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Time Unit of Mende

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I. Introduction

Is well known the word: mass, space, time. However, in the literary sources there is no precision determination of these concepts. If we speak about the mass, then to us, at least, are known its three properties, which it characterize as mass. The first property consists in the fact that any mass has linear dimensions. If it did not have this property, then it would be unobservable. The mass is had two additional fundamental properties, in connection with which to be introduced this concept as force. The law of universal gravitation indicates this concept. Actually, two masses are always attracted in accordance with this law. This property is the consequence of the fact that around the mass is observed the potential field, whose gradient is critical for the appearance of this force. This also means that the system of two remote bodies possesses potential energy. The third fundamental property of mass is this its inertia properties, which indicate that for accelerating the mass, it is necessary to exert force. From this property escapes the fact that the moving mass possesses kinetic energy. Thus, mass as physical concept possesses the following fundamental properties: it has linear dimensions, and also it can possess potential and kinetic energy.

The concept of space with the concept of linear dimensions or length, space is connected three-dimensional. Coordinate systems are introduced for the formal realization of this concept. But the space has one additional characteristic, which can be named exclusion principle. This principle consists in the fact that at one and the same point of space at the given instant, cannot be located two different masses. Strictly this principle defines one of the characteristics of this concept as time, that attests to the fact that the different bodies simultaneously can be located only at the different points of space.

What is time, how and why it flows, scientists and philosophers still argue. It is known that time on the level with the mass and the length, enters into all systems of units as primary not on what the not depending value. However, it is known that, in order to measure the time, hours are necessary. There are many types of different hours, but all them unites one special feature. It occurs that in all conceivable hours, always occurs interaction of other primary physical quantities, after all as masses, length and force. In the pendulum hours their motion is determined by the mass of the Earth and by the length of pendulum. The same relates also to the satellites, which revolve around their stars or planets. In the hours with the mechanical springs the motion is determined by mass and dimensions of pendulum, and also by elastic properties of spring. Mechanical resonance systems can be used as the hours, but also in the required order here occurs interaction of three primary parameters: force, mass and length. Electromagnetic resonance systems also can be used as the hours, but also here their motion will depend on the dimensions of resonator, and also on the dielectric and magnetic properties of medium.

But give let us visualize that in this inertial system suddenly for some reasons changed the gravitational constant, either the inertia properties of mass changed, or the electrodynamic properties of medium finally changed - all this will involve a change in the rate of the motion of hours. Thus, asserts itself the conclusion that time is not primary physical quantity as, for example, the mass length and force, but directly it depends on the values indicated it can be through them expressed.

Important is a question about side to what, and as rapidly flows the time. It is known that practically all laws of microcosm are invariant with respect to sign change of time; therefore for these laws does not have a value to what side it flows time.

If we have a frame of reference, which passes of one inertial system to another, which is unavoidably connected with the processes of retarding or accelerating this system, then in this system the process

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of retarding or accelerating the time must occur. Thus, it is possible to consider that the time can leak unevenly, first being accelerated, then slowing down. But if this is so, that arises question, and time can generally stop, or change its direction. Almost obvious it is the fact that, if any motion suddenly ceased, and all bodies, including atoms, suddenly they stood still at its places, then the concept of time would lose its sense. The same would occur when the universe was absolutely empty. Thus, asserts itself the conclusion that the concept of time is the consequence of existence of material objects and their properties.

Is known that time reversal, i.e., sign change of time does not change the form of equations of motion. This means that for any possible motion of system can be achieved the time-reversed motion, when system consecutively passes to the reverse order of the states, symmetrical to states, passed in the previous motion. In this posing of the question naturally to assume that, when in the system it occurs no changes, then time for this system not at all flows. When in the system some reversible changes occur, i.e., it after a certain evolution returns reversibly to its initial state, the time flows first in one, and then in other direction. Since in this case the concept of time is used to in application to this concrete system, it is possible to introduce the proper time of system, i.e., to assume that in each separately undertaken system there is its proper time. States symmetrical on the time are characterized by opposite directions of the speeds (pulses) of particles and magnetic field. Temporary invariance leads to specific ratios between the probabilities of direct and reverse reactions, to the prohibition of some states of the polarization of particles in the reactions, to the equality to zero electrical dipole moment of elementary particles. It follows from the general principles of the quantum field theory that all processes in nature are symmetrical relative to the work of three operations: the time reversal, three-dimensional inversion and charge conjugation.

However the existing systems of units do not assume the application of time with the different signs. Why thus it did happen? Most likely because the time as physical quantity was introduced not on the basis any deep physical principles, but on the basis the solutions of the chamber of measures and weights. Simply for measuring the time were undertaken the existing in nature periodic processes, which frequently have different nature.

As was said, the hours, with the aid of which the time is measured, compulsorily operates with other physical quantities, such, for example, as mass, length and force. And if we express time through these parameters, then their combination will prove to be under the root, and it means and time will be able to assume both positive and negative values. But, although mass, length and force exist as the primary objectively existing physical quantities, we will encounter that difficulty, that by the existing systems of units force itself is evinced after the already introduced time. Is there a way of overcoming this difficulty? Yes, this way is located.

