

An Introduction to Gravity Modification

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A Guide to Using Laithwaite's and
Podkletnov's Experiments and the Physics of
Forces for Empirical Results

Benjamin Thomas Solomon

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Dedication

To my parents, Dr. & Mrs. Balasundram, who gave me a solid education, taught us about Johannes Kepler, Galileo Galilei and Leonardo da Vinci, to dream, and to persevere, persevere, persevere.

To my wife, Anushka, and son David, who patiently stood by me while I was doing what everyone said, was impossible.

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I would like to thank the National Space Society, NSS, for giving me the opportunity to present all my papers at the International Space Development Conferences, over the last seven years; especially, the New Mexico, California, Texas and Colorado chapters. Now looking back, after having written this book, it is quite clear that many of these presentations could have been much more theoretically robust, but without NSS support it is unlikely I would have reached this far this quickly.

To Mike Darschewski, who helped me work out the calculus solutions to some of the models presented in this book, and helped me proof read this manuscript. He was a big help as my expertise is in numerical modeling.

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To Palisade's @RISK team, especially Dave Doran and Stan Brown, who provide expertise and time while I worked through the distribution analyses. This powerful tool reduced the time required to analyze distributions from weeks to minutes.

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Introduction to Gravity Modification as an Engineered Technology

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Chapter 1: The Hypothesis

1.1 Motivation for Writing this Book

Some years ago I designed an electrical circuit which I thought had the possibility of creating a force without two characteristics. First, there would not be an equal and opposite reaction. And, second, it would not have moving parts.

I finally got around to experimenting with this circuit design in 1999, and was pleasantly surprised to find that its weight would change. It could both increase and decrease its weight by 3% to 5%. In one instance the circuit lost 98% of its weight for about 30 seconds. I have since not been able to reproduce this 98% effect, but believe that I have figured out why. I did more research and found that this circuit was probably the only circuit that did not use exotic superconducting materials or near absolute zero temperatures.

I must confess that I ran into a mental block on how to improve the circuit. So in order to figure out the ‘new’ rules about how things work, I set about to understand what is a force? How is it implemented in Nature? I found I could not stop there. The numerical modeling results caused me to look further, at the possibility of a starting point for a ‘new’ quantum theory or at least the boundaries for the ‘old’ quantum theory, therefore, this book.

I must add that much of the material in this book is new and original. Do note, too, that the circuits or their designs are not discussed in this book, as these are proprietary technologies, but I do explain how things work.

I do hope that this book will change the way we get into space – a thousand people at a time, instead of just three or seven; how we explore – manned rather than robotic; where we explore – everywhere instead of just Earth orbits; and put a million people permanently into space by the year 2020.

1.2 Trustworthy Rules

Gödel’s Incompleteness Theorem states that if we are prepared to accept that the rules of some such formal system F are to be trusted as giving us only mathematically correct conclusions, then we must also accept, as correct, a certain clear cut mathematical state-

ment $G(\mathbf{F})$, while concluding the $G(\mathbf{F})$ is not provable by methods of \mathbf{F} alone (Penrose 2004, 377).

Gödel tells us that whatever rules of proof we have, if we accept these rules as trustworthy (i.e. we cannot derive falsehoods), then we have access to other mathematical truths not previously available to us, provided these rules are not too limited.

Penrose uses Gödel's theorem to state that new theories can be derived from old ones provided all the rules are 'trustworthy'. The question then arises as to how we define 'trustworthy'. From the perspective of relativistic research and quantum theory, the answer is obvious. These rules are trustworthy because they provide the correct answers. This is absolutely correct, but in my opinion insufficient.

Relativity and quantum theory have been trustworthy because they have provided correct answers, and I might add, much more than anyone thought possible. They are insufficient, because we have not been able to derive gravity modification or interstellar travel technologies, assuming of course, that these technologies are feasible.

Therefore, from the perspective of these future technologies our rules on gravity and quantum phenomena are not 'trustworthy'. In this book I have changed these trustworthy rules.

1.3 Scope of this Book

This book is a compilation of more than seven years of research into an alternative approach on how gravity, force, velocity and acceleration are realized.

