

Space And Time As Forms Of The Being Of Nature

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Abstract – In this paper space and time are analyzed as a form of existence of being. In the works of thinkers, he reacted to the tariffs given to time and space.

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Spatial characteristics are positions relative to others, distances between them, angles between different spatial directions (individual objects are characterized by length and shape, which are determined by the distances between parts of the object and their orientation). Temporal characteristics – «moments» in which the phenomena occur, the duration (duration) of the processes. The relationship between these spatial and temporal quantities is called metric. There are also topological characteristics Space and time – «contact» of various objects, the number of directions. They deal with purely spatial relations only in the case when it is possible to abstract from the properties and motion of bodies and their parts: with purely temporal ones - in the case when it is possible to abstract from the variety of coexisting objects.

However, in reality, spatial and temporal relationships are related to each other. Their immediate unity appears in the movement of matter; The simplest form of motion - displacement - is characterized by quantities that represent various relations between space and time (speed, acceleration) and are studied by kinematics. Modern physics has discovered a deeper unity of space and time (see Relativity theory), which is expressed in a joint regular change in the spatio-temporal characteristics of systems depending on the movement of the latter, as well as in the dependence of these characteristics on the concentration of masses in the environment.

To measure spatial and temporal values, reference frames are used. With the deepening of knowledge about matter and motion, scientific ideas about Space and Time deepen and change. Therefore, one can understand the physical meaning and significance of the newly discovered laws of Space and Time only by establishing their connections with the general laws of interaction and motion of matter.

The concepts of Space and Time are a necessary component of the picture of the world as a whole, therefore they are included in the subject of philosophy. The doctrine of Space and Time deepens and develops along with the development of natural science and, above all, physics. Of the rest of the natural sciences, astronomy and especially cosmology played a significant role in the progress of the theory of Space and Time.

Development of physics, geometry and astronomy in the 20th century. confirmed the correctness of the provisions of dialectical materialism on Space and Time. In turn, the dialectical-materialist concept of Space and Time allows one to give a correct interpretation of the modern physical theory of Space and Time, to reveal the unsatisfactory nature of both its subjectivist understanding and attempts to "develop" it, separating Space and time from matter.

Spatio-temporal relations are subject not only to general laws, but also to specific ones characteristic of objects of a particular class, since these relations are determined by the structure of a material object and its internal interactions. Therefore, such characteristics as the size of an object and its shape, life time, rhythms of processes, types of symmetry, are essential parameters of an object of this type, which also depend on the conditions in which it exists. Spatial and temporal relations are especially specific in such complex developing objects as an organism or a society. In this sense, we can talk about the individual space and time of such objects (for example, about biological or social time).

Basic concepts of space and time. The most important philosophical problems related to Space and Time are questions about the essence of Space and Time, about the relationship of these forms of being to matter, about the objectivity of spatio-temporal relations and laws.

Throughout almost the entire history of natural science and philosophy, there were 2 main concepts Space and time One of them comes from the ancient atomists - Democritus, Epicurus, Lucretius, who introduced the concept of empty space and considered it as homogeneous (the same at all points) and infinite (Epicurus believed that it is not isotropic, that is, it is not the same in all directions); the concept of time was then developed extremely poorly and was considered as a subjective sense of reality. In modern times, in connection with the development of the foundations of dynamics, this concept was developed by I. Newton, who cleared it of anthropomorphism. According to Newton, Space and time are special principles that exist independently of matter and from each other. Space itself (absolute space) is an empty "container of bodies", absolutely motionless, continuous, homogeneous and isotropic, permeable - not affecting matter and not subject to its effects, infinite; it has three dimensions. Newton distinguished from absolute space the extension of bodies - their main property, due to which they occupy certain places in absolute space, coincide with these places. Extension, according to Newton, if we talk about the simplest particles (atoms), is an initial, primary property that does not require explanation. Because of the indistinguishability of its parts, absolute space is immeasurable and unknowable. The positions of bodies and the distances between them can be determined only in relation to other bodies. In words, science and practice only deal with relative space. Time in Newton's concept is itself something absolute and not dependent on anything, pure duration, as such, evenly flowing from the past to the future. It is an empty «container of events» that may or may not fill it; the course of events does not affect the passage of time. Time is universal, one-dimensional, continuous, infinite, homogeneous (everywhere the same). From absolute time, also immeasurable, Newton distinguished relative time. The measurement of time is carried out using a clock, that is, movements that are periodic. Space and time in Newton's concept are independent of each other. The independence of Space and time is manifested primarily in the fact that the distance between 2 given points in space and the time interval between 2 events retain their values independently of each other in any frame of reference, and the ratios of these quantities (velocities of bodies) can be any.

Newton criticized R. Descartes's idea of a filled world space, that is, of the identity of extended matter and space.

The concept of Space and Time, developed by Newton, was dominant in natural science during the 17th and 18th centuries. It corresponded to the science of that time - Euclidean geometry, classical mechanics and the classical theory of gravitation. The laws of Newtonian mechanics are valid only in inertial reference frames. This distinction of inertial systems was explained by the fact that they move progressively, uniformly and rectilinearly precisely in relation to the absolute Space and time and correspond to the latter in the best way.

According to Newton's theory of gravitation, actions from some particles of matter to others are transmitted instantly through the empty space separating them. Newton's concept of Space and time, i.e., corresponded to the entire physical picture of the world of that era, in particular, the concept of matter as initially extended and unchanging in nature. An essential contradiction of Newton's concept was that absolute Space and time remained in it unknowable by experience. According to the principle of relativity of classical mechanics, all inertial reference frames are equal and it is impossible to distinguish whether the system is moving with respect to the absolute Space and time or is at rest. This contradiction served as an argument for the supporters of the opposite concept of Space and Time, the starting positions of which go back to Aristotle; this idea of space and time was developed by G. Leibniz, who also relied on some of Descartes's ideas. The peculiarity of Leibniz's concept of Space and Time is that it rejects the idea of Space and time as independent principles of being, existing along with matter and independently of it. According to Leibniz, space is the order of the mutual arrangement of a set of bodies existing outside each other, time is the order of successive phenomena or states of bodies. In this case, Leibniz further included the concept of a relative value in the concept of order.

Leibniz's concept is logically connected with his entire philosophical system as a whole. However, Leibniz's concept of space and time did not play an essential role in natural science in the 17th and 19th centuries, since she could not give an answer to the questions posed by the science of that era. First of all, Leibniz's views on space seemed to contradict the existence of vacuum (only after the discovery of the physical field in the 19th century did the problem of vacuum appear in a new light); moreover, they clearly contradicted the general belief in the uniqueness and universality of Euclidean geometry; finally, Leibniz's concept seemed irreconcilable with classical mechanics, since it seemed that the recognition of the pure relativity of motion does not explain the predominant role of inertial frames of reference. Thus, Leibniz's contemporary natural science was in contradiction with his concept of Space and Time, which was built on a much broader philosophical basis. Only two centuries later, the accumulation of scientific facts began, which showed the limitations of the then prevailing ideas about Space and Time.

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