

Unlinked Electromagnetic Fields Thrusters.

A novel approach to electric propulsion in aerospace applications.

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Abstract

The aerospace industry is undergoing a transformative phase, necessitating innovative solutions to overcome the limitations of traditional propulsion systems. This document introduces the concept of Unlinked Electromagnetic Fields Thrusters, a groundbreaking technology that promises to revolutionize electric propulsion in aerospace applications.

Unlinked Electromagnetic Field Thrusters operate on the principle of electromagnetic force fields, leveraging electromagnetic pulses to generate impulse forces without the need for propellants or fuels. Theoretical foundations, technological developments, feasibility assessments, and comparisons with existing propulsion technologies are discussed, highlighting the potential of Unlinked Electromagnetic Fields Thrusters to significantly enhance the efficiency, cost-effectiveness, and performance of propulsion systems in space exploration and satellite missions.

Unlinked Electromagnetic Fields Thrusters has obtained patents in several countries, including the United States of America, China, Russia, Japan, The United Arab Emirates, Eurasia, Canada, Israel, South Africa and México.

1. Introduction:

The propulsion systems utilized in aerospace industry are approaching their inherent limitations, necessitating the exploration of alternative technologies to propel spacecrafts and satellites more efficiently and sustainably. Traditionally propulsion systems, such as chemical engines, ion thrusters, and Hall effect thrusters, rely on the expulsion of mass to generate thrust, resulting in significant limitations in terms of efficiency and payload capacity. In response to these challenges, there has been growing interest in electric propulsion systems that utilize electrical energy to generate thrust without the need for propellants or fuels.

2. Background:

The concept of Unlinked Electromagnetic Fields Thrusters emerged from the need for a propulsion system that transcends the constraints of conventional propulsion technologies.

Our thrusters operate on the principle of unlinked electromagnetic fields, wherein electromagnetic pulses are used to induce impulse forces on susceptible objects according to Maxwell's equations, thereby enabling propulsion without the expulsion of mass. This technology represents a paradigm shift in aerospace propulsion, offering numerous advantages over traditional propulsion systems.

3. Technological foundations.

Basic concepts of Unlinked Electromagnetic Fields Thruster technology.

First we will present the two principles in which operation of our thruster is based and then proceed to explain in detail how it works

- a) An electromagnetic field such as a train of electromagnetic pulses can change the dynamic state of a susceptible object without requiring a balance of momentum between the object and the element that originated the field pulses.

$$\frac{d}{dt}(m_1\vec{v}_1) = -\frac{d}{dt}(m_2\vec{v}_2)$$

- b) An electromagnetic field can change the dynamic state of a susceptible object even after the element that created the electromagnetic field has ceased to exist.

a) An electromagnetic field such as a train of electromagnetic pulses can change the dynamic state of a susceptible object without requiring a balance of momentum between the object and the element that originated the field pulses.

If we take into account the so-called electromagnetic spectrum that includes radio waves, microwaves and light, we can take the reference of the impulse that is generated in the so-called solar sails or laser sails, where a susceptible surface—in this case a reflective surface such as Metallized Mylar—is deployed like a sail and a laser beam is directed onto it generating an impulse that has already been verified on different occasions, such as on the Japanese satellite “IKARUS”. In this case light with its wave-particle duality impacts the sail and the photons carry out an energy exchange with respect to the sail even though a photon in its basic nature has no mass; however, a loss of energy is generated on the photons since its wavelength changes becoming a longer wavelength which represents a decrease in its energy at the moment of impact. Photon momentum can be deduced as follows:

Momentum p is defined by:
$$p = mv$$

Considering relativistic mechanics, this equation can be compensated for the variants of mass with velocity using the Lorentz factor,

$$p = \gamma mv.$$

On the other hand, if the Einstein equation is taken into account,

$$E = mc^2,$$

and, considering that each photon has, according to Max Planck’s equation, an energy given by

$$E = h\nu,$$

where h is Planck’s constant and ν is the frequency of the electromagnetic wave, using these two equations we obtain that the momentum of the photon is equal to

$$p = \frac{h\nu}{c},$$

where c is the speed of light, and substituting $c = \gamma v$ in the previous equation, it results in a value for the equivalent momentum of the photon.

