The law of negligible action and related phenomena

The law of negligible action is an element of dynamics - it is related to both Newton's dynamics and the dynamics of spontaneous motion. The essence of this law comes from Galileo's gravitational law and is that the effective result of the interaction of (for example) two bodies depends on the speed at which they move relative to each other. This law manifests itself most effectively when the relative velocities of bodies are very high. Then the interaction of objects moving relative to each other (friction, resistance) is almost non-existent. Conversely, if the relative velocities of objects are small enough, the manifestation of this law is negligible and not noticeable. Because then there is enough time for the mutual interaction of objects to manifest itself effectively.

In ordinary, everyday life we deal with such small relative velocities of objects that the law of negligible action (NA law) is not noticed by people at all. Although there are examples in nature when the NA law manifests itself at a low speed of an object. Something like this is possible because we (as humans) are not always able to perceive speed and assess its value. We notice objects on one scale and their velocities on that scale, but we do not notice the components of those objects and their velocities existing on a completely different scale.

It happens that someone sees ball lightning approaching the window pane. He sees a slowly moving material ball, but does not see the extremely fast moving (vibrating and otherwise) components of the ball. He sees how the ball - slowly moving (!) - penetrates the window glass and a moment later moves on the other side of the glass. Of course, if he doesn't know the NA law, he doesn't understand what happened - he doesn't understand the mechanism of the phenomenon.

It is true that the ball lightning moved slowly and penetrated the window glass to the other side, but this phenomenon itself occurred precisely because the atomic elements that made up the ball were moving in a vibrating motion at a very high speed and with a relatively very large amplitude (compared to the amplitude of the atoms contained in the glass matter). And it is this large amplitude of vibrations (of elements) of atoms that is most important in this phenomenon. (We can guess that in ball lightning there are not whole atoms (as they exist in the matter of glass), but a mixture of their component elements. These elements not only vibrate, but also move very quickly in the volume of the ball.) Thanks to vibrations with high the amplitude of atomic elements in the volume of ball lightning, and in fact, thanks to their high velocity in the lightning body relative to the glass atoms, they leak through the glass matter. The free leakage of spherical lightning through the glass occurs because the atoms of the glass and the components of the spherical lightning body cannot interact effectively with each other. And that's why this law is called the "law of negligible action."

The law of negligible action manifests itself in many other situations, but people rarely encounter them. The ZD law is particularly interesting because it contradicts our usual "scientific habits", and in phenomena (and experiments) it is sometimes associated with the effect of releasing additional energy. This creates the impression that energy appears "out of nowhere." In fact, there is an appearance (release) of energy that was once stored in matter.

It is usually believed that the resistance of a medium to a moving particle is greater when the particle enters the medium at a higher speed. (And this actually happens if the speeds are not too high.) And it turns out that at a very high particle speed, the resistance of the medium to its movement can be almost zero. There is a well-known example of such fast particles in physics - neutrinos. A neutrino, for example, flies through the Earth's body with great ease precisely because this particle has a very high initial velocity when penetrating the Earth. It can be said that due to this high speed, resistance from the Earth's atoms cannot be formed, energy cannot be exchanged between the neutrino and the atoms, and the neutrino's speed cannot be slowed down. (Eventually, however, there is some braking in the measuring instrument, which produces a trace on the basis of which scientists form their opinion about the existence of a neutrino.)

The neutrino example is an example in which there is no release of energy that was once stored in matter a long time ago, and even if it does happen, no one has noticed it yet. The release of energy from the structure of matter due to the high relative speed of objects, during which the NA law is manifested, occurs in the following two examples. The first example concerns experiments with shooting bullets at armor plates, conducted by W. Jaworski. You can read them on http://nauka.relis.ru/05/9810/05810078.htm. The second example is related to the operation of the Ranque vortex tube and the Potapov thermal generator. You can read about it on the websites http://www.transgasindustry.ru/books/Potapov/15.html, http://vtgandvhg.sbn.bz/ and http://electrik.org/print.php?sid=155 .

In these two examples, the NA law is manifested only to such an extent and in such a way that at high relative velocities - of the projectile (object 1) relative to the armor plate (object 2) and the moving water (or air, object 1) in the vortex tube relative to the surface pipes (object 2) - elements of one object penetrate into a very thin layer of matter of another object. (In the example of shooting at a plate, a distinction should be made between the tearing of the plate with a bullet and the mutual penetration of atomic components of two objects at the boundary bullet and plate.) There, some elements are slowed down and others accelerated, some connections are broken and others are connected, and, in general, basically, there is a recombination of the structure of matter. The processes taking place there are too complex to be described in a simple way today - prior research is needed. But the most important thing that takes place in these processes is the separation of energy from the material structure that previously existed in it in a potential form.

You can learn more about the law of negligible action by observing its illustration using the computer modeling program BlowStand1.exe and files with the .blo1 extension; the program and files are located on http://pinopa.narod.ru/BlowStand1exe.zip. The source program is located on http://pinopa.narod.ru/BS1_Source.zip.

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