Why Free energy is mathematically and physically possible

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I. Introduction

In this paper, I would like to bring some simple mathematical proofs and discuss some physical concepts that show why free energy is indeed possible. The subject concerning the existence of free energy has already been discussed by several physicists such as T.E. Bearden[1,2] in two papers. However, it seems that most physicists do not realize that classical Newtonian mechanics does provide the answer concerning the existence of free energy.

The principle of conservation of energy is considered the most important principle in physics which has never been violated. Therefore, this principle seems to forbid the existence of free energy. This is not true. Most physics forgot to stress that the principle of conservation of energy is rigorously satisfied if a specific condition is fulfilled, namely that the force used in the physical process must verify Newton's third principle. We know that all the forces existing in nature do not necessarily verify this principle. These forces are generally called external forces. The existence of external forces which do not satisfy Newton's third principle deserves special attention since one must recognize, as shown below, that there is no energy conservation principle for that kind of force.

Most of our technology (motors and generators) does comply with the energy conservation principle because of Newton's third principle. It is the reason why the efficiency of motors and generators can never be higher than 100% because they work as closed systems. However, the existence of external forces does imply the existence of opened systems where the energy is provided by other particles located outside the system or by the medium. Therefore, classical mechanics does not forbid the existence of the so-called energy free devices or over-unity devices provided they use forces that do not satisfy Newton's third principle. The reader interested by this subject can consult the numerous web sites on free-energy devices. However, we can debunk the whole subject of over-unity devices by pointing out the existence of opened systems, a fact which is not well-known in the literature. In the case of an opened system, the efficiency can be higher than 100% because the work of the external force is not taken into account. The only question to be answered is how do we generate an external force? Since the Lorentz force can certainly not be considered as an internal force because this force does not follow Newton's third principle, therefore, the Lorentz force can be used for building the so-called free energy devices.

II. Newton's Third Principle in Newtonian Mechanics

It is fundamental to recall some basic definitions in classical mechanics (1-5). Newton's second law of motion states that the motion of two particles in a given reference frame is described by the differential equations:

$$\frac{d\mathbf{P}_1}{dt} = \mathbf{F}_{12} + \mathbf{F}_{11} \qquad \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{21} + \mathbf{F}_{22} \qquad (1)$$

with the following definitions $\mathbf{P}_1 = m_1\mathbf{U}_1$ and $\mathbf{P}_2 = m_2\mathbf{U}_2$. We must distinguish between the internal forces $\mathbf{F}_{12}$ and $\mathbf{F}_{21}$ and the external forces $\mathbf{F}_{11}$ and $\mathbf{F}_{22}$ acting on the particles due to sources outside the system. We can speak of *mutual interaction* between two particles only if the internal forces follow Newton's third principle, namely $F_{12} = -F_{21}$. Therefore, an external force is by definition a force that does not follow Newton's third principle. When the external forces are zero, we say that the system is closed or isolated.

The center of mass of the system is a fictitious point $\mathbf{r}$ where the entire mass $m = m_1 + m_2$ of the system can be thought to be concentrated. It is defined by:

$$m\mathbf{r} = m_1\mathbf{r}_1 + m_2\mathbf{r}_2 \qquad (2)$$

The motion of this point is only determined by the effect of external forces since we have:

$$\frac{d}{dt} m\mathbf{U} = \frac{d\mathbf{P}_1}{dt} + \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{11} + \mathbf{F}_{22} = \mathbf{F}_e \qquad (3)$$

We can now study the motion of a second fictitious particle called the relative particle with a reduced mass $M = m_1m_2/(m_1 + m_2)$. This single particle is located at the place occupied by either the first or the second particle depending on our choice of the rest position as shown in Figure 1. The distance $\mathbf{R}$ is therefore $\mathbf{R}_{12} = r_1 - r_2$ if particle 2 is located at the origin of a reference frame or $\mathbf{R}_{21} = r_2 - r_1$ if particle 1 is now the origin of our reference frame. For each choice, we have an equation of motion:

$$\frac{d}{dt} M\mathbf{V}_{12} = \mathbf{F}_{12} + \frac{1}{m}(m_2\mathbf{F}_{11} - m_1\mathbf{F}_{22})$$
$$\frac{d}{dt} M\mathbf{V}_{21} = \mathbf{F}_{21} - \frac{1}{m}(m_2\mathbf{F}_{11} - m_1\mathbf{F}_{22}) \qquad (4)$$

where the relative velocity $\mathbf{V} = d\mathbf{R}/dt$ between the two reference frames is reciprocal since we have $\mathbf{V}_{12} = -\mathbf{V}_{21}$. It follows that the reciprocity $V_{12} = -V_{21}$ of the rest reference frame is linked to the existence of Newton's third principle as shown in Figure 1 for the three possibilities. The reciprocity concept and Newton's third principle are two faces of the same coin. Therefore, we cannot use the reciprocity of the reference frames in special relativity and at the same time state that Newton's third principle does not apply in special relativity.

