Counter gravitation and energy from spacetime by momentum transfer

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Abstract

Through the ECE series of papers, we have provided theoretical research into counter gravitation and energy from spacetime. In this paper, we present two methods that can even be understood on a classical level. The momentum of the electromagnetic field is used to counteract gravitation, and a resonance mechanism of this field is used to create mechanical resonance for energy transfer from spacetime.

Keywords: Unified field theory; electromagnetism; counter gravitation; field momentum; resonance.

1 Introduction

In ECE theory [1–5], several developments have shown that interactions are possible with the spacetime or vacuum, for example, by the resonant Coulomb law [1] and the Ampère-Maxwell law [6]. In the view of ECE theory, electrodynamic and mechanical systems, which are usually considered to be closed systems, have a connection to the surrounding spacetime or vacuum or aether. This makes them open systems, and allows energy to be transferred from/to the vacuum. In standard physics, this is considered to be possible only in very restricted situations, for example, if the quantum vacuum is involved. In this paper, we describe a new method based on momentum transfer from electrodynamic to mechanical systems. The structure of spacetime itself does not need to be considered to the extent that is required for other methods.

2 Canonical momentum

In mechanics, the momentum of a moving mass is

$$\mathbf{p}_m = m\mathbf{v}_m, \tag{1}$$

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where m is the mass of a body and $\mathbf{v}_m$ is its velocity. When the mass moves in a gravitational field $\mathbf{g}$, this field has its own momentum. According to ECE theory, the momentum of the gravitational field is

$$\mathbf{p}_g = m\mathbf{Q}, \tag{2}$$

where $\mathbf{Q}$ is the vector potential of the gravitational field. This is not known in Newtonian theory and is very problematic (or does not appear at all) in Einstein's general relativity. We can compare the above equation with electrodynamics, where the magnetic vector potential $\mathbf{A}$ generates the field momentum

$$\mathbf{p}_A = q\mathbf{A}, \tag{3}$$

acting on a charge q. The mechanical vector potential $\mathbf{Q}$ in Eq. (2) has the dimension of a velocity, so we can denote it by $\mathbf{v}_g$ and write

$$\mathbf{p}_g = m\mathbf{v}_g. \tag{4}$$

The *canonical momentum* of classical mechanics is the sum of all momenta:

$$\mathbf{p}_c = \mathbf{p}_m + \mathbf{p}_g = m\mathbf{v} + m\mathbf{v}_g. \tag{5}$$

Only the mechanical (and not the canonical) momentum is measurable. Therefore, the Hamiltonian (or total energy) is defined using the measurable momentum only. In the non-relativistic case with potential energy U, the Hamiltonian is

$$\mathscr{H} = \frac{1}{2m}\left(\mathbf{p}_c - \mathbf{p}_g\right)^2 + U = \frac{1}{2}m\mathbf{v}^2 + U. \tag{6}$$

The Lagrangian $\mathscr{L}$ can be derived from Hamilton's equation

$$\mathscr{H} = \sum_j p_j \dot{q}_j - \mathscr{L}, \tag{7}$$

where q_j are the generalized coordinates and p_j are their momentum components. The result is

$$\mathscr{L} = \frac{1}{2}m\mathbf{v}^2 + m\mathbf{v}\cdot\mathbf{v}_g - U \tag{8}$$

(see Section 9.3.2 of [5]).

3 Equations of motion

We will now study the question of whether the gravitational force on the Earth's surface can be counteracted by a field momentum (which can only be produced by electromagnetism). We restrict the concept of the canonical momentum to one-dimensional motion (like in the X direction) because, in one dimension, we simply have

$$p_A = qA \tag{9}$$

with charge q and vector potential A. To obtain the equation of motion, we apply Lagrange theory. Using the field momentum of electromagnetism instead of gravitation, the Lagrangian (8) becomes

$$\mathscr{L} = \frac{m}{2}\dot{X}^2 + qA\dot{X} - U. \tag{10}$$

The potential energy in the constant gravitational field at the Earth's surface is

$$U = mgX \tag{11}$$

with g=9.81 m/s^2. For a static A field, the equation of motion from the Lagrangian is simply

$$\ddot{X} = -g. \tag{12}$$

This is the equation of free fall. If we assume a time dependence of the vector potential, the Lagrangian is

$$\mathscr{L} = \frac{m}{2}\dot{X}^2 + qA(t)\dot{X} - mgX, \tag{13}$$

and the Euler-Lagrange equation is

$$\ddot{X} = -\frac{q}{m}\dot{A}(t) - g. \tag{14}$$

We see that gravitational acceleration g can be counteracted, if q and $\dot{A}$ have a suitable sign.

4 Examples

4.1 Counter gravitation

We consider examples of Eq. (14) which lead to a growing $X(t)$. This means that gravity is counteracted by the momentum of the vector potential. For

$$A(t) = -A_0\, t^n, \tag{15}$$

the A term in the Euler-Lagrange equation (14) becomes positive and outperforms the gravitational term $-g$ after a short time. It has to be $n \geq 1$ to obtain growing curves. Two examples with $n = 1$ and $n = 2$ have been solved numerically and are graphed in Fig. 1 using a logarithmical scale. The results can also be obtained analytically and are polynomials in t. The general solution of Eq. (14),

$$\ddot{X} = -\frac{q}{m}A_0\, n\, t^{n-1} - g, \tag{16}$$

is

$$X = -\frac{A_0 q}{m\,(n+1)}\, t^{n+1} - \frac{1}{2}g\, t^2 + c_1 t + c_2 \tag{17}$$

with constants c_1 and c_2.