From fundamental physics we know:

$$\lambda = \frac{c}{\nu}$$

Finally we obtain De Broglie's relationship:

$$p = \frac{h}{\lambda}.$$

This last expression shows that when a photon hits the surface of a light sail, if it is reflected with a longer wavelength, it is this energy loss of each photon upon impacting the sail's surface that allows an increase in sail's momentum; photons are not exclusive to the region of the electromagnetic spectrum that encompasses light. In this way, the laser beam generates a change in the momentum of the sail without there having to be a balance of momentum with the source that generated the laser beam, which is an electromagnetic wave that travels through space once it has been generated to subsequently generate an interaction of the wave with the surface of the sail.

Let us consider, on the other hand, a plate of conductive material on which a series of electromagnetic field pulses generated by an emitter are applied. These pulses, upon impact on the plate, generate induced currents that in turn oppose the magnetic field that created them, generating a repulsion effect; this action can generate a change in the momentum of the plate due to the action of the repulsion force that the magnetic field pulses originate

Maxwell's equations for electromagnetism allow determining the magnitude of the induced currents and the forces resulting from the interaction of variable or pulsed magnetic fields acting on a plate of conductive material:

$$\begin{aligned}\nabla \cdot \mathbf{E} &= \frac{\rho}{\varepsilon_0}, \\ \nabla \cdot \mathbf{B} &= 0, \\ \nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t}, \\ \nabla \times \mathbf{B} &= \mu_0 \mathbf{J} + \mu_0 \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t}.\end{aligned}$$

Through the action of electromagnetic fields, as we will see later, it is possible to generate an impulse force through mechanisms unrelated to the principles of conservation of momentum balance but maintaining the principles of conservation of energy. Several researchers have already been able to demonstrate in the laboratory that this is possible.

Building upon the photon momentum established by $p = \frac{h}{\lambda}$, it is essential to consider the broader implications of wave-particle duality to fully understand the momentum transfer in Unlinked Electromagnetic Fields Thrusters. In 1924, inspired by the nature of light and the success of relativity theory, Louis de Broglie proposed that not only light, but all known matter particles exhibit an analogous wavelength. De Broglie conjectured that the dynamic state of any particle can be described by:

$$\lambda = \frac{h}{p} \tag{1}$$

De Broglie's wavelength equation bridges the fundamental gap between electromagnetic waves and the dynamic state of susceptible objects, such as the conductive plates (PL) utilized in our passive layouts and in our active layouts.

To rigorously demonstrate how an electromagnetic field pulse can alter the dynamic state of a particle without requiring a momentum balance with the original emitter, we refer to the Compton effect. In 1923, Arthur Compton's experiments with X-ray scattering particles (electrons) proved conclusively that electromagnetic waves can transfer physical momentum to matter.

From special relativity, the fundamental relation between energy and matter is established as:

$$E^2 = p^2c^2 + m^2c^4 \quad (2)$$

For a massless photon ($m = 0$), its energy and momentum are directly related by $p = E/c = h\nu/c$. If we analyze Compton's scenario, we assume an electron originally at rest ($p_0 = 0$) on the conductive plate is impacted by a photon (representing our unlinked electromagnetic pulse) with an initial momentum magnitude of $h\nu/c$.

