

# Future technology - launching space rocket using gravitational shielding

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## **Abstract.**

This paper presents a novel technological advancement for Earth-to-Space rocket launches, utilizing gravity shielding implemented at the launch pad. The gravity shield, positioned at the base of the launch pad, mitigates the influence of Earth's gravitational forces on the rocket during its ascent phase. This innovation holds particular significance during the critical initial moments of launch when the rocket must overcome gravitational resistance to achieve liftoff. The proposed technology is grounded in the principles of gravitational physics, which elucidate the generation of gravitational fields and the dynamics of gravitational interactions among celestial bodies, incorporating established scientific insights into the fundamental structure of matter. By leveraging the physical theory of gravitation, this approach not only elucidates a plethora of experimental data and observational phenomena but also facilitates the reconciliation of gravitational theory with quantum mechanics, offering theoretical explanations for various gravitational anomalies across micro and macroscopic scales. These advancements bear profound practical and economic implications. The development of gravity shielding technology and its integration into missile systems represent a pioneering frontier in space exploration, promising to revolutionize sectors such as energy, transportation, and defense. Consequently, this trajectory offers unprecedented opportunities for commercial monopolization in high-tech markets, thereby shaping the future landscape of technological innovation and industrial competitiveness.

## **Introduction.**

The method commonly known as "gravity assist," employed in space exploration to manipulate spacecraft trajectory and velocity by utilizing the gravitational forces of celestial bodies, is a well-established technique. Gravity assist exploits the gravitational pull of celestial bodies to alter the speed and direction of spacecraft. It is recognized that gravitational forces significantly impact space rocket flights. Through gravity assist flyby maneuvers, momentum can be either augmented or diminished, thereby modifying the spacecraft's orbital energy. Primarily utilized in solar orbits, this technique facilitates the acceleration of spacecraft, propelling them outward within the solar system, surpassing the reach achievable solely by the launch vehicle. Notable examples include Voyager 1, Voyager 2, and the Galileo spacecraft, which effectively employed gravity assist maneuvers to achieve their mission objectives within the Sun's gravitational domain [1, 2].

However, the launch of rockets from Earth's surface demands substantial energy input due to the influence of gravity. Presently, spacecraft with payloads are propelled into space employing launch vehicles equipped with jet engines. During liftoff, rockets ascend from the launch pad, gradually attaining vertical velocity and altitude. Earth's gravitational force opposes the thrust generated by the rocket's engines, thereby diminishing acceleration. Jet engines must overcome a minimum gravitational potential energy of 1 MJ/kg to achieve an altitude of 100 km for orbital flight. Realistically, additional energy is necessitated to counteract factors such as air resistance losses, thrust efficiency, and the cyclical operation of engines, among others. The transportation of diverse payloads and equipment into space mandates the utilization of rockets with varying payload capacities, with the mass of the rocket escalating exponentially alongside the payload mass. Consequently, launch costs constitute a significant portion of overall space project expenditures, with standard rocket launch costs exceeding \$20 million [3, 4].

Presently, rockets serve as the sole means of launching spacecraft into orbit and beyond, with jet engines constituting the foundational propulsion technology. Given the absence of viable alternatives, rocket propulsion is anticipated to remain indispensable for the foreseeable future. Currently, the sole strategy to mitigate the influence of Earth's gravitational field involves situating launch sites at low latitudes in proximity to the equatorial plane. In these regions, the centrifugal force induced by Earth's daily rotation marginally diminishes surface object weight.

The reduction of spacecraft and rocket weight during launch operations by mitigating the impact of Earth's gravitational field holds considerable potential significance. Such advancements may yield substantial benefits in terms of enhanced efficiency and cost-effectiveness in space exploration endeavors.

The notion of employing gravity shielding mechanisms for space rockets directly on the launch pad represents a fundamental approach to spacecraft weight reduction. Gravity shielding entails the process of shielding an object from the influence of a gravitational field, theoretically resulting in a reduction of the object's weight if such mechanisms were feasible. It is widely acknowledged, however, that gravitational fields, unlike electric fields or radio signals, cannot be attenuated through shielding measures. According to modern scientific paradigms, gravity is attributed to the curvature of space-time as per the principles outlined in the General Theory of Relativity (GTR), or is conceptualized as a gravitational field with properties yet to be fully

elucidated according to alternative theories. Consequently, gravitational shielding is deemed incompatible with both Newtonian mechanics and GTR, as it is perceived as contravening the principle of equivalence [5,6,7].

The development of new technologies aimed at manipulating gravity in terrestrial conditions is impeded by the absence of a comprehensive physical theory of gravity delineating the fundamental interactions and dynamics of gravitational fields acting upon material bodies.

