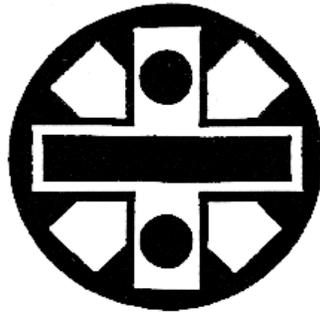


RODIN AERODYNAMICS

THE
RODIN SOLUTION
PROJECT

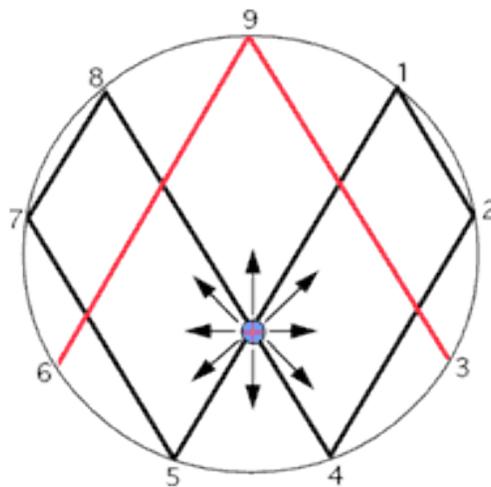
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RODIN AERODYNAMICS

THE
RODIN SOLUTION
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EXECUTIVE SUMMARY

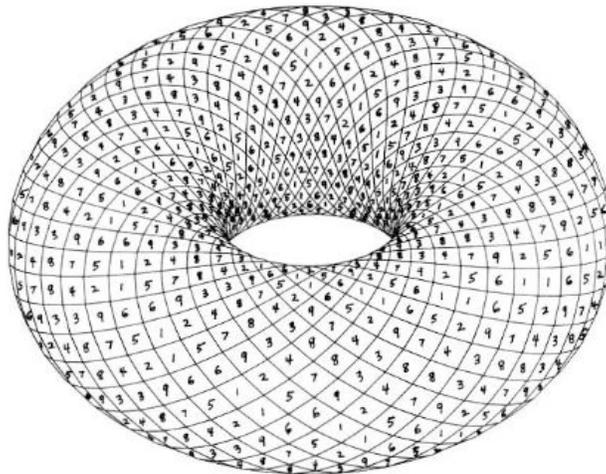


Rodin Vortex-Based Mathematics Energy Schematic

"In every age there is a turning point, a new way of seeing and asserting the coherence of the world."

Jacob Bronkowski

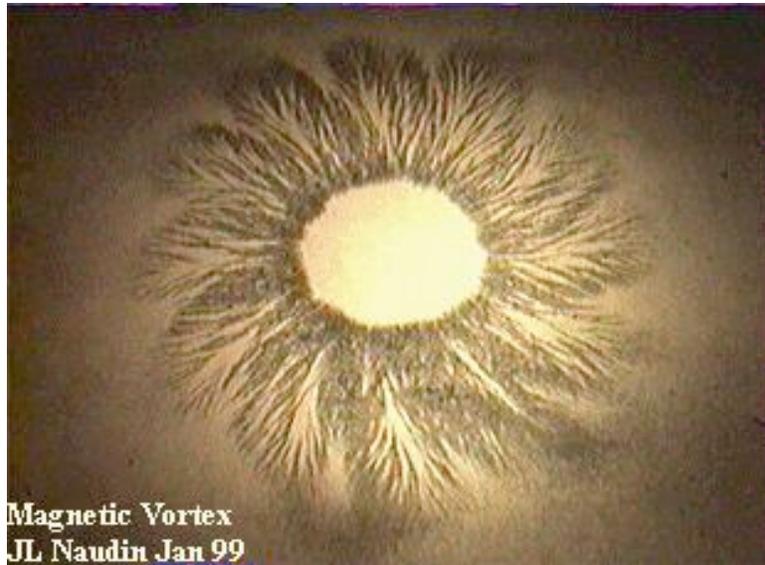
Marko Rodin has discovered a series of regularities in the decimal number system heretofore undocumented and overlooked by conventional mathematics and science. These patterns lay out on the surface and within the internal volume of a torus. Mathematicians, computer scientists and other leading scientific thinkers have tested and validated this revolutionary discovery, known as the Rodin Solution and often referred to as the Rodin Coil.