Following the impact, the electron acquires a non-zero final momentum ($p \neq 0$) scattered at an angle φ , while the photon is deflected at an angle ϑ with a reduced frequency $\nu' < \nu$ (meaning its momentum is reduced to $h\nu'/c$). The conservation of energy and momentum for this system are expressed as:

$$h\nu + m_e c^2 = h\nu' + \sqrt{p^2c^2 + m_e^2c^4} \quad (3)$$

$$\frac{h\nu}{c} = \frac{h\nu'}{c} \cos \vartheta + p \cos \varphi \quad (4)$$

$$0 = -\frac{h\nu'}{c} \sin \vartheta + p \sin \varphi \quad (5)$$

Solving for p^2 from the energy conservation relation (3), we obtain:

$$p^2 = \frac{1}{c^2}(h\nu - h\nu' + m_e c^2)^2 - m_e^2 c^2 = \left(\frac{h\nu}{c}\right)^2 + \left(\frac{h\nu'}{c}\right)^2 - \frac{2h^2\nu\nu'}{c^2} + 2h(\nu - \nu')m_e \quad (6)$$

Squaring and summing the momentum expressions (4) and (5) leads to:

$$p^2(\sin^2 \varphi + \cos^2 \varphi) = \left(\frac{h\nu'}{c}\right)^2 (\sin^2 \vartheta + \cos^2 \vartheta) + \left(\frac{h\nu}{c}\right)^2 - \frac{2h^2\nu\nu'}{c^2} \cos \vartheta \quad (7)$$

Comparing equations (6) and (7), we arrive at the sought result:

$$2h(\nu - \nu')m_e = 2h\frac{h\nu\nu'}{c^2}(1 - \cos \vartheta) \iff c\frac{\nu - \nu'}{\nu\nu'} = \frac{h}{m_e c}(1 - \cos \vartheta) \quad (8)$$

Defining the Compton wavelength for the electron as $\lambda_C = \frac{h}{m_e c}$, and translating initial and final frequencies back to wavelengths ($\lambda = c/\nu$, $\lambda' = c/\nu'$), we obtain the Compton effect formula:

$$\lambda' - \lambda = \lambda_C(1 - \cos \vartheta) \quad (9)$$

This mathematical demonstration confirms that when an unlinked electromagnetic field pulse impacts the conductive plate (PL), the energy loss of the incident wave ($\nu' < \nu$)

directly translates into an increase in the kinetic momentum ($\mathbf{p} \neq 0$) of the susceptible particles within the plate. Multiplied across high-frequency pulse trains, this fundamental quantum momentum transfer manifests macroscopically as the induced currents and resulting repulsion forces described by Maxwell's equations.

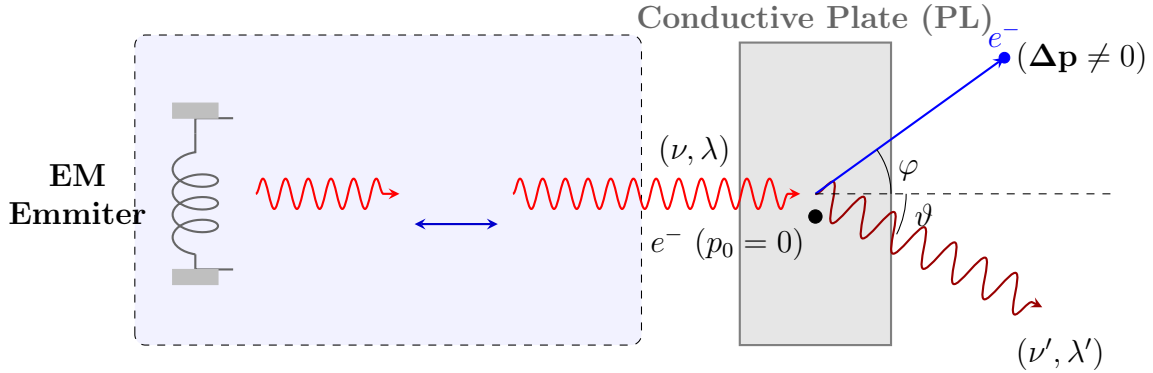


Figure 1: An incident EM pulse impacts an electron within the conductive plate (PL). The resulting Compton scattering transfers kinetic momentum to the particle, yielding a macroscopic thrust force as the cumulative effect of millions of synchronized pulses.

b) An electromagnetic field can change the dynamic state of a susceptible body even after the element creating the electromagnetic field has ceased to exist.