The objective is to provide a platform of concepts, formulae and the engineering that will facilitate the development of real gravity modification technologies, in a consistent and robust manner. Do note that a single innovative concept by itself is insufficient to foster research into gravity modification as there are many laws, and properties that need to be challenged and expanded upon.

Philip Bourke of the University College Dublin, Ireland, used to say that 'the academics would ask "Fine if it works in practice, but does it work in theory?" while the practitioners would ask "Fine if it works in theory, but does it work in practice?"'. I address both questions in this book.

This book lays the foundational groundwork on how gravity modification can be approached, and physically realized. To this end,

the new platform of concepts, Continuity of Frames of Reference, Unison Transformation Model, Momentum Exchange Bypass, Asymmetrical Transformations, Properties of Emergence, and the non-inertia field, have been presented as a cohesive and synergistic subject. In the process I have placed limitations on quantum theory and shed some light on the statistical nature of particles.

I do not attempt or claim to present a set of cohesive analytical solutions that answer all questions. That is not the purpose of this book. In that sense this is not a book like Roger Penrose's 'Road to Reality'. The purpose of this book is to engineer gravity modification today.

I do present an engineer's perspective of the physics and the engineering of this gravity modification technology. Many times, the solutions, like non-inertial fields, are found through extensive numerical analyses, and then applied across many different phenomena, thereby proving their value.

This book is not about hyper-dimensional space or hyper-dimensional materials. If they do exist, both are unattainable in this century. This book is about the four real dimensions, real materials, real fields, and real forces.

1.4 What is Gravity Modification?

Okay. Right now there is the general consensus that gravity is curved spacetime, and that this curvature is caused by mass. With contemporary physics, the only way one can modify the effects of gravity is to modify the curvature of the underlying spacetime. According to contemporary theories, modifying spacetime can only be effected with very large amounts of mass.

In that sense gravity modification is going on all around us, as planets orbit stars, and stars change their position within galaxies. The underlying structure of spacetime is constantly being altered by the changing position of the planets, stars, and galaxies.

Using mass as a propulsion technology to modify spacetime is unconstructive or at the very least self-defeating. For a propulsion technology to work we require a set of equations that do not require mass as the gravity modifying factor. These missing equations dictate the link between gravity and the only other two macro forces in Nature, electric and magnetic forces.

Let's define gravity modification. Gravity modification is the modification of the strength and/or the direction of the gravitational

effect without the use of mass as the primary source of this modification. Gravity modification necessarily implies the sidestepping of momentum exchange.

Gravity modification consists of two parts, field modulation and field vectoring. Field modulation is the ability to attenuate or amplify a force field. Field vectoring is the ability to change the direction of the force field. With our current technologies the only force fields we recognize at the macro level are gravitational, electric and magnetic.

For inter planetary travel we are primarily interested in force fields. However, for terrestrial work we are interested in both force fields as a means of propulsion and gravity modulation for lifting.

Interstellar travel, however, is only achievable through a technology that I term translocation. The theoretical basis for translocations is asymmetrical transformations. Asymmetrical transformations will enable us to cross large distances in a reasonable amount of time without messing with the velocity of light restrictions. Is this possible? Yes, I show that asymmetrical transformations are observable in Nature.

1.5 Emergent Properties

Smolin (2005) describes emergent properties as arising of new properties in large complex systems. Smolin's emergence parallels Penrose's interpretation of Gödel's Incompleteness Theorem, §1.2.

This book essentially describes force, inertia motion and non-inertia motion as emergent properties of spacetime which we describe as some function of energy. These are transient effects of spacetime, and are reversible. The key to understanding gravity and force is the non-inertia field. Gravity is a form of a non-inertia field that is emergent from spacetime. And so are electric and magnetic fields

We will see later in this book that the non-inertia field effects are independent of how it is created. Laithwaite's mechanical, Podkletnov's 1992 and 1997 publications are electromagnetic-mechanical, or Podkletnov's 2003 publication, and my circuits, purely electromagnetic effect.

In Chapter 13, Force as a Field Effect, I replace the vector product of velocity and magnetic field to create a force with a process model of a non-inertia field. This process model of the interaction of a charged particle's electric field, velocity and magnetic field, explains why this non-inertial field, or force, is orthogonal.

No matrix theory required. The matrix theory happens to be the short-cut for the process model. This implies that particles are ‘real’ and ‘mechanical’. Their interactions can be described by real processes if we know how to figure out these relationships or processes.

