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A Source of Conservative Forces do Work on a Closed Trajectory

It is proved that the power of conservative forces (including gravitational forces) performs work on **closed** trajectories of multiple body's motion, if these bodies are not rigidly connected and between them forces are acting, which depend on the speed of these bodies. A shortened version of this paper has been published in [1, 2] as an appendix.

We shall begin with considering some examples.

Example 1. There is an electrical charge Q and another charge much smaller by its size $q_1 << Q$. Coulomb forces acting of the q_1 from the side of the charge Q do not perform any work on a closed path of the motion of charge q_1. Let there be another charge $q_2 << Q$, and both charges q_1 and q_2 are moving along near closed paths. Then between them Lorentz forces are acting. Let the medium in which the charges q_1 and q_2 are moving provides some resistance to their motion. Then under the influence of Lorentz forces a certain work will be performed. The energy for this work is provided from the electrical charge Q (this is similar to the fact that Lorentz forces acting as Ampere forces perform work by the energy of the power force). Thus, the source of Coulomb forces performs work on closed paths of the two charges motion.

Example 2. There is a DC motor with self-excitation (in which the armature winding and the electromagnetic field are connected in series or in parallel). In such a motor the energy source is a DC voltage source, i.e. a source of Coulomb forces. This source explicitly performs work.

In the general case from these examples it follows that the source of Coulomb forces performs work on closed trajectories of multiple unconnected charges motion. As the Coulomb forces are conservative, then the previous conclusion is equivalent to the following:

0) The source of conservative forces performs work along **closed** trajectories of multiple bodies motion, if

- a body – it is something, on which a conservative force is acting,
- The bodies are not connected rigidly,
- Between the bodies are acting forces that depend on the speed of these bodies motion.

Conservative forces (by definition) do not perform work on a closed trajectory. The force of gravity is a conservative force (which is proved mathematically). Hence the conclusion is reached that

1) there does not exist a motor using only conservative forces (specifically, the force of gravity) to perform work.

Next *an unproven* conclusion is made that

2) there **does not exist** a motor using **the energy** of conservative forces source (including the gravity forces), for performing the work.

Coulomb forces are also conservative. From this by analogy one can make the conclusion 1). However, the conclusion 2) is easily refuted by the previous assertion 0). Therefore, in the general case, the assertion 2) is incorrect, and the true statement is as follows:

3) **There can exist** a motor using **the energy** of conservative forces source for performing work.

Nevertheless, the existence of the motor that uses energy of the **electrical** conservative forces source (ECF) does not mean that there is a motor that uses the energy source of the **gravitational** conservative forces (GCF).

Electrical forces create the charges motion along a closed trajectory – *electric current* which forms a magnetic field. Due to this the energy of ECF turns into magnetic energy. It occurs even if the energy is not expended for the motion of the charges on the closed path. Thus, the energy of ECF exceeds the energy of the mechanical motion of the charges. This is the reason for the existence of a motor using the energy ECF.

Gravity forces also can create a mass motion on a closed trajectory – *mass current*. Let us assume that mass current also forms a *gravity magnetic* field (it is shown in [3]). Then by analogy with the previous we may assume that

4) **there can** exist a motor using the **energy** of the source of **gravity** conservative forces for performing work.

This does not contradict the law of conservation of energy: it is the energy of GCF that is converted into work, and GCF power source loses some of its energy (it cannot be said that the energy of GCF may be used only for the movement of the masses).

References

1. Khmelnik S.I. Mathematical Model of Dust Whirl, http://vixra.org/pdf/1505.0087v2.pdf; see also http://lib.izdatelstwo.com/Papers/33.141.pdf; http://vixra.org/pdf/1504.0169v3.pdf.
2. Khmelnik S.I. The Equation of Whirlpool, http://vixra.org/pdf/1506.0157v1.pdf
3. Khmelnik S.I. Experimental Clarification of Maxwell-Similar Gravitation Equations, http://vixra.org/pdf/1311.0023v2.pdf