The high energy electromagnetic field generator

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Abstract: The original concept described is named the high energy electromagnetic field generator. This concept's governing physics entail the coupling of gyration (high frequency spin), vibration (high frequency abrupt pulsations/harmonic oscillations) and possible curvilinear translation, of electrically charged systems. If we couple the system's high frequency of rotation (30,000 to 100,000 RPM, and higher) with high vibration (abrupt pulsations/harmonic oscillations) frequencies in the range of 10^9 to 10^{18} Hertz (and above) we can obtain electromagnetic field intensity values in the range 10^{24} to 10^{28} Watts/m^2 (and beyond). These extremely high electromagnetic field intensity values emphasise the novelty of this concept, especially suited for the design of energy generation machinery with power output levels much higher than those currently achievable. The utilisation of such high power sources for space power and propulsion generation, as it pertains to reduction in a spacecraft's inertial mass as a direct result of local vacuum polarisation, is an important application of the described theoretical concept. In this manner, extreme spacecraft speeds can be achieved.

Keywords: faster than light travel; superluminal propulsion; quantum vacuum plasma; QVP; vacuum energy fluctuations; vacuum polarisation; spacetime manipulation; quantum vacuum engineering; quantum field theory; far from equilibrium thermodynamics; spatio-temporal excursion.

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1 Introduction

The original concept described herein, is named the high energy electromagnetic field generator (HEEMFG). When put in practice, this system can provide the design of energy generation machinery with power output levels much higher than those currently achievable. The utilisation of such high power sources for space power and propulsion generation, as it pertains to reduction in the spacecraft's inertial mass as a direct result of local vacuum polarisation, is an important application of the described theoretical concept.

This concept's governing physics entail the coupling of gyration (high frequency spin), vibration (high frequency abrupt pulsations/harmonic oscillations) and possible curvilinear translation (thus three modes of motion) of electrically charged systems.

There are four known fundamental forces which control matter and therefore control energy, namely the strong and weak nuclear forces, the electromagnetic (EM) force and the gravitational force. In this hierarchy of forces, the EM force is perfectly positioned to be able to manipulate the other three. A stationary electric charge gives rise to an electric (electrostatic) field, while a moving charge generates both an electric and a magnetic field (hence, the EM field); additionally an accelerating charge induces EM radiation in the form of transverse waves, namely light. Mathematically as well as physically, EM field intensity can be represented as the product of electric field strength and magnetic field strength. EM fields act as carriers for both energy and momentum, thus interacting with physical entities at the most fundamental level.

Artificially generated, high energy, EM fields interact strongly with the vacuum energy state (an aggregate/collective state comprised of the superposition of all quantum fields' fluctuations permeating the entire fabric of spacetime), thereby giving rise to emergent physical phenomena (in other words revolutionary/new physics), such as force and matter fields unification. According to quantum field theory, this strong interaction between the fields is based on the mechanism of transfer of vibrational energy between the fields, further inducing local fluctuations in adjacent quantum fields which permeate spacetime (these fields may or may not be EM in nature). Matter, energy, and spacetime are all emergent constructs which arise out of the fundamental framework that is the vacuum, energy state.

Everything that surrounds us, ourselves included, can be described as macroscopic collections of fluctuations, vibrations, oscillations in quantum mechanical fields. Matter is confined energy, 'frozen' in a quantum of time. Therefore, under certain conditions (such as the coupling of hyper-frequency axial spin with hyper-frequency vibrations of electrically charged systems) the rules and special effects of quantum field behaviour also apply to macroscopic physical entities (O'Connell et al., 2010).

Moreover, coupling of hyper-frequency gyrational (axial rotation) and hyper-frequency vibrational electrodynamics (as used in the concept herein disclosed) is conducive to a possible physical breakthrough (force field unification is feasible with the concept at hand) in the utilisation of the macroscopic quantum fluctuations vacuum plasma field (quantum vacuum plasma – QVP, in short) as an energy source (or sink), an induced physical phenomenon, for which the technology readiness level has been considerably advanced by a team of research engineers from NASA JSC (Brady et al., 2014). This research involves the use of high radio frequency/microwave driven resonant cavity Q-thruster technology within the context of QVP physics.

The QVP is the electric glue of our plasma universe. The Casimir effect, the Lamb shift, and spontaneous emission, are specific confirmations of the existence of QVP (Milonni, 1994).

It is important to note that in region(s) where the EM fields are strongest, the more potent are the interactions with the QVP, therefore, the higher the induced energy density of the QVP particles which spring into existence(the Dirac Sea of electrons and positrons). These QVP 'particles' may augment the obtained energy levels of the HEEMFG system (even though they are short-lived, these 'virtual' particles have a real effect).