The establishment of a comprehensive "Physical Theory of Gravity" holds the potential to furnish a theoretical framework conducive to the advancement of gravity manipulation technologies. This theoretical groundwork is essential for the exploration and realization of novel approaches to gravity control, as recognized within the realm of contemporary scientific discourse [8,9].

### **Concept of the technology.**

Presently, all space endeavors are conducted within the Earth's gravitational realm, as the phenomenon of gravitational shielding has not been substantiated by scientific and experimental evidence thus far. This limitation stems from an incomplete understanding of the mechanism governing gravitational interactions between celestial bodies, coupled with a lack of comprehensive physical explanations for the nature of gravitational fields, precluding the consideration of gravity as a viable energy source. Within the framework of modern physics, no unified theory of gravity exists that comprehensively describes this fundamental mode of interaction based on empirically verified scientific observations and experiments.

Our research endeavors have endeavored to address this critical gap in understanding. We have laid the groundwork for a physical theory of gravitation, elucidating the genesis of gravitational fields and the dynamics of gravitational interactions among material bodies, while integrating established scientific concepts pertaining to the structure of matter. This physical theory of gravitation not only serves to rationalize myriad experimental findings and observational phenomena but also endeavors to reconcile gravitational theory with quantum mechanics, offering cogent explanations for diverse gravitational anomalies spanning micro and macroscopic scales [8,9].

The central tenets of our theory yield several key insights: firstly, the gravitational field is posited as an electromagnetic field arising from the collective interactions of atoms and charged particles, including those in plasma states; secondly, each atom and charged particle, in a state of equilibrium, generates a gravitational field characterized by the superposition of pulsating, vortex-free electric and magnetic fields, with discrete frequencies and quantized energy levels; thirdly, the resultant gravitational wave, emitted radially by matter, assumes a multimodal character through the superposition of gravitational waves originating from all constituent atoms.

Our theory posits that matter engenders a gravitational field comprising longitudinal pulsating electric and magnetic fields ("E" and "H" - fields), resonating within the frequency range of  $10^{19}$  to  $10^{23}$  Hz, akin to X-rays and gamma rays. These pulsating fields, devoid of vortical components, exhibit remarkable penetrative capabilities typical of gravitational fields. Upon interacting with external bodies composed of atoms and particles, these pulsating fields induce

precession of their magnetic moments akin to the gyroscopic effect, resulting in attraction towards the source of the pulsating field and, consequently, a cohesive gravitational attraction towards the entirety of the material object. The energy of these pulsations is quantised, as they are formed due to quantum levels of atoms. Also, pulsations of electric and magnetic fields emitted in radial directions can be considered as gravitational particles – “gravitons”, which provide attraction between bodies. These pulsating "E" and "H" - fields (a stream of particles - "gravitons") act on external bodies consisting of atoms and particles and cause precession of their magnetic moments, similar to the mechanical effect on a gyroscope. These pulsating «E» и «H» fields, devoid of transverse components, exhibit surprising penetrating abilities characteristic of gravitational fields. This is explained by the high frequency of pulsations from  $10^{19}$  to  $10^{23}$  Hz. these fields, at which it is impossible to compensate their effect by external antiphase induced fields. The interaction of pulsating multimode “E” and “H” fields with matter differs significantly from the interaction of electromagnetic fields with matter. When passing through matter, the “E” and “H” fields interact with electrons and atomic nuclei or individual particles, resulting in an attraction force on their sides in the direction of the gravitational field source. This interaction is very small, so “E” and “H” fields have a greater penetrating power.

By elucidating the underlying mechanisms governing gravitational attraction, our theory underscores the practical feasibility of attenuating gravitational forces through gravitational shielding. This breakthrough holds profound implications for potential applications in gravity control and harnessing Earth's gravity as a prospective energy source. Initial insights stemming from our theory were disseminated in 2020, with comprehensive documentation of the Physical Theory of Gravitation slated for publication in 2024 [8,9].

### **The new technology.**

We introduce a novel technology for launching space rockets (Earth-to-Space) utilizing gravity shielding directly on the launch pad. This pioneering technology, underpinned by insights derived from our physical theory of gravity, represents a paradigm shift in space launch methodologies. At its core, this technology entails shielding the rocket during launch from the gravitational influence of the Earth, resulting in a reduction in the rocket's weight at liftoff and conferring numerous technical advantages.