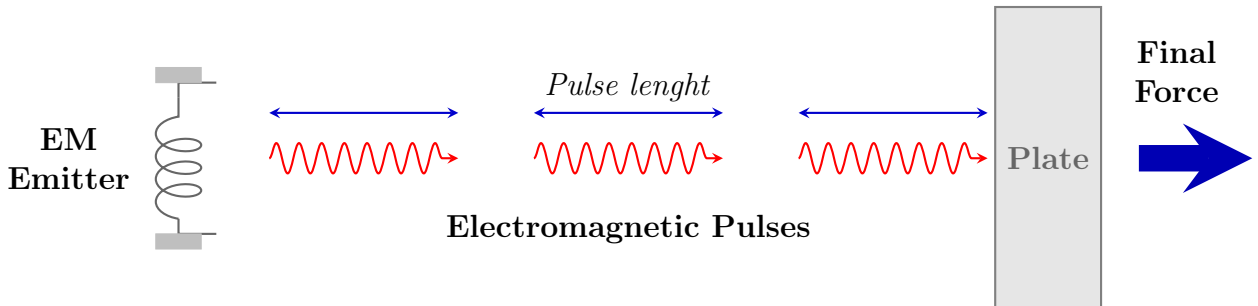


Figure 2: Diagram showing a series of electromagnetic pulses emitted towards a conductive plate, with each interval separating the pulses being equivalent to a time that the emitter ceases to exist as such.

If the emitter in fig. 1 ceases to exist as in fig. 2, the target plate will be receiving the impact of the remaining electromagnetic field pulses that are traveling through the space between the disappeared emitter and the plate until the last pulse impacts the target.

We can also consider the case of a light sail that is at a great distance from the origin of a light beam directed to it; if at a given moment this light beam stops transmitting, the sail may still experience acceleration due to the remaining radiation that travels through the space from the original source to the light sail

We can easily appreciate this concept by observing radio telescopes that can capture the energy of electromagnetic waves generated by stellar bodies that have long since ceased to exist. Some sources of electromagnetic radiation in the universe cease to exist, but the

electromagnetic energy they have generated continues to travel through space for up to millions of years and that electromagnetic energy can be captured by radio telescopes because its sensors are susceptible to these types of radiation and can continue to do so regardless of whether its source no longer exists.

The concept that a susceptible object can be affected in its dynamic state by electromagnetic fields whether modulated or pulsed for a certain time after its source of origin has ceased to exist is what we call “unlinked electromagnetic field effect.” And is the basis of our 100% electric thruster’s design.

4. Unlinked Electromagnetic Field Thruster Technology

Making use of the above concepts to the development of a 100% electric impulse engine for space use that does not use propellant or fuel.

Understanding the principle of Unlinked Electromagnetic Fields Thrusters might seem complicated, but it can be simplified with a straightforward analogy. Imagine a plate made of conductive material suspended in space. Now, imagine a pulse emitter that sends out magnetic field pulses. Every time a pulse hits the plate, it generates an induced current. This current, in turn, creates a magnetic field that opposes the one that caused it, generating a force. Now, if the pulse emitter suddenly stops or disappears, the magnetic field pulses it had emitted continue to travel through space until they reach the plate and generate force pulses due to the repulsion between the fields created on the plate and the incoming field pulses.

This is similar to how radio telescopes in astronomy can detect electromagnetic signals from cosmic sources that no longer exist. This process of generating induced currents and resulting forces can be deduced directly from Maxwell’s equations and electromagnetic theory.

Applying this principle to the design of an Unlinked Electromagnetic Fields Thruster, consider this assembly that we call “passive layout”

A pulse emitter and a plate, both firmly fixed on the same frame, the emitter is activated by an electronic circuit and sends out intense electromagnetic field pulses; the duration of these pulses is shorter than the distance between the emitter and the plate divided by the speed of light which is the propagation speed of the electromagnetic field pulses. This allows each pulse to detach or unlink from the emitter before reaching the conductive plate. The emitter generates a large number of pulses per second, each time that an unlinked pulse impacts the plate, induced currents are generated producing a repulsion force against the electromagnetic field pulses that created them, this force lasts a very short time but results in a micro-impulse, and when it is multiplied by the number of pulses produced by the emitter in one second, this micro-impulse determines the final impulse and consequently, the movement of the structure containing the emitter and the plate.

