Author:
Edmundas Jauniškis from *The Lithuanian Young Scientists Club*

Abstract:
A new approach to the axiom of mechanics. The energetic approach of the first axiom of mechanics. The principles and the concept of mechanical movement keeps changing. Mechanics is closely related to thermodynamics.

The Content:

The List of References:
1. Paul Strathern. *Mendeleyev's Dream*. Penguin Books, London: 2000.
2. I. Niuton. Philoshophae. *Naturalis Principia Mathematica*. 1687.
3. http://www.membrana.ru/articles/readers/2004/12/01/205800.html (Russian)
4. J. Vaitkevičius. *Gamtamokslis ugdymas* (Natural Science Education). 2009, No. 2(25) (Lithuanian)
5. A.I. Veinik. *Termodinamika realnych procesov.* Minsk: 1991 (Russian)

The Energetic Aspect of the First Axiom of Mechanics

Who was the First to Introduce the Axiom of Mechanics?

A very interesting English book [1] was published in the year 2000. In 2001, it was introduced for the Aventis award as the book of science.

The book describes that the scientist and doctor Avicenna from the Ancient Asia was the first to introduce axiom of mechanics 600 years till Isaac Newton created his own axiom. Thus this provides strong evidence that Newton only used the axiom created by Avicenna. (It can just be stated that there is a complete correspondence between the axioms of Avicenna and Newton. All in all, there is serious evidence that [1] Newton, as one of the latest alchemist in the Medieval times[1], was able to get and use the manuscripts of the scientists and alchemists of the Ancient Asia.)

However, we do not aim to provide the historical priorities in this paper.

Isaac Newton wrote his scientific work [2] in the Latin language which was used in the Middle Ages:

Lex I: Corpus omne perseverare in statu suo qiuescendi vel movendi uniformiter in directum, nisi quatenus a viribus impressis cogitur statum ilum mutare.

Newton’s first law translated in English: Every single body perseveres in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed.

However, the following question arises: why does a body investigated tries to persist in its state of rest or move uniformly? Unfortunately, this is not explained in any book of physics.

More and more scientists have started to doubt about the physical meaning of the first axiom of mechanics. The example could be the suggestion made by Stephan Tiguncev [3], the Russian Doctor of Engineering. He suggests introducing the concept of "curved motion" instead of "uniform motion" in the first axiom of mechanics because the motion is taking place on the surface of the Earth.

What is the Earth? First of all, the Earth is a huge massive body with its magnetic and energetic field, as well as its own atmosphere. All bodies on the surface of the Earth conform to the factor mentioned above.

In my opinion, we accept the following condition: due to the fact that mechanics has been created on the surface of the Earth, we have to consider the Earth as the main report system for all the bodies on this surface: the ones who aren't on the movement, and the ones who move independently of their nature of movement.

(We will not be easily able to assign the report system attribute to every single object. On the contrary, we would get the following results: the object in its state of rest has the energy (in the regard of the Earth which is in motion) in the report system of the moving object. This is the total absurd. If you think in an analogous way, a poor man would be treated as wealthy in the report system of an ex-man of property, though, in fact, he doesn't have any money).

In this axiom, the author equalises the state of rest and the state of moving uniformly in a straight line on the theoretical bases. He considers them to be equal.

However, this is illogical from the physical point of view: the state of rest is the condition, and the movement in a uniform straight line is the process which has the beginning and the end.

How could the state of rest and the movement in a uniform straight line be compared?

I suggest analysing the first axiom of mechanics from the energetic perspective:

When a body is in its state of rest, its external energy is equal to zero: $E_{external} = 0$ ($v = 0$).

When a body moves (or would move) uniformly in a straight line (practically speaking, such bodies don't exist in the natural enviroment), the external force would be constant: $E_{external} = \text{constant}$ ($v = 0$)

When a body is affected by the external force, its external energy is larger than zero: $E_{external} > 0$ ($v > 0$).

The first conclusion to be drawn is as follows: there is a big difference between the state of rest and uniform motion in a straight line. When a body is in its state of rest, its external energy is equal to zero: $E_{external} = 0$. When a body moves uniformly in a straight line, its external energy would be larger than zero: $E_{external} > 0$ and $v > 0$.

We also know that when the object provided is affected by another object, the external energy of the one is larger than zero: $E_{external} > 0$ and $v > 0$.