The Rodin Coil Vortex-Based Mathematics Toroid Surface Topology

The Rodin Coil is a blueprint, or schematic of the universe, that enables anything to be engineered. By using the schematic of a Rodin Coil (partially illustrated above), one can know the pathways and motion everything takes – past, present and future – from the quantum level up to solar systems and galaxies. Simply put, Rodin has discovered the underpinning geometry of the universe. He has found the missing energy behind the continuous creation and recreation of the universe. Scientists refer to this missing energy as “dark matter” or “dark energy” because they have so far been unable to account for it.

Finding this “dark energy” is the biggest scientific search of our times. And Marko Rodin has found it.



The Rodin Coil is a nozzle that can turn mankind into intergalactic citizens by functioning as a vertical lift power propulsion spacecraft due to its massive magnetic field

Rodin, with his *Vortex-Based Mathematics*, is able to decode the entire universe from the quantum level to galaxies, using a mathematics so simple even a nine year-old can do it. *Vortex-Based Mathematics*, or the Rodin Solution, will change our world forever.

The Rodin Torus Coil makes much of current technology obsolete, including the following :

- The combustion engine
- Alternating current
- Conventional computer compression schemes
- Current methods of heat dissipation in computer processors
- Conventional wireless communication
- Winged airplanes

- All conventional types of encryption
- Endless repeating decimals are eliminated as a result of being able to compute a whole value for anything
- Chemical-based approaches to medical treatment can be eliminated through controlling genetic engineering via the *high-dimensional flux fields* which are the basis of all creation

The scope of the Rodin Solution, and its applications, is staggering. It is universally applicable in science, biology, medicine, genetics, astronomy, chemistry, computer science, physics, and astrophysics. The Rodin Solution can be applied to treating incurable diseases by unraveling the secrets of DNA and genetic coding. It can be applied to computer operating systems by enabling the design of circuitry for microprocessors that have no waste heat, do not require refrigeration and eliminate all resistance and parasitics. It can be applied to creating artificial intelligence with a new operating system that replaces the binary code with what Rodin calls the *binary triplet*. And the Rodin Solution can revolutionize astrophysics and space travel, effectively ending the combustion era and ushering in what Rodin calls the *flux field era*, by re-imagining and raising the efficiency of motors with the Rodin Coil.

The Rodin Solution is not just a theoretical concept or a figment of Marko Rodin's imagination. Crude versions of the Rodin Coil, created and tested by leading scientists and engineers, show 60% more efficiency than anything presently used in antennas, computer research, or life-saving medical devices.

The first phase of the Rodin Solution Project encompasses:

1) Capitalizing Rodin Aerodynamics Film Studio, LLP to develop a feature length dramatic film, as and to produce a documentary film with an accompanying book, an animated multi-media curriculum, and a video game. *\$6 million*

2) Assembling teams of researchers, scientists and engineers to collaborate with Rodin to research and test evolutionary and revolutionary applications of the Rodin Solution and to facilitate Rodin’s personal research in areas such as genetics, vertical-lift vehicles and flux-generator coils; *\$3 million*

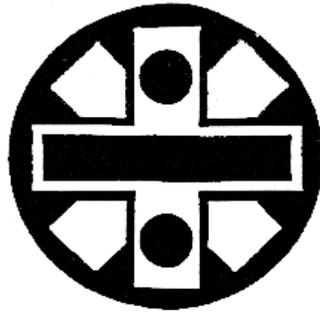
3) Establishing a state of the art digital teleconferencing and teaching facility to convene teleconference seminars and teach symposiums to train researchers, scientists, engineers, etc., providing them with new mathematical tools to make discoveries and breakthroughs in their own work; *\$3 million*

The second phase of the Rodin Solution Project encompasses:

1) Producing a dramatic feature-length film; *\$30 million*

2) Producing functioning prototypes and bringing them to market; *\$9 million*

Each of the above program areas will catapult the project in new directions. As this occurs, strategic planning will be undertaken to determine the direction, shape and scope of further aspects of the Rodin Solution Project.



