of systems; time does not pass in stationary systems.*

- *Time is reversible (because basic equations in physics do not change with change of sign of time).*
- *Time is essentially irreversible (because all human experience is an evidence that the future differs from the past, and that a movie, which was started counter, is not realistic).*
- *Time can be described mathematically as a scalar variable quantity, which changes equally in all points of three-dimensional physical space.*
- *Time can be described as one of directions in four-dimensional variety, which is called space-time, at that this direction, generally speaking, is own for every physical system.*

In general, the situation about the problem of time now is similar to the situation some centuries ago. It is well illustrated by the words, which are attributed to Augustine Blessed. They sound like this: "While I do not think about time, I know that time exists, but when I begin to think about it, I stop understanding, what it is." Situation related with the notion of time is complicated by the circumstance that this notion is widely used by representatives of various fields of knowledge (biologists, geologists, historians, philologists, and psychologists). With this many authors put their own sense in the notion of time. Often they do not want to take the trouble of explanation, what do they understand under the term of "time".

Let's consider some basic theses concerning time, which were based on achievements of philosophy and physics, sciences, where problem of time is investigated most deeply and in full. The most of known conceptions of time can be kept within two principally different conceptions of time, those are relational and substantial. These conceptions differ in interpretation of relation of time and physical matter (substance and physical fields belong to physical matter). According to relational conception there are no time itself in nature, and time is only a relation or system of relations between physical events. In other words, time is a specific manifestation

of properties of physical bodies and changes occurring to them.

Another conception, substantial one, vice versa supposes that time represents an independent phenomenon of nature; it is a substance of a special kind, which exists along with space, substance and physical fields. Relational conception of time is usually associated with the names of Aristotle, G.V. Leibnitz, A. Einstein. The brightest spokesmen of substantial conception of time are Democritus, I. Newton and one of the modern scientists N.A. Kozyrev.

From the philosophical position both conceptions of time are analyzed in the monograph [1] in details. It is shown in this monograph that each concept has its own merits and demerits, but with the modern extent of their development not one of them describes all properties of time. In relation with this fact we made a conclusion, that not one of these conceptions has advantages to each other (though we can mention that substantial conception is more adequate to the materialistic ideology). The analysis of relational and substantial concepts is made in the article [2] from positions of physics. A conclusion that modern physics including theory of relativity also does not give a ground to prefer one of these conceptions is made in this article. Besides, a wide range of fundamental questions connected with time has no answer. That's why both conceptions of time need further development.

Let's note the difficulties on the way of development of these conceptions. A complexity of generation of physical theory of time on the basis of relational conception lies in the following. Since relational conception assumes that time is fully determined by physical matter, then time in the frames of such theory should be expressed in some characteristics of processes, which take part in physical systems. But then the notion of process itself should be defined before introduction of notion of time and independently on it.

However, we hardly can imagine, how we can formulate a definition of process without paying attention on the notion of time, in particular, without using such characteristics of process as its duration or speed of its passing. Let's note that analogous situation could appear during the development of relational conception of space. Here we need to formulate a definition of physical system before introduction of notion of space, i.e. without mentioning even of such simplest characteristic of system as its spatial size. It is not clear how we can do it.

An essential difficulty during the construction of physical theory of time on the basis of substantial conception lies in the need to answer the question: "How does time substance transfer its properties to physical matter?"

The author of this article does not know the works, in which we can find a fact of successful overcoming of the above mentioned difficulty being on the way of

development of relational conception of time. Researchers holding this conception usually concentrate their attention on description of methods to measure time and do not clear up the essence of time phenomenon itself in details. Let's remind that the term "time" has two different senses. On the one hand it means a certain phenomenon of nature (time-phenomenon). And on the other hand it means a quantitative characteristic of this phenomenon (time-parameter). Since the clocks as any physical device is an element of physical matter, then it seems to be natural that we can generate a theory, in which the readings of clocks giving the values of time-parameter are expressed by some properties of physical matter. However, even the successfully construction of such a theory (which can be called the relational theory of clocks or relational theory of time-parameter) does not mean a binding correctness of relational conception of time, since this theory does not tell anything about the essence of time-phenomenon. Let's underline in repetition of [3] that a skill to measure some value is not a guarantee of understanding of nature of physical phenomenon described by it.