The second conclusion to be drawn is the following one: according to the physical energetic meaning, the condition when a body moves (or would move) uniformly in a straight line is equivalent to the movement of the body affected by the external energy because in both cases $E_{external} > 0$ *and* $v > 0$ *is valid.*

The third conclusion is valid: only two conditions out of three are valid: $E_{external} > 0$ and $v > 0$.

The fourth conclusion: from the three object conditions, the initial condition must be considered the first one when an object is in its state of rest. In order for it to move "uniformly in

a straight line", it must get external energy from another object or the system of objects! Now it is necessary to ascertain the fact that the first axiom of mechanics isn't totally accurate but rather too long.

Therefore, the axiom of mechanics should be formulated as follows:

Every object tries to remain in its state of rest. It changes its state of rest when it is affected by an external energy.

Aristotle [3] stated that force is the cause of movement. More precisely, it is the affect of one body towards another one (the interaction between bodies can be evaluated from the energetic point: bodies share their energy with each other).

As seen above, the energetic analysis of this law allows making it more concrete.

Therefore, we can formulate the energetic version of the first axiom of mechanics: every object tempts to maintain its constant external energy: $E_{external} = 0$. Why is external energy so important in this case? It is explained in the following way: every object (including us) is restricted by its size and mass.

For example, different bodies, which are lifted up from the surface of the Earth and then set free, fall down because their energy is the smallest one. During this process, the energy is transmitted when these bodies interact. However, at the end of the process, a body is in the position with the minimal external energy on the surface of the Earth.

Thus, the body preserves its condition and the parameters: its internal energy $E_{internal}$, its size and its mass (the smaller the external energy $E_{external}$, the more possible it is).

Now the meaning of the so called "inertia" becomes clearer: the essence of inertia is the external energy of the bodies (kinetic energy). For example, a body affected by other bodies gets external energy $E_{external}$ (practically speaking, in nature there are no bodies which are not affected by other bodies). A body tries to give the redundant energy $E_{external}$ away by moving (when there is friction). It gives this energy away because it wants to return back to its previous position when $E_{external} = 0$. If bodies do not have enough degrees of freedom in their movements, the redundant external energy $E_{external}$ passes to the internal energy $E_{internal}$ of this body.

Consider the following example: two different bodies with opposite electricity charges attract each other, their charges become neutral, and their external energy decreases. Meanwhile, two bodies with the same electricity charges push each other. On the contrary, their joint external energy could only increase. There is an experiment in physics during which a hollow metal globe is electrified. The charge received concentrates on the surface of the globe. This is the demonstration of the external nature of electricity charge energy.

From the energetic perspective, mechanics analyses the variations of the *external* energy of bodies, while thermodynamics analyses variations of the *internal* energy of bodies. It can only be stated that there is no clear distinction between mechanics and thermodynamics in the physical processes. These factors depend on the degree numbers of latitude of bodies, as well as on the parameters of other interactive bodies...

The professor Vaitkevicius [4] states that: "The weak position of natural sciences in the development of students' world-view is not in the imagination of sciences, or in the empiric experience (their strength is exactly there) but rather in the disunity of sciences..."

In my opinion, the disunity in natural sciences was triggered by the incorrect basic fundamentals. For example, in chemistry the analogical principle is found. It confirms the main idea of the article.

In Veiniks' book[5], we found the principle of shift of balance formed by the French chemist Le Shatelje (1884). It is stated: if a system is in the state of balance, after it is affected by an external force, which overbalances it, the system passes to the condition in which the effect of external influence recedes. As a result, the system is in the balance of a new level.

The conclusion: the only way to unite natural science is to analyse and rewrite the axioms proposed by the scientists of the ancient times.

Resources:

1. Paul Strathern. *Mendeleyev's Dream*. Penguin Books, London: 2000.
2. I. Niuton. Philoshophae. *Naturalis Principia Mathematica*. 1687.
3. http://www.membrana.ru/articles/readers/2004/12/01/205800.html (Russian)
4. J.Vaitkevičius. *Gamtamokslis ugdymas* (Natural Science Education). 2009, Nr2(25) (Lithuaniain)
5. A.I.Veinik. *Termodinamika realnych procesov.* Minsk: 1991 (Russian)

Author Physicist Edmundas Jauniškis ©

E-mail: edmundas2007@gmail.com