Modern physics recognizes four types of interactions, strong or nuclear, electromagnetic, weak, and gravitation; and most importantly that the effects of fields are “transmitted by quanta” (Kane 2000, 18).

I propose to replace gravitation and its graviton with the emergent shape-motion process interaction of spacetime. This process interaction is one that comes into effect due to shape or shape changes of a particle.

1.6 Process Transformations

In chapter 9, Unison Transformation Model, we see how the process interaction, using just the gravitational equivalent of the Lorentz-Fitzgerald transformations, causes the effect of gravity.

I must confess that physics does not formally recognize particles to have real physical shape, but particles do indirectly occupy the space around them, through their fields. Special Theory suggests that shape and space are necessary requirements of nature, as nature has length and time that can contract or dilate, respectively.

The Continuity of Frames of Reference, chapter 7, provides the handle for transformations. It is the engineering of these transformations that future technologies will implement. The Unison Transformation is just that, a set of transformation that exists in Nature that governs how a body falls under the influence of gravity. Again, this is a process model of why an object will fall.

This is critical to any future interstellar travel, because if we understand the process behavior, we are that much closer to engineering the technology.

Momentum exchange is a good example of the need for a process model. Current understanding of momentum exchange is vector based. This provides no new knowledge of why momentum exchange works the way it does. The same Unison Transformation (Solomon 2007) model that is used to explain why a body falls under the influence of gravity is used to explain momentum exchange.

This is a remarkable development as this means that the mechanics of a falling body are the same as momentum exchange, and

that they are the same phenomenon. This understanding allows one to propose and formalize Momentum Exchange Bypass (Solomon 2003). Momentum Exchange Bypass is the use of transformations to effect vector motion changes on a body without an external influence.

1.7 Shape-Motion Duality

The Unison Transformation Model is consistent with the properties of the Special Theory of Relativity. This was a very important change from the previous Time Dilation Gravity model (Solomon 2001). Special Theory is all that is needed, as the scope is less than the size of an average room.

I hear the reader say that Special Theory is about linear motion. Yes, this is correct. I will demonstrate numerically that the Lorentz-Fitzgerald transformations for inertia motion can be observed in non-inertia gravitational fields, and are keys to understanding the potential for gravity modification. This is unlike current hypotheses on gravity where the scope is the Universe itself, and interactions are measured on galactic scales.

A numerical model for the Unison Transformation was developed in MS Excel. This book presents the results of this substantial body of numerical modeling results.

The Unison Transformation Model is very different from General Relativity, even though it is based on the Special Theory of Relativity. General Relativity states that (Schultz 2003) a particle falls in a gravitational field because spacetime is curved, and therefore, it falls into this curved structure. As far as I know, there has not been any discussion on effect of the shape of an elementary particle. Macro bodies, yes, but not elementary particles.

The Unison Transformation Model requires three characteristics of spacetime. First, that the shape of a particle is its motion, that there exists the shape-motion duality. This is derived from experimental observations of the Lorentz-Fitzgerald transformations. At rest, if the shape is a sphere, at constant relative motion it is a symmetrically flattened sphere, an ellipsoid. In acceleration the flattening is asymmetrical. The front of the ellipsoid was more flattened than the back. Thus shape is motion and motion is shape or shape-motion duality.

The second characteristic is that spacetime is not curved. It appears to be curved because it is measured differently by different

observers. This is derived from the observation that the same particle will concurrently, but differently transform itself in the presence of other particles.

The third characteristic is that in a gravitational field this measurement changes with the distance from the gravitational source. That is, mass, or its equivalent, is something that alters our measure of both space and time, as a function of our distance from this mass. Mass produces a distortion field of measurement, assuming that mass is the true source of gravity. As a result of mass altering the measure of space and time, it alters the shape of the particle, and therefore, due to shape motion duality, the particle exhibits acceleration.

I also do show that Bell's theorem excludes the effect of gravitation acceleration being quantum mechanical in nature. One may add that like Bell's Theorem, the Lorentz-Fitzgerald transformations are a physical reality that is experimentally verifiable. The Lorentz-Fitzgerald transformations are, therefore, independent of theoretical developments that attempt to explain their origins.