The splitting between internal and external forces is independent of the origin of the force, and therefore, this partition must apply in all branches of physics: classical physics, special relativity, electromagnetism and quantum mechanics. Therefore, special relativity and quantum mechanics are both incomplete theories, since they imply the existence of internal forces associated to the reciprocity concept and the conservation of energy and ignore the existence of external forces.

III. Conservation of Energy and Over-Unity Devices

By definition, the equation of conservation of energy must be satisfied:

$$\frac{d}{dt}\left(\frac{1}{2} m_1 U_1^2\right) + \frac{d}{dt}\left(\frac{1}{2} m_2 U_2^2\right) = \frac{d}{dt}\left(\frac{1}{2} mU^2\right) + \frac{d}{dt}\left(\frac{1}{2} M V_{12}^2\right) \qquad (5)$$

When the external forces are zero $\mathbf{F}_{11} = \mathbf{F}_{22} = 0$, the system is closed or isolated, in that case, we get:

$$\frac{d}{dt} m\mathbf{U} = \frac{d\mathbf{P}_1}{dt} + \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{12} + \mathbf{F}_{21} = \mathbf{0} \qquad (6)$$

It follows that the velocity $U = dr/dt$ and the kinetic energy $E_K = m\,U^2/2$ of the center of mass are constant or zero. Thus, Newton's third law can be interpreted as a law of momentum exchange. Hence a failure of the third law would be a failure of momentum conservation.

If the external forces are zero and the internal force F_{12} is derivable from a potential function $E_p(R)$, the equation of motion for the reduced mass becomes:

$$\frac{d}{dt} MV = -\nabla_R E_p(\mathbf{R}) \qquad (7)$$

One can multiply the two sides of the above equation by V to obtain:

$$\frac{d}{dt}\left(\frac{1}{2} MV^2 + E_p\right) = 0 \qquad (8)$$

Therefore, we have conservation of mechanical energy only in the case where the internal forces are central and satisfy Newton's third principle for translation. We can now give three well-known examples concerning the application of the principle of conservation of energy to a closed system.

The first example concerns the case of a simple non-relativistic harmonic oscillator of mass m_1 and spring constant k_0 fixed to a wall of mass $m_2 > m_1$. The equation of motion for the displacement of the mass is:

$$M \frac{d^2\mathbf{R}}{dt^2} = -\nabla E_p \qquad (9)$$

where the internal force derives from a potential $E_p[\mathbf{R}(t)] = k_0 R^2/2$. Since k_0 is constant, the potential does not depend explicitly on time; therefore the system is closed and the mechanical or total energy E_T is also constant:

$$E_T = \frac{1}{2} MV^2 + \frac{1}{2} k_0 \mathbf{R}^2 = Ct \qquad (10)$$

with the approximation $M \approx m_1$.

The second example is the case of a stone of mass m_1 dropped in the gravitational field of the Earth of mass $m_2 > m_1$. The potential energy between the two bodies is given by the relation:

$$E_P[\mathbf{R}(t)] = -G\frac{m_1 m_2}{R} \qquad (11)$$

while the total mechanical energy conservation law has for expression:

$$E_T = \frac{1}{2} MV^2 - G\frac{m_1 m_2}{R} = \text{Constant} \qquad (12)$$

where $R(t) = r_s - r_e$ is the distance between the stone and Earth considered as point particles.