Implementation of this groundbreaking technology necessitates the integration of ground-based gravity shielding within the launch complex. Positioned at the base of the launch pad, the gravity shield attenuates the impact of Earth's gravitational forces on the rocket during liftoff, thereby effecting a weight reduction of the missile (achieving an approximate reduction ranging from 10% to 30%, contingent upon the dimensions of the gravity shield and the rocket's configuration). The shielded region of Earth's gravitational field above the pad assumes a conical form, the dimensions of which are contingent upon the shield's diameter and the mass of rockets positioned above it (Figure 1).

During the critical moments following liftoff, when rockets typically require support to attain full thrust, the gravity shield facilitates weight reduction, thereby streamlining the launch process.

Subsequent to stabilization, all connections between the rocket and the pad are severed, enabling the rocket to commence ascent with diminished weight.

The transformative benefits of this innovation are manifold: reduction in fuel consumption for rocket propulsion, abbreviated launch durations, diminished power requisites for jet engines, decreased spacecraft mass at liftoff, and ultimately, reduced costs associated with orbital insertion (attributable to decreased fuel consumption during launch). Notably, this technology necessitates minimal alterations to existing rocket designs, with the primary modification entailing the installation of a gravity shield within the launch pad infrastructure. The cumulative effect of these advancements culminates in a tangible reduction in the overall cost of spaceflight, with projected costs for launching one pound of payload into low orbit estimated at \$200 to \$300.

Furthermore, this technology holds promise for the effective launch of ballistic missiles housed in subterranean silo launchers. Gravity shielding, deployed around the shafts of these launchers, confers a reduction in launch weight for ballistic missiles by locally attenuating Earth's gravitational field. Moreover, the incorporation of gravity shielding serves to fortify launch complexes against adversarial incursions (Figure 2).

### **Assessment of gravitational field shielding.**

The level of gravity of the Earth can be reduced by using a shield of material that will effectively absorb gravitational radiation in the form of “E” and “H” - fields with the high frequency of pulsations from  $10^{19}$  to  $10^{23}$  Hz.).

Our research shows the real possibility of creating two types of gravity shields (Figure 1):

(i) gravity shields, those composed of high-density materials such as tungsten, uranium or lead. The main properties of materials for gravity shielding are high-density materials and high atomic number of materials (high Z materials);

(ii) gravity shields, those fabricated from superconducting materials with dynamic control of electron motion. The main properties of such shields are: high electron rotation frequency orthogonal to the gravitational field. Electrons must be spinning in the superconductor volume due to the action of the running magnetic field (at least 5000 revolutions per minute).

Our calculations show the following.

- an estimate of the shielding effect of type (i) can be obtained using the attenuation coefficient  $h$ , which reduces the force of gravitational attraction of the rocket to the Earth taking into account the shielding:

$$P = P_o e^{-hx}, \quad (1)$$

where:  $P$  - weight of the object when using the screen,  $P_o$  - weight of the object on the Earth,  $h$  (1/m) - attenuation coefficient,  $x$  (m) - thickness of the screen in the form of hemispheres.

*\*the attenuation parameter for lead is  $h = 0.3 \text{ m}^{-1}$ , which at a screen thickness of 1 meter can provide attenuation of the Earth's gravitational field up to 30% (calculated value).*

- an estimate of the shielding effect (ii) with the superconductor can be obtained using the coefficients  $h$  and  $w$ , which reduce the gravitational attraction force of the rocket to the Earth taking into account the dynamic shielding:

$$P = P_0 e^{-nhx}, \quad (2)$$

where:  $P$  - is the weight of the object when using the dynamic screen,  $P_0$  - is the weight of the object on the Earth,  $n$  - is the rotation frequency of electrons in the superconductor around the vertical axis of the screen,  $h$  (1/m) - is the attenuation coefficient,  $x$  (m) - is the thickness of the superconductor screen in the form of hemispheres.

*\*the attenuation parameter for super conductive ceramics is  $h = 0.03 \text{ m}^{-1}$ ,  $w = 300 \text{ s}^{-1}$  which at a screen thickness of 0,1 meter can provide attenuation of the Earth's gravitational field up to 2,7 (calculated value).*

Water is not a material with high density, but it can also be used as a gravity shield due to its large thickness, for example, when launching rockets over deep seas and oceans. The gravity shielding effect can be up to 5% of the rocket weight.

These advancements represent a pivotal step towards the realization of practical applications of gravity shielding technology across diverse domains.