Eq. (17) contains the charge-to-mass ratio q/m that is known from the Millikan experiment, where it is related to electrons. To check if this method is suited for macroscopic engineering, we have to insert some realistic values for the parameters. From Eq. (14), we see that the gravitational acceleration g is effectively counteracted, if

$$\left|\frac{q}{m}\dot{A}\right| \approx g. \tag{18}$$

With $g \approx 10$ m/s^2, $q = 10^{-4}$ C and $m = 1$ kg, we obtain

$$\dot{A} \approx \frac{mg}{q} = 10^5 \text{ V/m}. \tag{19}$$

From this, the inverse rising time for A can be estimated to be

$$\frac{1}{\Delta t} = \frac{\dot{A}}{\Delta A} \tag{20}$$

by using

$$\dot{A} \approx \frac{\Delta A}{\Delta t}. \tag{21}$$

We assume that A is increased periodically in cycles. Setting the maximum amplitude $\Delta A = A_{max} = 10^{-4}$ Vs/m, we obtain a frequency for these cycles of

$$f = \frac{1}{\Delta t} = \frac{\dot{A}}{A_{max}} = \frac{10^5}{10^{-4}}\frac{1}{\text{s}} = 10^9 \text{ Hz}. \tag{22}$$

Please note that a cycle frequency in the 1 GHz range is a technical requirement.

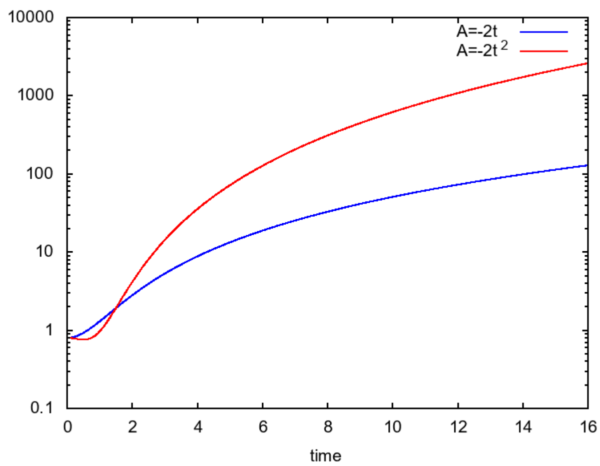

Figure 1: Trajectories $X(t)$ for two values of n according to Eqs. (14/15).

4.2 Energy from spacetime

As a second example, we consider a harmonic oscillator in an external momentum field. Instead of a driving force, we use an oscillating vector potential

$$A(t) = A_0 \cos(\omega t). \tag{23}$$

The potential of the repulsive force is

$$U = \frac{1}{2} k X^2 \tag{24}$$

with the spring constant k. In a driven oscillator, the resonance frequency is

$$\omega_0 = \sqrt{\frac{k}{m}}. \tag{25}$$

Then, the Euler-Lagrange equation (14) is

$$\ddot{X} + \frac{k}{m} X = A_0 \, \omega \, \frac{q}{m} \, \sin(\omega t), \tag{26}$$

which is an equation of an undamped, forced oscillation, giving resonance at $\omega = \omega_0$. The vector potential term qA, acts as a driving force, even though it is a momentum and not a force. For $\omega \to \omega_0$, the amplitude grows to infinity. The benefit of this approach is that no minimum value of the momentum amplitude is required, so that a resonance can be generated even by small values of A_0 and q. An example is graphed in Fig. 2.

As in the preceding example, we will now determine the physical parameters for a technical implementation. With $A_0 = 10^{-4}$ Vs/m, $q = 10^{-4}$ C and $m =$ 1 kg, we obtain

$$A_0 \frac{q}{m} = 10^{-8} \text{m/s}. \tag{27}$$

From Eq. (26), it would require a frequency of $\omega \approx 10^8$ Hz to obtain a driving term in the range of unity. It could be that an electric resonance circuit is easier to construct for realizing the desired effect.

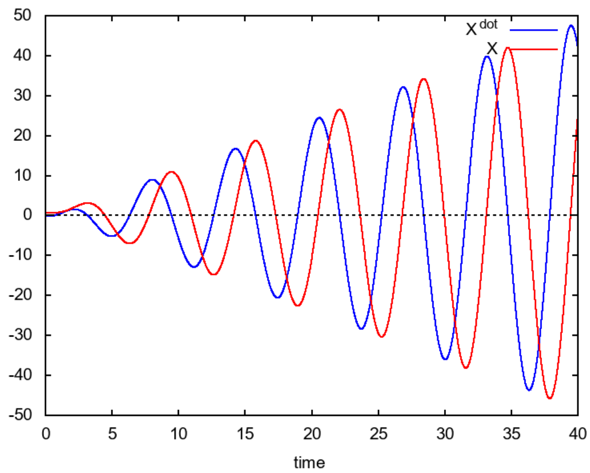

Figure 2: Trajectories $\dot{X}(t)$ and $X(t)$ for a driven harmonic oscillator.

5 Conclusions

The described mechanisms can be used to extract energy from spacetime or to directly counteract gravitation. For the resonance mechanism, the important point is that the driving force has to operate without a feedback effect. The mechanism that generates A must be independent of the amplitude X of the oscillator. The vector potential may arise from the vacuum or aether. It can be created by a magnetic field, for example. The condition of decoupling is fulfilled for a permanent magnet, where the vector potential is replenished by the elementary magnets of the material from the vacuum, even if its amplitude is diminished by driving the oscillator. In the examples described, we need a time-varying vector potential. This could be realized by a toroidal coil, for example. It must be noted, however, that coils with standard cores work only for frequencies up to 1-2 MHz. For higher frequencies, special technologies are necessary. This paper should give ideas to engineers for inventing new types of applications.

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