RODIN AERODYNAMICS

THE
RODIN SOLUTION
PROJECT

SCOPE OF THE WORK

THE RODIN SOLUTION

The main scientific race of today is to find the missing energy behind the creation of the universe. Scientists know this energy exists, but can't see it. They refer to this as "dark matter" or "dark energy" because it's still unaccounted for. Marko Rodin has discovered this "dark energy" within a series of regularities in the decimal number system which have never been documented in mathematics. These patterns lay out on the surface and within the internal volume of a torus and are a synthesis of numerical patterns previously overlooked by conventional science and mathematics. Leading mathematicians, computer scientists and other leading scientific thinkers have tested, confirmed and validated this revolutionary discovery, known as the Rodin Solution.

Quite simply, Marko Rodin has discovered the source of the non-decaying spin of the electron. Although scientists know that all electrons in the universe spin they have never discovered the source of this spin. Rodin has. He has discovered the underpinning geometry of the universe, the fabric of time itself. He has done this by reducing all higher mathematics – calculus, geometry, scalar math – to discrete-number mathematics. The result is a blueprint, a schematic, that enables anything to be engineered because one can see the pathways and motion that everything takes – past, present and future – on the sub-nuclear level up to the level of galaxies and solar systems.

SIGNIFICANCE OF THE RODIN SOLUTION

The potential scope and breadth of the Rodin Solution is staggering; it is universally applicable in mathematics, science, biology, medicine, genetics, astronomy, chemistry, physics and computer science. The Rodin Solution will revolutionize computer hardware by creating a crucial gap space, or equipotential major groove, in processors. This gap space generates underpinning nested vortices resulting in far higher efficiency with no heat build-up. The Rodin Solution replaces the binary code with a new code called the binary triplet which

will revolutionize computer operating systems. It will transform physics and astrophysics by finally answering how black holes and pulsars work. Space travel will be revolutionized by reactionless drives that are unaffected by the weight they pull, making the present day combustion engine obsolete. The revolution brought on by reactionless drives will far surpass the societal changes wrought by the shift from steam engines to the present day combustion engine. The Rodin Solution can even be applied to ending pollution and drought by creating an inexhaustible, nonpolluting energy source. Because Rodin's *Vortex-Based Mathematics* enables him to condense a trillion-fold calculation to only a few integer steps and because he is able to solve all the mathematical enigmas, the Rodin Solution will revolutionize computer information compression.

Rudimentary versions of the Rodin Coil, or Rodin Torus, have been created and tested by leading scientists and are presently being used by the U.S. Government in antennas that protect the four corners of the continental U.S.. Life-saving medical devices based on crude approximations of the Rodin Coil Torus are being manufactured and used in the treatment of cancer patients. Microsoft's former senior researcher is using the Rodin Coil to research, develop and patent new computer information-compression schemes.

Although many people are applying aspects of the Rodin Solution, on the basis of private consultations and a Rodin monograph published 20 years ago, Marko Rodin has never explained key concepts such as the phasing and energization of the Rodin Coil. Although there has been a virtual stampede to get at this work, Rodin has remained silent or uncooperative, preferring to continue his work and research in isolation. He is now ready to reveal publicly the true power and scope of the Rodin Solution.