The third example can be obtained by taking into account the relative motion between two charged point particles which is induced by a mutual potential electrostatic energy:

$$E_P[\mathbf{R}(t)] = \frac{q_1 q_2}{R} \qquad (13)$$

with the energy conservation law

$$E_T = \frac{1}{2} MV^2 + \frac{q_1 q_2}{R} = \text{Constant} \qquad (14)$$

One must point out that the above energy conservation laws do not depend on the choice of a reference frame or an observer. Therefore, the existence of a medium such as the ether cannot be proved or disproved by these equations. However, the case is different if there exist open systems and the ether which can provide the energy needed to sustain the so-called free

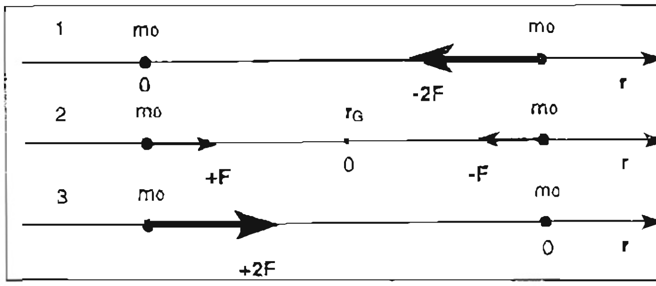

Figure 1. Three possible reference frames to describe the mutual interaction between two identical particles.

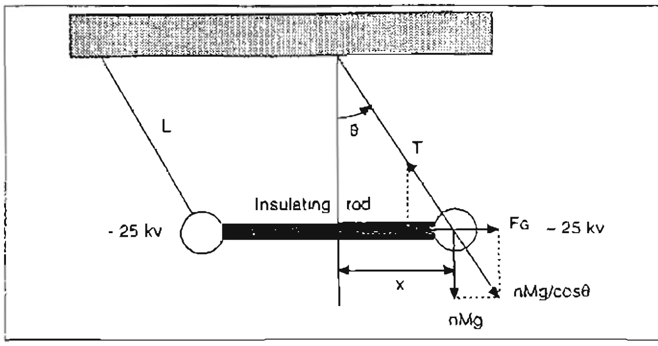

Figure 2. Various forces acting on a double solid pendulum (n=2)

IV. Charged Capacitor Pendulum Experiment

The violation of Newton's third principle by the Lorentz forces implies that a charged capacitor must accelerate its center of mass without external help if the capacitor has an absolute motion with respect to the ether. Moreover, the existence of an external force must also result in the violation of energy conservation. The experiment showing the linear spontaneous motion of the capacitor through the ether has already been reported elsewhere.[5-9] The experiment as shown in Figure 2 consists of two massive aluminum balls weighing 500 g each suspended by fine cotton wires to the ceiling of the laboratory. In order to keep the balls at a fixed distance D, an insulating rod is used between the balls. The bi-filar pendulum was placed in the middle of the laboratory room empty of any metallic object. The distances between the laboratory walls and the balls or the wires are about 2.25 m. The direction of the stimulated force and the resultant motion thereby produced by the external force are toward the positive electrode of the capacitor as shown by the experiment.

One of the methods used to measure the displacement of the pendulum consists to place a measuring wood rod parallel to the pendulum and takes a video movie of the experiment when the voltage is switched on and off. By measuring the amplitude of the oscillation one can determine the displacement which amounts to a few mm. The results are reliable since we can increase the effect to 5 cm by oscillating the high voltage. In that case, no measurement is indeed necessary to prove the existence of this effect.

In classical circuit theory, the generator, the wires and the capacitor form a closed system where the conservation law of energy for internal forces applies. Therefore, the energy E_S of the generator is converted into energy stored E_P in the charged capacitor and into heat E_R dissipated during the charging process, it follows the conservation law:

$$E_S = E_P + E_R$$

$$\text{with:} \quad E_P = \frac{1}{2} CV_0^2 = E_R = \int_0^\infty R I^2(t)\, dt \qquad (15)$$

If the capacitor is not perfect, there is a leaking current and a corresponding dissipated energy which is provided by th...

Figure 2 shows a pendulum of mass 2M where M is the mass of one ball and L is the length of the string which makes an angle θ with the vertical. The forces acting on the system are the gravitational force 2Mg, the tension **T** in the string and the stimulated force $\mathbf{F}_G$. The horizontal component of the tension force is balanced by the stimulated force F_G when the stationary state is reached, therefore we have $F_G = 2Mg\,tg\theta \approx 2Mgx/L$, where $x \approx L\,tg\theta$ is the displacement of the ball.