I do not discuss duality in this book, but would like to mention it here. Duality appears to be related to point and volume. Electric fields are point-like, and radial, in nature, while their dual, magnetic fields, form closed volumes. Particles are point-like while their dual, waves, take up space. A particle's shape is finite and has volume, but its dual, motion, behaves like a moving point in space.

Could there be other dualities waiting to be found? Particle-wave. Shape-motion. Electric-magnetic fields. One relating to nuclear forces, and another to quantum phenomena? Do these dualities inter-lock so that their properties appear to overlap?

1.8 Reality versus the Observer

The Copenhagen interpretation (Herbert 1985, 46) requires that there is 'no deep reality' as a particle does not have a real position when it is not being measured. This is because position is an attribute that belongs jointly to the electron and its measuring device. Thus, if you take away the measuring device you take away the electron's position, too. One dissenter, N. David Mermin, said that this sounds like the moon not being present because the observer is blind-folded.

This book presents a counter perspective, that particles do have real positions and real velocities that are present independently of the

observer. In this instance, relativity is more correct than quantum theory.

Observer independence is absolutely necessary otherwise the laws of physics will not be the same for each observer. The Copenhagen interpretation of ‘no deep reality’ should be replaced with Internal Structure Independence. That one cannot determine the quantum-mechanical properties of elementary particles just by watching their motion. This excludes the use of quantum theory to model gravitational acceleration, or even force as an exchange of velocity based momentum between particles.

Many questions relating to the philosophy of quantum mechanics are resolved when one recognizes that there are three distinctly different phenomena, shape-motion, particle-wave, and quantum-mechanical. The observer appears to change the observation because a particle’s probability distribution is non-local, but its wave nature is local. This observation breaks from the implicit quantum theoretical axiom that the wave function and the particle’s probability distribution go hand-in-hand.

After much numerical modeling, I discovered a new distribution, based on existing published experimental observations. The distribution describes how a particle’s probability alters with its radial distance from its center. I have named this distribution, the Anushka Distribution, after my wife. I have checked through Palisade’s @RISK documentation of the 37 known distributions to confirm that this distribution is new, the 38th distribution.

1.9 The Future Is Beyond Our Imagination

Imagine this. It is 10:42 a.m., somewhere in the Indian Ocean. A new US Navy carrier floats on the ocean waves. It is huge and could easily fit 1,000 Boeing 747s. Easily. Without a doubt. It does not look like a ship. It looks like two giant saucers inverted on each other so that the cross section is ellipsoidal, while it is obviously circular around.

10:47 a.m., a siren had signaled a few minutes earlier, and this carrier is now hovering close to the Moon’s surface, overlooking Lunar City One.

The passage above illustrates some paradigm shifts. First paradigm, it just may be that the space explorers of the future may not have their ancestry in the airplane and rocket companies of today. There are several reasons for this.

These will be companies that have mastered the engineering of enormous superstructures like ship builders of today have. In fact many of these ship and submarine builders have another edge over the modern, leading edge aerospace companies of today. They have portable nuclear reactor technology.

If one looks at the New York Stock Exchange, one finds that companies do not last a hundred years or more. The main reason given for this observation is investment inertia. The established companies are so invested in the 'older' technology that they are unable to come to terms with the 'newer' technology and unable to risk capital investments. Therefore, lose out in the longer term.

The standard method to avoid this is to fund a small, sharp team to prove the new technology, and then to fan it out across the organization once proven.

Second paradigm, what is the difference between the Navy, the Air Force, and the Space Force, if the three have the same technology and capability, and can be anywhere the other is, just as effectively?

Third paradigm and this is an old issue. How does one establish private property ownership, off the Earth? I ask this question because I believe that 99% of the future space exploration initiatives will be funded by private companies. Initially, these will predominantly be mining and trading companies.

Fourth paradigm, engine technology will shift away from automotive and aerospace companies, to the semiconductor industry. These new engines will require combined degrees in physics, electrical engineering, and circuit design.

Fifth paradigm, Moore's Law will drive prices down to where everyone will own vehicles with these engines.

And some day, us Earthlings will say, "Let's have lunch on Mars."

The future is beyond our imagination but not beyond our grasp.

Section 2:

The Experimental Evidence