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Matter Motion

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Abstract

The basic principles Maximum comfort, Pulsation and Reactivity are formulated in the paper, determining the meaning, goal and character of material systems motion. Maximum comfort is defined as a generalized function describing the system existence with time whose extreme values correspond to a comfortable system state. Pulsation determines periodicity and cyclic recurrence of natural phenomena. Reactivity combines mechanical principals of inertia and action and counter-action, giving an explanation of the memory essence in this way. The application of these principles can give an explanation of some 'non-philosophical' problems like the dual character of the light and the shape of celestial bodies.

Keywords: Matter; Energy; Motion; Maximum comfort; Pulsation; Reactivity

Introduction

Right in the beginning Homo Sapiens started being interested in the surrounding world and asking questions about the cause of the observed phenomena. Different views have given rise to different explanations and disputes that continue even to this day. This is due to the absence of strictly defined notions and terminology supposing 'intuitive understanding' which cannot clarify the essence of the problems. Different synonymous terms as *matter, objective reality, all existing,* etc. [1,2], do not lead to a unanimous opinion what is *Matter.* Same concerns the *Energy* which is defined as *vital force, ability to change the environment* or as a *general measure of motion* [1-3]. Although true, they do not give a possibility for investigation and establishment of relations and dependences.

The situation is different in natural sciences. Mechanics and Physics study quantitatively specific characteristics and properties of the processes in the world. This permits the derivation of the following well-known equations connecting *Matter* and *Energy*:
$E = mv^2/2$, where E is the kinetic energy, m is the mass of the body and v is its velocity;
$E = mgh$ of potential energy, where g is the acceleration and h stand for height;
$E = mc^2$, where c is the light velocity.

These formulae express the relationship between *mass* and *Energy.* Therefore, they manifest unanimity of *mass* and *Energy*.

According to Louis de Broil 'The mass could be accepted as something like a frozen energy and both could be transformed one into another [4,5].

By analogy formula $S = vt$ determining the covered distance as a function of velocity and time leads to the conclusion that time $t = S/v$ is a motion, i.e. there is a union among *Space, Time* and *Motion.* Therefore, *Motion* appears as a tying element in all of the above cases.

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Motion has always been thought as an attribute of Matter [1] or because of non-defined vital force [2]. Leucippus and Democritus have proclaimed unity and indivisibility of the Matter and Motion 'eternal, no creatable and no annihilable.' The Aristoteles' formulation that the Form determines the Motion is unclear as well [2]. So is Hegel's formulation claiming that 'contradiction is the root of the motion' without definition of contradiction and how and why it appears [2].

To avoid frustration due to the lack of clear and broadly accepted definition, the assumption that the motion obeys common principles independently of its manifestation, could be accepted as a starting point. Such principals should be valid for dead and live matter as well irrespectively of its organization. In such way the paper's goal is formulated as follows.

Goal. Formulation of general principles of matter motion founded on the ideas of ancient and late philosophers and being in agreement with the established laws in natural sciences.

Following principles: Maximum comfort, Pulsation and Reactivity are an attempt to formalize the Motion and its relation to the cause, goal and realization of the matter systems motion.

Materials and Methods

Materials: Ideas and results of ancient and late philosophers and scientists are used.
Methods: Mathematical Analysis, Classical Physics, Quantum Theory.

Results

Maximum Comfort

This principal was initially formulated by V. Sgurev and G. Gluhchev [6]. It determines the individual's behavior as a movement to the state of maximum comfort, which means increase of the stuff/energy in every moment, and stable or economical position consisting of minimal loss of stuff/energy. Thus, the *maximum comfort* is the *cause* and its achievement is the *goal* of the movement. In a generalized form it can be formulated as follows: 'Each material system strives for a state of maximum comfort in every moment of its existence.' However, what does *maximum comfort* mean for an arbitrary material system? To answer this question, we will start with the precondition that every material system has specific parameters changing with time within intervals compatible with its existence. In this way, the state of maximum comfort will mean optimization of the parameters at any moment. Formally, this can be presented as follows.

Let an arbitrary system, denoted as *MS*, depends on *n* parameters p_i(t) (i = 1,2,...,n) being functions of time *t* within specific intervals $\Delta_i(t)$. The generalized function

$$EX(t) = \{p_1(t), p_2(t),..., p_n(t)\}$$

called *Function of existence*, will describe the state of *MS* at every moment. In this way the state of maximum comfort can be determined as such a state where parameters $p_i(t)$ obtain optimal values.

This principal is valid for the physical laws as obtaining maximum space for gases, minimum potential energy for bodies, movement alongside the line of minimum resistance, selection of the shortest path, or a trajectory of minimum curvature [7-9]. In this sense it is worth noticing the fact that the ratio *surface/volume* obtains minimum value at spheroids, which may serve as a logical explanation of the form of stars and planets.

In the live matter it is realized in the processes of metabolism. Remarkable is the sunflower's behavior rotating towards the sun all the time to achieve efficacy of the photosynthesis. Just the opposite is the behavior of plants in dry weather when leaves shrink to avoid extreme loss of water. In the animals it is realized in search for the best living conditions as a proximity to food and water, and a safe den. For human beings it takes place in their everyday personal and social activity.