The operation principle can also be applied using an array with a primary magnetic field pulse generator and two secondary emitters; we call this array “active layout”. A primary emitter generates intense electromagnetic field pulses, each one shorter in duration than the distance between the secondary emitters and the primary emitter divided by the speed of light; the secondary emitters then emit synchronized pulses, one of attraction and one of repulsion, which generate micro-impulses that finally consolidate in a final impulse.

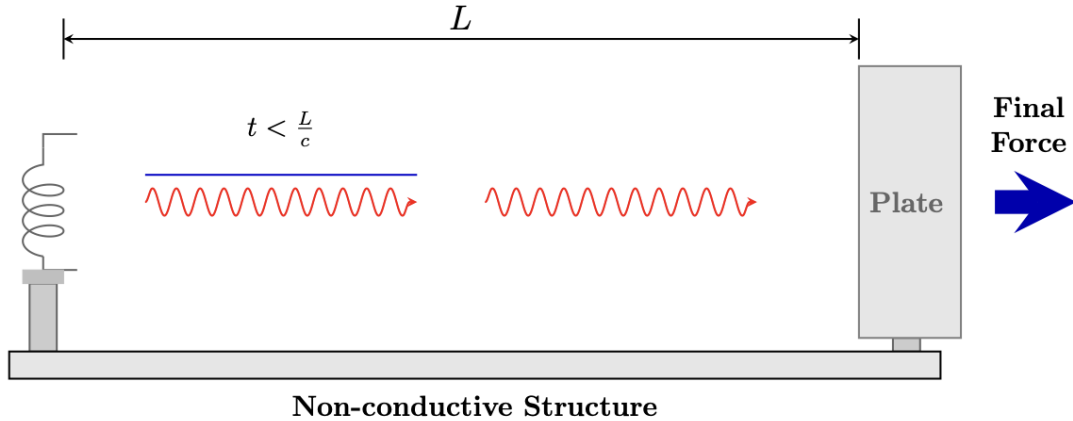


Figure 3: Diagram illustrating two sequential electromagnetic pulses within a coupled, non-conductive structural frame, resulting in a net macroscopic force transferred through the system.

5. Experimental Validation:

So far we have carried out feasibility tests using torsion balance and various assemblies that allow us to measure, evaluate and calibrate various thrusters based on the principle of unlinked electromagnetic fields. Due to the extreme complexity of the mathematics related to this area of science, we have seen that the best option to advance rapidly in the processes of debugging and perfecting this technology is computer simulation, which will allow us to obtain the best relationship of parameters as well as being able to estimate the maximum scope of this technology, being one of the most important issues the maximum speed that could be achieved with this kind of design.

As we have been obtaining good results in terms of validation and impulse, we have high expectations regarding this technology. The theoretical analysis allows us to anticipate that the thrust forces and maximum speed far exceed those of current ion engines and, although it is possible that the unlinked electromagnetic fields technology will not be able to exceed the maximum thrust force of the most powerful chemical engines, we anticipate that it can far exceed their maximum speed.

Currently we are carrying out laboratory tests with different variants of the Unlinked Electromagnetic Fields Thrusters, firstly with magnetic field pulses in the active and passive layouts—that is, using plates of conductive material as targets both isotropic and anisotropic in the case of the passive layout and using secondary emitters as targets in the active layout versions. We are also carrying out tests with versions focused on the use of primarily electrical field pulses using plates as electric field emitting elements and feeding them with high-voltage electronic circuits (20 000 to 40 000 Volts).

6. Comparative Analysis:

Comparisons with existing propulsion technologies, such as ion thrusters and chemical engines, reveal the unique advantages of unlinked electromagnetic fields technology.

Notably, Unlinked Electromagnetic Fields Thrusters offer independence from propellants or fuels, cost-effectiveness in manufacturing and potentially superior thrust and speed characteristics compared to traditional propulsion systems.