To be more precise, the EM fields created by the HEEMFG system, interact with the vacuum energy state, which is an aggregate state composed of the superposition of all quantum fields' fluctuations filling the entire fabric of spacetime. Contributions to this vacuum state energy density are made by the quantum vacuum-zero point fluctuations, the quantum chromo-dynamics gluon and quark condensates and the newly discovered Higgs field (exhibiting massive 126 GeV particles), among other yet undiscovered fields (super-symmetry). In other words, major contributions to the vacuum energy state are made by collectives of quantum fluctuations in fermionic fields (fields of matter), quantum fluctuations in bosonic fields (fields of force) and quantum fluctuations in scalar fields (Higgs field).

2   Concept novelty

The physical equation which describes the maximum intensity achieved by the HEEMFG system is described by the magnitude of the Poynting vector, which in non-relativistic form (accounting for all three modes of motion) can be written as:

$$S_{max} = f_G \left(\sigma^2 / \varepsilon_0 \right) \left[R_r \omega + R_v \nu + v_R \right] \tag{1}$$

where f_G is the HEEMFG system geometric shape factor (equal to 1 for a disc configuration), σ is the surface charge density (total electric charge divided by surface area of the HEEMFG system), ε_0 is the electrical permittivity of free space, R_r is the radius of rotation (disc radius), ω is the angular frequency of rotation in rad/s, R_v is the vibration (harmonic oscillation) amplitude, ν is the angular frequency of vibration in Hertz, and the term v_R is the curvilinear translation speed (acquired via a propulsive unit of either chemical, nuclear or magneto-plasma-dynamic (VASIMR) type attached to the HEEMFG system – the integrated unit being the spacecraft).

Therefore, if we consider only rotation, given a disc configuration, with $\sigma = 50,000$ Coulombs/m^2, a disc (spinning/axially rotating) radius of 2 m and an angular speed of 30,000 RPM, we can generate an EM field intensity (S_{max} = rate of energy flow per unit area, or energy flux) value on the order of 10^{24} Watts/m^2 (this value does not account for any QVP interactions).

Furthermore, if we couple the high frequency of rotation with high vibration (harmonic oscillation) frequencies in the range of 10^9 to 10^{18} Hertz (and above) we can obtain S_{max} intensity values in the range 10^{24} to 10^{28} Watts/m^2 (and beyond). These extremely high EM field intensity values emphasise the novelty of this concept, especially suited for the design of energy generation machinery with power output levels much higher than those currently achievable.

For the case of an accelerating angular frequency of vibration ($a_{max} = R_v v^2$), neglecting rotation and curvilinear translation, equation (1) becomes (note intrinsic significance of acceleration):

$$S_{max} = f_G \left(\sigma^2 / \varepsilon_0 \right) \left[\left(R_v v^2 \right) t_{op} \right] \qquad (2)$$

where t_{op} is the operational time for which the charged electrical system is accelerating.

Close inspection of equation (2) results in an important realisation, namely: strong local interaction with the high energetics of the quantum vacuum fields' fluctuations superposition (macroscopic vacuum energy state) is possible in a laboratory environment, by application of high frequency gyration and/or high frequency vibration of minimally charged objects (order of unity), in an acceleration mode. In this manner, a high degree of vacuum energy polarisation can be achieved.

Local polarisation of the vacuum in the close proximity of a spacecraft equipped with an HEEMFG system would have the effect of cohering the highly energetic and random quantum vacuum fields' fluctuations, which virtually block the path of an accelerating spacecraft, in such a manner that the resulting negative pressure of the polarised vacuum allows less laboured motion through it (Froning, 2009).

Spontaneous electron-positron pair production out of the vacuum (Schwinger, 1951; Kim, 2015) is a strong indicator of vacuum polarisation being achieved. Schwinger gives a value of the electric field (E) on the order of 10^{18} V/m for this phenomenon to take place. The mass production rate $(dm / dt)_{pp}$ of particle/anti-particle pairs can be expressed in terms of S_{max} (energy flux), namely:

$$2_\gamma (dm / dt)_{pp} c^2 = S_{max} A_S \qquad (3)$$

where A_S is the surface area from which the energy flux emanates, c is the speed of light in free space, and (γ) is the relativistic stretch factor $[1 - (v^2 / c^2)]^{-1/2}$. Note that the pair production rate increases with increasing energy flux from the spacecraft's generated EM field. Therefore, the level, to which the vacuum is polarised, thus allowing less laboured motion through it, strictly depends on the artificially generated EM energy flux.