APPLICATIONS OF THE RODIN COIL TORUS



The Rodin Torus Coil tested at Hewlett Packard and determined to be creating 62.5% greater magnetic output than the present day standard wound electrical coils

COMPUTER PROCESSORS & OPERATING SYSTEMS

The Rodin Solution enables Marko Rodin to design circuitry for computer microprocessors that have no waste heat and - thus, require no refrigeration or heat sink - eliminating all friction, resistance and parasitics. This is possible because:

- 1) Rodin knows the natural pathway that electricity wants to take without forcing it, scientifically known as the longest mean free pathway of least resistance;
- 2) Rodin has discovered the source of the non-decaying spin of the electron;
- 3) Rodin uses electricity's own magnetic field to bathe conductors in a magnetic wind to maintain constant temperature without any risk of short-circuiting or incinerating conductors.

State of the art manufacturers of conventional processors have no idea how to prevent heat buildup. Rodin knows how to incorporate, in the conductors, a crucial gap space that creates underpinning nested vortices that are responsible for super-efficiency. One of Rodin's great abilities is to create microprocessor electrical circuitry in which the conductors touch, yet do not short-circuit. He is able to do this as a result of what he calls *harmonic shear* which creates a natural wall of insulation without requiring any special materials. This natural electrical insulating shear is created by the harmonic phasing activation sequence of the electricity.



Rodin Torus Coils on exhibition at a New Energy Symposium

Not only does the Rodin Solution introduce a new type of processor for computers, its application also enables Rodin to create a new artificial intelligence operating system that replaces the binary code with a new code Rodin calls the *binary triplet*. Former Microsoft senior researcher, Russell P. Blake, treats the binary triplet briefly in his article, "The Mathematical Formulation of the Rodin Coil Torus", in which he states that the Rodin Torus has

perfect mathematical coherence on all six axes and is not only three dimensional, but actually higher omni fourth dimensional. and higher.

With the Rodin Solution, Marko Rodin is able to navigate on all axes of a Rodin Coil Torus, thus resolving the obstacles to creating artificial intelligence by being able to compute multi-dimensionally. Rodin also adds a new factor of polarity to the binary code by using his *binary triplet code* which is based on the fact that all numbers begin and end at a point. The basis of the *binary triplet* is Rodin's *binary combinational explosion tree* which enables Rodin to map this process through the event horizon of a torus and into the vortex-well singularity where it inverts. No mathematics, other than Rodin's, can calculate while inverting, since all existing branches of mathematics self-destruct before emerging on the other side of the toroid.

The Rodin Solution harnesses a heretofore unavailable mathematical skill, or language, that takes advantage of number patterns' six different self-referencing axis configurations over the surface topology of the Rodin Coil's *toroidal matrix*, thus enabling the creation of new revolutionary artificial intelligence hardware and software.

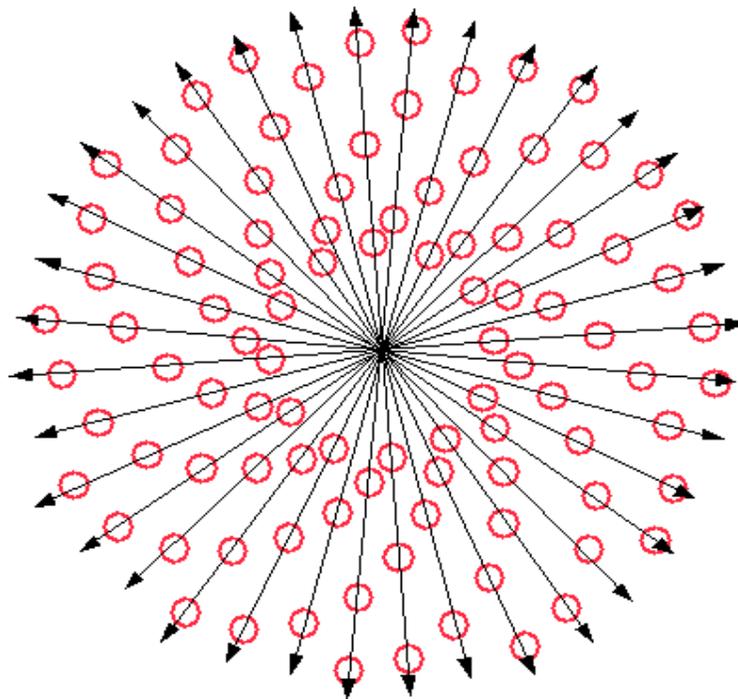
Marko Rodin's *binary-triplet* based operating system relies upon the discovery of the *Bifilar Doubling Circuit*. Any further description of how Rodin creates the *binary doubling circuits* is proprietary, as well as the methods Rodin uses to harness them.