	Chemical	Ion	Unlinked Fields
Required	Tanks for fuel/oxidants, electric valves, high power pumps and complex servomechanisms.	Electric energy, propellant tanks, high voltage electronics, exotic materials.	Electric energy, high frequency electronics.
Cost	Very High	Very High	Low
Remarks	High thrust; performance limited by the rocket equation.	Very low thrust; requires exotic materials and propellant.	High thrust, 100% electric. No fuel or propellant required.

7. Expected impulse.

Regarding the amount of thrust that this type of motor can generate, let us think for a moment that the primary magnetic pulse emitter and the target are two parallel conductors placed at a distance d , each having a total length equal to L .

If we consider the equation for calculating the force between both conductors:

$$\frac{F}{L} = \frac{\mu_0 I_1 I_2}{2\pi d},$$

this equation is obtained directly from the manipulation of the equations of electromagnetic theory and is the basis for the definition of the unit for electric current (the ampere).

We can see that the smaller the distance between conductors, the greater the force created by the magnetic field between both conductors. The currents I_1, I_2 can reach values of several hundred amperes during the execution of very short pulses. It is easy to determine that it is feasible to generate high levels of attraction or repulsion force between both conductors (depending on the direction of the currents). Although as the distance between both conductors decreases the force increases linearly, the smaller the distance between both, the shorter must be the duration of the pulses to achieve their unlinking, so a calculation will have to be reached where the force is maximized based on the ability to produce the most intense and brief pulses that are possible.

It is general knowledge that in the past, accidents have occurred in electric power plants because high currents in parallel steel connecting bars have caused these bars (up to half an inch thick) to bend and generate short circuits.

Considering the two impulse currents equal and with a magnitude of 7000 amperes, the distance between conductors equal to 5 cm and the length of the conductors equal to 20 cm, arranged in a circumference of 6.37 cm in diameter, as well as a ratio of the pulse width and the time between each pulse of 1 to 2 (that is, if the pulse width is equal to w , the pulses will be spaced by a time equal to $2w$), then we can do the following calculation:

Generated Impulse Calculation

- F Attraction or repulsion force (Newtons)
- μ_0 Vacuum magnetic permeability = $4\pi \times 10^{-7}$
- I Current in impulse conductors = 7000 A
- L Impulse conductors length = 0.2 m
- d Distance between impulse conductors = 0.05 m

Governing Equation:

$$F = \left(\frac{\mu_0 I^2 L}{2d\pi} \right)$$

Numerical Substitution:

$$F = \frac{(4\pi \times 10^{-7})(7000)^2(0.20)}{2\pi(0.05)} = \mathbf{40 \text{ N}}$$

Duty Cycle and Total Impulse:

$$\text{Total impulse per second} = (\text{Force of one pulse}) \cdot (k)$$

$$k = \frac{w}{w + x}$$

$$\text{For } x = 2w \implies k = 1/3$$

Final Result:

$$\text{Total impulse per second} = 40/3 = \boxed{13.33 \text{ Newtons}}$$

Conductor Geometry:

- **Diameter (\varnothing):** 6.37 cm
- **Circumference (L):** $2\pi r = 0.2 \text{ m}$

As can be seen, in this 100% electric motor, the impulse per second can be extraordinarily high. We have calculated these approximations through computer simulations and the performance can be greatly improved by using more specific components such as metals and very low resistivity compounds, capacitors with ultra-low inductance discharge and optimal transmission lines. According to our calculations it is possible to manufacture low- cost, low-weight thrusters with reduced volumetric dimensions that can provide good levels of impulse without using propellants or fuel.

Thrust forces on the order of 1 to 20 newtons may seem small compared to what a chemical motor can offer; however, the force in the unlinked field motor can be applied to the satellite or spaceship for long periods of time, producing final velocities much greater than those produced by chemical motors. An unlinked field thruster can generate thrust for months or years without ceasing to produce acceleration and operate as long as they have a supply of electrical energy, while chemical motors can only work for a few minutes.