The above energy conservation law will be violated when there is a stimulated force F_G since we have now:

$$\frac{d}{dt}\left(\frac{1}{2}\,\mathrm{nM}U^2\right) = U \cdot F_T \qquad (16)$$

where F_T is the sum of the gravitational force 2Mg, the tension T in the string and the stimulated force $\mathbf{F}_G$. knowing that **U** is the velocity of the pendulum in the Earth's reference frame. When the generator is switched off, a kinetic energy $E_K = 2MU^2/2 = 2MLg(1\cos\theta) \approx Mgx^2/L$ is recovered. This energy cannot be given by the generator but is taken from the ether. For two balls charged at 50 kV, the kinetic energy of the pendulum is $E_K = Mgx^2/L \approx 1.4\text{x}\ 10^3$ ergs while the electrostatic potential energy is $E_p = CV_0^2/2 \approx 1.4\text{x}10^5$ ergs. The kinetic energy due to the stimulated force is not a small quantity and cannot be taken from the generator since in classical circuit theory no motion of the capacitor is taken into account during the charging process. The effect is even more important if we applied the high voltage in an oscillatory manner in synchronism with the oscillatory motion of the pendulum. It results in an amplification of the magnitude of the displacement of the pendulum which now reaches ± 5 cm. This implies an increase of the kinetic energy almost 25 times the above kinetic energy.

One may think that the stimulated force is produced by the electrostatic forces resulting from the induced charges in the surroundings. Four tests were done to reject the hypothesis that the force is induced by the surroundings.

First test, we switch the polarity of the power supplies and observe that the direction of the force has also changed 180°. We recall that the direction of the force must not change if the spontaneous force is produced by asymmetries of the electrostatic forces.

Second test, we put a wood plate about 5mm near by the negative ball. When the voltage is increased, one can see the pendulum attracted by the induced charges in the wood plate, at about 30 kV when we increase the voltage above this value, then the spontaneous force takes over and one can see the pendulum moving away from the wood plate in the opposite direction.

Third test, we used coated wires to supply the balls, therefore the ionization current almost drops to zero, about 3 micro-amp. In that case, no more translation effect was observed even by oscillating the D. C. voltage.

Fourth test, when the ionization current is present, we oscillate the D. C. voltage and obtain an huge increase of the kinetic energy of the pendulum which proves that we are using an external force to produce work. We recall that an internal force can be distinguished from an external force by oscillating the potential function since for an internal force, the oscillating kinetic energy does not increase with respect to time as shown in equations 13 and 14 while for an external force the kinetic energy does increase as it is the case of a swing pushed by an external observer.

The earth magnetic force play no role in this experiment since the force involved is too small and not in the good direction.

One may also think that the stimulated force is produced by electrical wind or corona discharge. We must point out that the stimulated force does not exist if there is no current circulating inside the conductors. Let us recall that a current flows inside a conductor if there is a permanent non-uniform electrical field inside the conductor or inside the battery. There are several ways to produce this non-uniform field. For example, it can be produced by the presence of thin wires near by the balls as explained in the paragraph 6-11 high-voltage breakdown in the Feynman lecture book, see also the very important and not well-known paper by H. A. Pohl[10] dealing with this subject.

The current can also be produced by ionization of the air or by the leakage current in a dielectric. In the report by R.L. Talley[11] where the pendulum was in vacuum, no effect was observed because there is no current involved in the experiment except in one experiment where a dielectric was placed between the two electrodes. In that case, the observed effect can be explained by the leakage current in the dielectric. I think that this positive result justifies our viewpoint that a current is needed in order to produce a stimulated force through the violation of Newton's third principle. One can also criticize the experiment by noting that the voltage 19 kV is too small to show the effect. T.T. Brown used voltage up to 150 kV and obtained huge forces as indicated in P.A. LaViolette's book[12].

There are several possible mechanisms to explain the motion of the pendulum by an electrical wind effect:

The first one, the thrust results from the ejection of charged particles by the wires. Due to the cylindrical symmetry of the wires, the reaction forces must cancel to zero on the average.

The second one, electrons are attracted by the positive ball and the positive ions by the negative ball, due to the difference of mass of the two species of particles, the motion should be in the direction of the negative ball and cannot explain the thrust in the positive direction.

The third one, both negative and positive ions are attracted by the balls of opposite polarity. The transfer of momentum in the positive direction can be explained by a collision process and is due to the difference of mass between the two kind of ions. Let us assume that the spontaneous motion is due to a direct collision of both positive and negative ions with the metallic conductors. Then the transfer of momentum must be attributed to the difference of masses between the two kinds of ion, namely the masses of the emitted electrons. In A.D. Moore's book[13] (p. 84), it is stated that 6×10^{12} electrons per second leave the negative electrode for a corona amounting to 10^{-6} A. For a 1.5 mA leakage current in the pendulum experiment, we obtain $9\text{x}\ 10^{15}$ electrons/s which amounts to a mass transfer $8\text{x}\ 10^{-12}$ g/s which is several orders smaller than the 3.5 g stimulated force observed.

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