### **The Market Opportunity.**

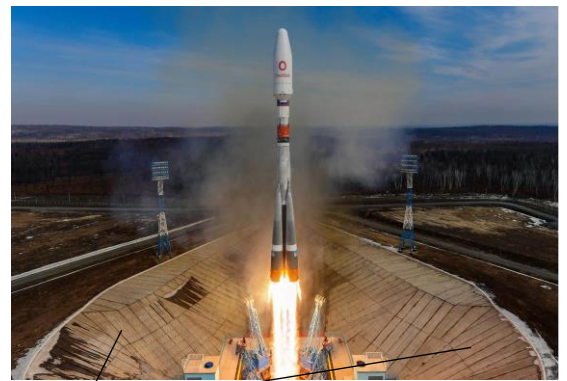
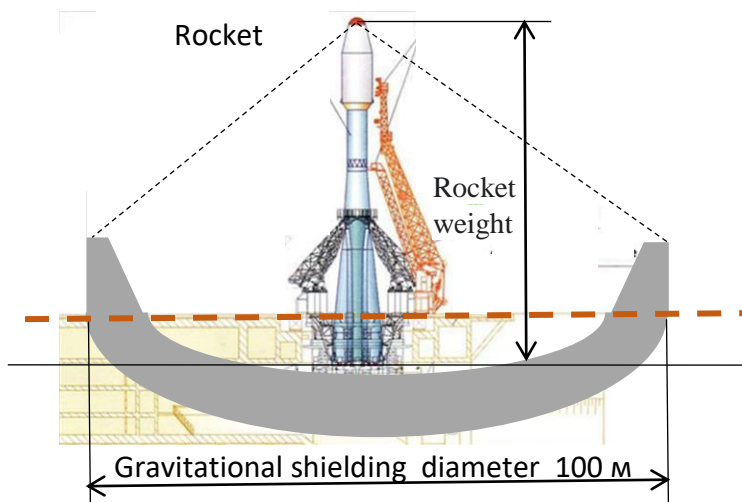
The development of technology aimed at producing gravity shielding and its integration into missile systems represents a groundbreaking frontier in space exploration. This innovative approach heralds a paradigm shift in the trajectory of technological advancement within the space industry. The advent of controlled gravity technology holds the potential to catalyze commercial monopolization across high-tech sectors, including energy, transportation, and military industries.

The practical implications of the new found "Physical Theory of Gravitation" extend far beyond conventional boundaries, offering unprecedented opportunities for manipulating and modulating gravitational forces within localized regions. This transformative capability facilitates the reduction of object weight, paving the way for revolutionary advancements across diverse domains:

- Streamlined delivery of payloads to Earth's orbit, enabled by the substantial reduction in rocket fuel consumption resultant from diminished launch masses.
- Innovations in air defense mechanisms, leveraging the creation of "gravity" barriers to disrupt the aerodynamics of unauthorized airborne entities, thus bolstering security measures.
- Pioneering developments in vehicular technologies harnessing gravity-shielding principles, effectively mitigating gravitational mass and unlocking novel avenues in transportation and related fields.

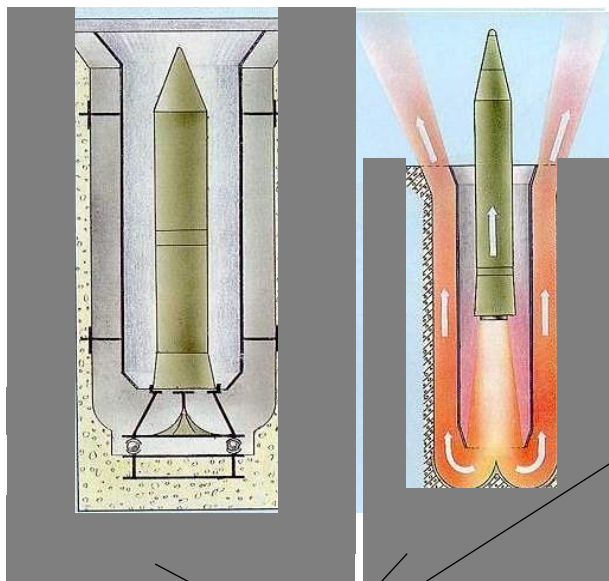
These pioneering applications underscore the intrinsic importance and immense commercial potential inherent in the implementation of the insights gleaned from the "Physical Theory of Gravitation." As such, the emergence of this theoretical framework heralds a new era of technological innovation, poised to revolutionize various sectors and reshape the landscape of industrial competitiveness.

**Figure 1**



Gravitational shielding

**Figure 2**



Gravitational shielding of rocket launchers

## **Figure legends**

Figure 1 - The gravity shielding is installed at the bottom of the launch pad and creates an area of reduced earth gravity for rocket launches.

Figure 2 – A mine launcher is a vertical well (shaft) that houses the structures, mechanism, and hardware for launching missiles. The shaft is surrounded by a gravity shielding around the perimeter and at the bottom.



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