MATHEMATICS and PHYSICS

Using his *Vortex-Based Mathematics*, Marko Rodin is able to show that numbers are real and that nature expresses herself through numbers. He solves the longstanding debate in mathematics – whether numbers are a man-made contrivance or based in nature - by proving that numbers are a condition of creation. With this math, Rodin is able to demonstrate the man-made mistakes in

mathematical theories and arrive at a correct solution. He is also able to predict any missing unknown prime number and to show that symmetry exists in all prime numbers.

In Rodin's *Vortex-Based Mathematics*, zero does not exist, but is replaced by the number 9. Instead, zero is defined as the *vortex-well* that passes through the center of the Rodin Torus. *Vortex-Based Mathematics* harnesses the secret of the upright vertical axis by aiming all of the numbered quantum tiles over the torus surface topology at a single point in the center, which Rodin calls the *Dandelion Puff Principle*. This is based on Rodin's proof that *numbers are stationary vector interstices resulting from positive emanations*. These positive emanations have been postulated and conjectured to exist, but have never been observed. Marko Rodin is able to demonstrate that they are linear, they do not bend, and travel in a straight line, forming linear radial spokes along the Z-axis of the Rodin Torus.



Spirit Energy Emanations of a Rodin Coil

Because Rodin is able to tap into this newly discovered emanation he is able to create electricity without reluctance or friction, which he refers to as *synchronized electricity*. This *synchronized electricity* can be observed in its past, present and future position using Rodin's mathematical *interferometry numerical patterns*, which are non-invasive and hence, eliminate the possibility of the Heisenberg Uncertainty Principle. This "principle" states, for example, that you cannot know the future position of an electron even if you know its past and present position, because one position affects the other by your way of knowing it. The only way scientists can model an atom is to observe it, invasively, through an electron microscope, but this causes the electrons to absorb the light and jump the valiance ring and you've just deflected and contaminated it. With the Rodin Solution, an electron is observed not with light, but by creating a mathematical matrix or *interferometry numerical pattern*. Thus, nothing is contaminated. Hence, Rodin is capable of determining the electron moment in all frames of reference. This enables him to "see" infinitely small or large, from the quantum level to the shape of galaxies and the universe.

ASTROPHYSICS

The Rodin Solution explains the secret of creation. It explains how the universe reprocesses matter, uses matter as its coolant source to bathe itself at the core of a black hole, and then to dissipate heat away from the center of the galaxy. And every galaxy in the universe, it turns out, is in the shape of a torus.

The Rodin Solution also explains how black holes work. A black hole is a negative vortex where everything implodes – swirled and compressed until it reaches the inner diameter of the toroid, which is called the *singularity*. *Spirit* emanates omnidirectionally from this *toroidal pinch*. Matter is drawn in at the top and ejected at the bottom. This is the source of gravity, of all motion, and of time. It is what causes everything to warp and spin. When the old, dead stars and planets are shot out of the white hole (every black hole is connected to a white

hole), they are a hot, gaseous stream of inter-nebular matter. As this stream gets further away from the *toroidal pinch* point it cools and amalgamates, forming new stars and planets all over again. *This is why our human bodies are made of stardust – we are made of countless stars of the past. This is an endless cycle of renewal.*

The Rodin Solution harnesses this energy by tapping into a self-contained energy source that is renewable anywhere. The creation of a *reactionless drive*, called a *flux thruster*, becomes possible. A *flux thruster* would enable humans to travel anywhere in the universe without having to return to Earth for fuel or living supplies. Technology could be taken to any planet and could make it habitable because the Rodin Solution provides the secret of molecular engineering. One could go to a dead, barren planet and transform it into an oasis.