The equation of impulse and momentum,

$$Ft = m(\Delta v),$$

allows to easily appreciate this.

8. Business impact of Unlinked Fields Thruster .

A thruster that does not use propellant (often called a "non-reactive propulsion engine") such as the "Unlinked Fields Thruster" is a paradigm shift in space propulsion technologies. The business impact of the Unlinked Fields Thruster can be summed up in one sentence:

Space would be accessible to unprecedented commercial, economic, and scientific achievements

Pillars of this impact:

1. The end of the tyranny of Tsiolkovsky's so-called "Rocket Equation"

Currently, to carry cargo into space, you need fuel or propellant, but to move that fuel, you need more fuel, this makes up to 90% of the mass of a rocket just chemical fuel or propellant.

Cost reduction: Without the need for massive tanks or dangerous chemicals, the cost per kilogram in orbit would drop from thousands of dollars to virtually the cost of maintaining the spacecraft.

- **Maximized payload:** Most of the space previously occupied by fuel or propellant would be used for satellites, supplies, or passengers.

2. Logistics and Space Mining

Asteroid mining (gold, platinum, rare earths) is impractical today because of the cost of bringing the material back to Earth.

- **Immediate cost-effectiveness:** With the Unlinked Fields Thruster, entire asteroids could be moved into Earth or moon orbit for processing.
- **Permanent trade routes:** Constant "supply lines" would be established between Earth, the moon, and Mars, with logistics similar to land trade routes.
- **Obsolescence of the fossil sector in the aerospace industry:** Traditional logistics companies involved in the aerospace business would have to adapt or die in the face of a technology that is not limited by constant refueling.

3. Cost and Capacity Comparison

Factor	Traditional Propulsion	Unlinked Fields Thruster
Load/Fuel Ratio	1:10 (approx)	No fuel limit
Travel Time to Mars	7 – 9 months	5 – 7 Weeks (constant acceleration)
Shelf Life	Disposable / Limited Reuse	High (no mech/elec wear)
Environmental Impact	Emissions in atmosphere	Clean

4. New Emerging Markets

- **Mass Space Tourism:** Space would cease to be for millionaires. Orbital hotels would be built with steady, cheap supplies.

- **Space Debris Cleanup:** Currently expensive because it requires a lot of fuel to maneuver. With an Unlinked Fields Thruster, a few spacecrafts could clean up the entire Earth orbit in a cost-effective way.
 - **Orbital Energy:** We could build gigantic solar farms in space and maintain their position effortlessly, sending energy back to Earth via microwaves or lasers.
 - **Long-lasting space stations:** By compensating for orbital degradation with constant 100% electric impulse.
-

Unlinked Fields Thruster seen from a technical and commercial perspective:

We must understand that we are moving from a model of impulse by reaction (burning and expelling something to generate movement) to a model of 100% electric impulse (through the interaction of electromagnetic fields).

1. Technical Leap: From Mass to Energy

In a chemical rocket, the limit is imposed by the amount of fuel you can carry.

In the Unlinked Fields Thruster, the energy comes from a 100% electrical source, whether solar cells or atomic batteries, its limit is marked by the availability of electricity.

- **Constant Acceleration:** Unlike current engines that give a "push" and then turn off engines to save fuel, this engine could accelerate all the way.
- **No Stage Waste:** You wouldn't need to drop empty tanks, making the ship a 100% reusable asset, similar to a ship or airplane.

2. Impact on colonization on Mars or the Moon

If we establish a base on Mars with this technology, the dynamics change completely:

- **Just-in-Time Logistics:** Today, if a colony on Mars needs a critical spare, it must expect launch windows that occur every 2 years, with this engine, the trip could take a few weeks, allowing for a steady flow of supplies.
- **Local Resource Independence:** It would no longer be mandatory to extract water from the poles of Mars to make return fuel.
- The colony could focus 100% on food production and habitats.
- **Medical Safety:** In an emergency, an "ambulance" ship could return a patient to Earth in record time, something impossible with current impulse technology.