II. Unit of Mende's Time

The mass itself in accordance with the law of universal gravitation is the carrier of force, since. two masses, spread in the space, are attracted. Let us write down this law:

$$F=G\frac{m_1 m_2}{r^2} \tag{2.1}$$

Here G - gravitational constant, equal 6.67408(31)x10^{-11} m^3/kg·s^2. The Gravitational constant in this relationship is expressed in the units of the system SI (m, kg, s).

The force of interaction of the attracted masses is constant value and it must not depend on time; however, time enters into gravitational constant. This connected with the fact that in the system SI the force is expressed in the newtons, into dimensionality of which enters the time.

It is known from other side that there is a principle of the equivalence of heavy (gravitational) and inert mass. Moreover it is experimentally proven that this principle is observed with the very high degree of accuracy. Specifically, these two principles can be undertaken as the fundamental bases for the introduction to time as physical quantity.

If are located two identical masses m, located at a distance $2r$, then, in accordance with the law of universal gravitation, the force of their attraction determines the dependence:

$$F_g=\frac{mm}{4r^2}. \tag{2.2}$$

In the relationship (2.2) the gravitational constant is accepted to equal unit and is dimensionless quantity.

If the masses indicated revolve around the overall center of masses and acts the principle of the equivalence of gravitational and inert mass, then the equality will be carried out:

$$T=\pm 4\pi\sqrt{\frac{r^3}{m}}, \tag{2.3}$$

where T - period of revolution of masses around the overall center.

Let us accept the value of the obtained period for the time unit of Mende and let us designate by its letter M :

$$M=T=\pm 4\pi\sqrt{\frac{r^3}{m}}. \quad (2.4)$$

The relationship (2.3) includes immediately two laws: the law of universal gravitation and the principle of the equivalence of gravitational and inert mass. It also determines the dimensionality of time. Certainly, this dimensionality to us is unusual, but became accustomed we to other dimensionality in physics, into which enters incomprehensibly from where undertaken second. The advantage of this approach is the fact that the time as physical quantity is introduced on the basis of the fundamental laws of physics and it, as a consequence of this, corresponds to the principle of time reversal.

If we as the unit of length take meter, and as the unit of the mass - kilograms, the unit of time in this system will be value 4π, dimensionality of which it is determined by the relationship (2.3). In order to transfer this value into seconds, should be divided it into square root of gravitational constant. If this was made, then it will be evident that the newly introduced unit of time into 1.5318x10 ^{6} of times is more than second. This, of course, is not very convenient, but in order to avoid these inconveniences, it is possible to introduce the dimensionless conversion factor, equal to the value indicated. In this case the relationships between the values of all physical quantities will be preserved, although the dimensionality in them will be others.

Since time now has its own dimensionality, passage to the electrical systems of units also does not compose labor, simply into the appropriate dimensionality of ones it is necessary to put the new dimensionality of time with the selected dimensionless conversion factor. In this case the dimensionality of all of those existing of one will be expressed only in the units of mass and length.

The introduction of the new unit of time it is possible to approach and differently. Let us write down law of gravity (2.1) only through the mass of the interacting bodies and distance between them, assuming gravitational constant to the equal dimensionless unit

$$F=\frac{m_1 m_2}{r^2}.$$

Assuming $m_1=m_2$, we obtain

$$F=\frac{m^2}{r^2}. \quad (2.5)$$

If we with the force (2.5) act on the body by mass m, the body will obtain the acceleration $a=\frac{F}{m}$. For the unit of time M_1 this body will cover a distance $s=\frac{FM_1^2}{2m}$, from where, using relationship (2.5), we obtain

$$M_1=\pm\sqrt{2}\sqrt{\frac{sr^2}{m}}. \quad (2.6)$$

Assuming $s=r$ from (2.6) we obtain

$$M_1=\pm\sqrt{2}\sqrt{\frac{r^3}{m}}. \quad (2.7)$$

Comparison (2.7) and (2.4) shows that these relationships are characterized by only coefficient. Therefore both approaches in the content are equivalent.

Thus, it is shown that the unit of time is not primary value and can be expressed through such fundamental concepts as mass and length.

It should also be noted that the adoption of this innovation can lead to serious reconstruction of our views.

III. Conclusion

The concept of time does not up to now have the substantiated physical determination. Contemporary the unit of the measurement of time are based on the periods of the rotation of the Earth around its axis and rotation around the sun, and also the rotation of the Moon around the Earth. This selection of ones is caused both by the historical and practical considerations: by the need for matching human activity with the change of day and night or seasons. In the system SI as the unit of time second, where its following determination is accepted, is accepted: “one second - this is the time interval, equal l9192631770 to the periods of the emission, which corresponds to the passage between two hyperfine levels of the basic quantum state of cesium -133 atom at rest with 0 K». In the proposed article it is shown that the unit of time is not primary value, and can be expressed through such fundamental values as mass and length taking into account the fundamental law of the equivalence of gravitational and inert mass.

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