The most obvious case to illustrate it is the case with the phenomenon of heat. The temperature of bodies was measured by means of thermometer as in the times when existence of hydrogen was recognized or after the creation of molecular-kinetic theory of substance. Thus, we can state that there is no real progress in development of physical theory of time on the basis of relational concept yet.

As opposed to this theory a certain development took shape in substantial conception of time. First of all it is related with the name of Saint Petersburg physicist Nickolay A. Kozyrev (1908-1983). Working on the problem of the source of stellar energy, N.A. Kozyrev advanced a hypothesis on presence of other properties of time along with duration. These are the properties, which give time a possibility to influence events in the World. The scientist called these properties physical or active, and the theory to describe them he called "causal mechanics" (such name was stipulated by the fact that according to scientist's ideas physical properties of time manifest in cause-effect relations). N.A. Kozyrev made a huge theoretical and experimental work in development of his hypothesis and expanded it with a cycle of astronomical observations. Main results of these researches are stated in score of his publications. Most of them were included in the collection of scientist's selected works [4]. Unfortunately, N.A. Kozyrev didn't have time to finish the development of his theory. The scientist showed a possible way to study time and passed a significant part of this way himself.

Followers of the scientist make the further advance on the way outlined by N.A. Kozyrev. In particular, in the work [5] a notion of spatial-time substance is introduced to the development of Kozyrev's ideas. The latter represents a four-dimensional variety, which has geometry of pseudoeuclidian space by Minkovsky (due to this fact it matches all theses of the theory of

relativity). Besides, substance has certain physical properties. It is supposed in the given model that substance and fields, which form our world, are not independent physical realities, but specific structures of such substance (like concentrations, vortexes, etc.) and as a whole our World is a single wave like solitary wave, which propagates through substance in the direction from the past to the future. In frames of the given model we can immediately solve the question formulated above: how the time substance transfers its properties to the physical matter? Since substance and fields are particular states of substance itself, then there is no requirement of special transfer of properties from substance to matter and fields. These objects initially have properties, which are common with substance. In such model the notions of the course of time and its direction get a clear sense, it is easy to prove the statement on symmetry of the World, which is analogous to the known CPT-theorem of quantum theory of field. We have a possibility to show that mirror asymmetry of the World and asymmetry of it regarding particles and antiparticles can be the consequences of spatial-time substance acting upon the World. Development of the given notions was a construction of a model of electron as a structure formed by such substance [6,7]. This model describes the electromagnetic field of arbitrarily moving charge in details (without an application of Maxwell's equations).

Up to the present time many results of theoretical, laboratory and astronomical researches by N.A. Kozyrev found a confirmation and development in the works by other specialists, which used different approaches. Some of these works were published in the collective monograph [8] and in two special issues of "Galilean Electrodynamics" journal [9]. The work of Russian interdisciplinary seminar on temporology permanently acting on the base of Moscow State University (head of this seminar is A.P. Levitch) is devoted to the studying of time phenomenon. Materials of the seminar are placed at: www.chronos.msu.ru/SEMINAR/rindex.htm.

A flow of information on researches, which work out Kozyrev's ideas has been growing during last years; and it is the evidence that this direction of studying of time founded by this outstanding scientist has perspectives. At the same time we should recognize that many problems concerning time are not solved yet, and time remains the mystery of the Universe.

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N. A. Kozyrev's Ideas Today

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(Editor's notes by Alexander V. Frolov)

Introduction

Nikolay Alexandrovich Kozyrev's ideas amaze our imagination. They are full of optimism. For the first time in physical constructions we can see vital, creative principles of the World, which are able to oppose to its heat death foretold by traditional physics to be inevitable.

N.A. Kozyrev came to his ideas by the analysis of the observed data about luminance, masses and sizes of

stars. This analysis brought him to a conclusion that the processes of thermonuclear synthesis cannot serve as a main source of stellar energy. **The scientist made a hypothesis that Time is a source of stellar energy.** According to N.A. Kozyrev, Time has active (physical) properties besides its passive property of duration. Time effect the events in the World due to these active properties. These properties manifest in cause-effect relations and express themselves in the counteraction to the usual course of processes, which lead to the destruction of systems organization. Time influence is very small in comparison with usual destructive course of processes, however it is dispersed everywhere in Nature, therefore **there is a possibility of its accumulation.** Such possibility is provided in living organisms and massive cosmic bodies, in stars at first. **Active properties of Time can provide the interrelation of objects, when there are no usual physical effects between them. Time joins the entire**