The extreme values of the function *EX(t)* mean establishment of state of equilibrium [7]. Therefore, the motion of *MS* could be thought as striving for the achievement of a state of equilibrium and its infringement as a cause of the motion. The conclusion is that the principle is valid for all levels of matter organization i.e., each element of *MS* acts according to this rule. However, this is a prerequisite of generation of contradictions and their accumulation.

Pulsation

This principle reads as follows: 'The matter motion is realized as pulsation within time and space intervals depending on the strength of bonds in the system, which means periodic/cyclic transitions among different states.' This definition coincides with the understanding of Anaximander and Heraclitus: 'The world was, is and will be a live fire which regularly ignites, decays and goes out [3]. The life of any *MS* can be examined accordingly: rise, development, decay and death. Related to the *Universe* this means that after some time of expansion a shrinkage will begin and it will come back to its origin.

This principle could help for the elucidation of the natural phenomena concerning the dual character of the light. As Al-Halili [4] says: 'At present, the dual character of the light as a

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wave and particle is not disputable.' Maxwell has shown that the light is a combination of electric and magnetic fields, but this cannot explain its particle property. Max Plank assumed that the energy is divided into portions called quants. This explains the light behavior as a particle, but cannot explain its wave property. An acceptable explanation can be suggested, provided the photons are thought as running pulsing spheres. The sphere radius will determine the wave's amplitude and the frequency of pulsation its one frequency. Indeed, the shape of trajectory of a point from the sphere in the plane determined by the point and the straight line of the movement of the sphere's center will be a wave.

Reactivity

The existing *MS* are in continuous interaction and endure changes that will be preserved for some time after the end of the interaction. This obvious statement is actually based on Newton's laws of *inertia* and *action-and-counter action*. The obtained changes could be quantitative and/or qualitative, i.e they may concern either the *mass* or the *structure*, or both. The preservation time depends on the applied force and the steadiness of the system, which will determine how fast the initial state will be restored, if possible.

The preservation of the obtained changes during the time could be accepted as a *memory* or *reflection*.

Discussion

The concept of Maximum comfort is aimed to explain the cause and goal of Matter motion irrespective of its realization and character. For this a function EX of existence of an arbitrary MS is introduced describing the system's state. Its parameters $p_i(t)$ relate to different characteristics and their importance can change depending on the environment. Also, changes of one or a few of them can provoke changes in the others, therefore the set of $p_i(t)$ could be thought as a network. Similarity with a neural network includes the rules of learning and self-learning aimed to obtain a 'maximum comfort' in the sense of optimum classification rate of data which is the Artificial Intelligence and Robotics base.

Since some of the intervals $\Delta_i(t)$ can be quite sensitive, outer influence can provoke crucial disruption of the corresponding parameter $p_i(t)$ and drastically change the MS behavior. Physiological parameters like body temperature, blood pressure and diabetes are examples of such cases. Theoretical investigation of similar behavior is a subject of research in the Chaos Theory.

The assumption that the state of maximum comfort is actually a state of equilibrium is supported by the interaction of liquids of different concentrations where two processes can be observed: 1) diffusion, and 2) osmosis, if a semipermeable membrane is used. In both cases a chemical balance is achieved.

According to the second law of thermodynamics the entropy increases with the time. Thus, the disorder seems to be the maximum comfortable state of every system.

Also, the principle of Maximum comfort relates to the first law of Thermodynamics where the existence of a state function is assumed.

The Reactivity principle corresponds to the Le Chatelier-Braun principle claiming that when a chemical system that is in equilibrium is disturbed by a stress, the system's reaction will be to diminish it [11]. There are live questions where the formulated principles could be applied. One of them concerns the shape of the Black Holes [5] where the assumptions vary from an arbitrary and changeable shape to a spherical one. The sphere seems to be the best candidate for this, since it has minimum value of the ratio surface/volume, i.e., it is the most frugal body.

Conclusion

The above formulated general principles of the matter motion are not in contradiction with the known assumptions of the ancient and modern philosophers about the World. Known physical laws describing the relationship between Matter and Energy tell that the latter cannot be accepted as a self-dependent entity, but both appeared as two sides of one and same essence.

The unclear question about the cause and goal of the motion receives acceptable explanation via the law of Maximum comfort, expressing itself in Mass/Energy increasement, and/or preservation of the state with minimum loss of them.

Hegel's principle about quantitative accumulation and struggle between antipodes being true in essence, doesn't explain how the antipodes occur, while the egoistic strive for maximum comfort can be accepted as a natural cause for the appearance of contradictions. Proves of its validity are the everyday relations among individuals, groups of individuals, states and civilizations.

It is worth notice that probably this is the first time when general philosophical assumptions point at the solution of specific physical problems like the shape of the celestial bodies and the character of the light.

Unfortunately, the Principal of Maximum comfort leads to the unpleasant inference that the avidity and egoism are

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the major motors driving the World.

Conflict of interest: No

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