3. The Cost Structure (Capex vs. Opex)

The space business model would take a 180-degree turn:

Type of Expense	Chemical propulsion	Unlinked Thruster	Fields
Operating Expense (Opex)	Extreme: Fuel is 90% of the weight and costs per launch.	Low: You only need electricity or a compact power source.	
Capital Expenditure (Capex)	Medium: Rockets are expensive, but of well-known technology.	Very low: No complicated manufacturing processes or exotic materials, only high-frequency electronics	
Scalability	Limited by chemistry.	Unlimited (if you have access to electricity there is no limit).	

Economic benefit of the Unlinked Fields Thruster that uses solar energy systems and atomic batteries to move charges in space.

The economic benefit is not measured only in what you earn, but in what you stop spending, by eliminating the weight of the fuel, profitability skyrockets exponentially.

1. The Net Profit Margin per Launch

In today's industry, the profit margin of companies like SpaceX is significant, but it's limited by the cost of fuel and refueling infrastructure. With Unlinked Fields Thruster, the model changes:

- **Cost of "fuel":** Practically irrelevant, sunlight is free, and an atomic battery (RTG) has a lifespan of decades.
- **Payload Capacity:** If a current rocket charges \$2,500 USD per kg and spends 90% of its capacity on fuel, with 100% electric thrusters, it could charge \$1,000 USD per kg (being the cheapest on the market) and the profit margin would be close to 90%, since almost all the mass of the ship is paid payload.

2. The Asteroid Mining Market (Trillions at Stake)

This is where the numbers get astronomical. An asteroid like 16 Psyche contains metals valued at \$10,000 quadrillion dollars.

- **The current problem:** Bringing in 10 tons of platinum requires an absurd amount of fuel to slow down and enter Earth orbit.
- **The advantage:** Small asteroids could be captured and brought into lunar orbit.
- Whoever owns this technology would have a monopoly on precious metals, which could be worth between \$500 billion and \$2 trillion annually in operating income.

3. Satellite Logistics and Space Debris

Currently, a \$500 million satellite "dies" when it runs out of fuel to maintain its position.



Figure 4: Physical prototype of the Electronic Impulse Thruster.

- **Extension of useful life:** Ability to sell a "space tow" service. Your spacecraft could latch onto old satellites and hold them in position using only solar power.
- **Estimated fee:** You could charge \$50 million annually per satellite. With a fleet of 10 tugboats, you'd have a \$500 million-a-year business with minimal operating expenses.

Annual Revenue Estimate (Conservative Scenario)

Business Sector	Estimated Revenue Annual	Competitive Advantage
LEO Freight Forwarding	\$10 - \$20 Billion USD	Irrelevant operating cost.
Lunar/Mars Logistics	\$5 - \$15 Billion USD	Unprecedented speed and frequency.
Asteroid Mining	\$50 - \$100 Billion USD	Exclusive access to rare resources.
Orbital Maintenance	\$2 - \$5 Billion USD	Total ship reuse.

The Atomic Battery Factor: The use of atomic batteries is key here because it allows the engine to run in deep space or behind planets where the sun doesn't reach, allowing for 24/7 trade routes.

9. Patents:

In parallel with the development in laboratory, we have proceeded to prepare invention patents for the protection of the technology of Unlinked Electromagnetic Fields Thrusters. We have patents granted in several countries such as United States of America, China, Russia, United Arab Emirates, Japan, Israel, Eurasia, Canada, etc.

10. Conclusion:

In conclusion, Unlinked Electromagnetic Fields Thrusters represent a transformative technology with the potential to revolutionize electric propulsion in aerospace applications. By harnessing electromagnetic force fields this technology brings a sustainable, cost-effective, and high-performance alternative to traditional propulsion systems.

The concept that a susceptible object can be affected in its dynamic state by electromagnetic fields whether modulated or pulsed for a certain time after its source of origin has ceased to exist is what we call "unlinked electromagnetic fields effect," and is one of the bases of our 100% electric thruster's design.

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