If we consider the boundary condition in the close proximity of the spacecraft where the energy density of the artificially generated EM field equals the local energy density of the polarised vacuum (caused in part by the local zero-point vacuum fluctuations on the order of 10^{-15} Joules/cm^3 and in part by the artificial EM field interacting with the local vacuum energy state) we can write the approximate equivalence:

$$S_{max} \left(t_{op} / R_S \right) = \left[\left(h^* v_v^4 \right) / 8\pi^2 c^3 \right] \qquad (4)$$

where R_S is the electromagnetic (EM) field radius at EM wave propagating time t_{op}, such that $R_S / t_{op} = c$ (where c is the light speed in free space), (h^*) is Planck's constant divided by (2π) and (v_v) is the frequency of quantum fluctuations in the vacuum (modelled as harmonic oscillators).

Furthermore, given that the left side of equation (4) is on the order of ($\varepsilon_0 E^2$) where E is the artificially generated electric field (strength), considering the Schwinger value of (E) for the onset of spontaneous pair production, we obtain a (v_v) value on the order of 10^{22} Hertz, which matches our expectations, since the Dirac virtual pair production, results in total annihilation, yielding gamma rays, which occupy the EM frequency spectrum of 10^{19} Hertz and above.

A recent paper (Pais, 2015) considers the possibility of superluminal spacecraft propulsion in a special relativity framework. It is observed that under certain physical conditions, the singularity expressed by the relativistic stretch factor 'gamma' as the spacecraft's speed (v) approaches the speed of light (c), is no longer present in the physical picture. This involves the instantaneous removal of energy-mass from the system (spacecraft) when the spacecraft's speed reaches (v = c / 2). The author discusses the possibility of using exotic matter (negative mass/negative energy density) to bring about this effect. This may not have to be the only alternative. The artificial generation of gravity waves in the locality of the spacecraft, can result in energy-mass removal (gravity waves are propagating fluctuations in gravitational fields, whose amplitude and frequency are a function of the motion of the masses involved).

Moreover, it is feasible to remove energy-mass from the system by enabling vacuum polarisation, as discussed by Puthoff (Puthoff, 2002; Haisch et al., 1994); in that diminution of inertial (and thus gravitational) mass can be achieved via manipulation of quantum field fluctuations in the vacuum. In other words, it is possible to reduce a spacecraft's inertia, that is, its resistance to motion/acceleration by polarising the vacuum in the close proximity of the moving spacecraft. As a result, extreme speeds can be achieved.

Think of the vacuum energy state as a chaotic system comprised of random, highly energetic fluctuations in the collective quantum fields which define it. Considering Prigogine's (1977) work on far from equilibrium thermodynamics, a chaotic system can self-organise if subjected to three conditions, namely: the system must be nonlinear, it must experience an abrupt excursion far from thermodynamic equilibrium, and it must be subjected to an energy flux (order from chaos).

An artificially generated high energy EM field can fulfil all three conditions simultaneously, when strongly interacting (especially in an accelerated vibration/rotation mode) with the local vacuum energy state. Recall that these interactions are induced by the coupling of hyper-frequency axial rotation (spin) and hyper-frequency vibration (harmonic oscillations/abrupt pulsations) of electrically charged systems (HEEMFG), placed on the outside of the spacecraft in strategic locations. In this manner, local vacuum polarisation, namely the coherence of vacuum fluctuations within the immediate proximity of the spacecraft's surface (outside vacuum boundary) is achieved, allowing for 'smooth sailing' through the negative pressure (repulsive gravity) of the void.

As an aside, force and matter fields unification (Gross, 2007) is feasible with the concept at hand, due to the extremely strong interactions (EM in nature) between ordinary matter and the QVP/vacuum energy state (interactions which exhibit extremely high energies on Planck length scales in the immediate proximity of the disc/spacecraft surface).

3   Conclusions

This original concept, which may represent a breakthrough technology, does reveal a novel approach to the design of energy generation machinery with power output levels much higher than those currently achievable by conventional means.

The utilisation of such high power sources for space power and propulsion generation, as it pertains to reduction in the spacecraft's inertial mass as a direct result of

local vacuum polarisation, is an important application of the described theoretical concept. In this manner, extreme spacecraft speeds can be achieved.

To be more exact, the concept at hand can be utilised in the design of a device to manipulate/modify the local spacetime lattice (topology) energy density, which can be achieved via local vacuum energy polarisation. Moreover, due to the nature of the 'emergent physics' involved, it is possible to experience spatio-temporal displacement (excursion) effects.

Disclaimer

The views espoused and conclusions reached in this technical paper are the author's own, and do not necessarily reflect the views or beliefs of the US Government and the Department of the Navy.

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