Using current combustion-engine technology, transporting materials of significant weight into space is very cost prohibitive – approximately \$10,000 per pound. With *flux thruster* technology based on the Rodin Coil, one could carry any weight into space very inexpensively.

POWER SOURCES and TRANSPORTATION

Perhaps the most compelling, potential revolutionary application of the Rodin Solution and the Rodin-Coil Torus is the concept of a point energy source that can be focused on any desired application. If this concept bears fruit, it will usher in a new age of technology far surpassing those brought on by inventions such as the steam engine, the internal combustion engine and the electric power generator. Detailed citations are available from a variety of physicists who support this notion and base their support on established scientific experimental evidence and sound theoretical principles.

With the Rodin Solution, a propulsion device could be created with a *reactionless drive*, unaffected by the weight it's pulling, which would be able to propel

astronomical weights through space with negligible expense. This would revolutionize space travel, enabling a space ship to travel intergalactically. A senior NASA engineer in charge of communications has confirmed that Rodin's discovery will enable humans to travel anywhere in the universe, making us true intergalactic citizens.

Today, no one is able to pinpoint a location in space accurately. For example, once a spacecraft gets close to its destination, technicians are forced to incorporate a correcting calculation and then reset the direction of the craft. With Rodin's vortex-based mathematics, one can accurately pinpoint any direction in the universe and calculate an exact trajectory that pinpoints a spacecraft's position at all times. This is because Vortex-Based Mathematics "breathes". It's elastic, precisely modeling the expansion and contraction of the universe and the space/time fabric, something that today's mathematics is incapable of doing.

There are, no doubt, even more revolutionary applications of the Rodin Coil waiting to be discovered and tested.

TRANSFORMERS, MOTORS and ENERGY-EFFICIENT POWER

A motor based on the Rodin Coil is far more efficient than a conventional electric motor. The Rodin Coil produces so much more magnetism that a minimum 20% reduction in copper can be achieved, translating into tremendous weight reduction and savings in material. Rodin has a team capable of producing super-efficient motors with much lower power consumption than conventional motors. These motors could be incorporated into a product as small as a ceiling fan or as large as a power plant. An existing prototype of a ceiling fan presently tests 600% more efficient than a box fan. This will probably increase when manufactured with fine materials.

There is considerable loss of energy in conventional electric motors since they produce heat. For example, the standard Edison bulb has 90% loss of energy.

Only 10% of the energy produced is converted into light. In a motor based on the Rodin Coil, the heat produced is minimal due to the Rodin Coil's ability to concentrate magnetic energy at its core far more efficiently than any device presently existing. Moreover, the Rodin Coil device is extremely durable and efficient.

COMMUNICATIONS

Rodin-Coil antennas will radically change communications. They can receive and transmit through any media, penetrating what even magnets cannot penetrate, with a sensitivity heretofore considered impossible. Testing by engineers has already shown that the Rodin Coil is 60% more sensitive than any antenna existing. As a result, the U.S. government presently uses antennas designed by Rodin to protect the boundaries of the United States.

The ultimate application of Rodin coils to the field of antenna design is in the field of the human brain which is, in essence, an antenna. Rodin coils actually pick up and transmit "spirit" – that which animates and is present in all creation.

DNA and MICROBIOLOGY

DNA is thought to be a double helix with a displacement, called the major groove, nestled inside it. This displacement is critical to the field of medicine. Genetic scientists believe the major groove is hollow. However, the Rodin Solution reveals mathematically that the major groove nested inside the double helix of DNA is not hollow but occupied by a morphogenetic field (bioetheric template) defined by one of the two mathematical patterns discovered by Rodin, which he calls the *potential major groove gap space* or the *flux field of 3, 9, 6*.

By using flux fields to control DNA, the pathway to discovering new ways of treating and eliminating disease is opened, enabling selective cutting and splicing of genetic sequencing at will.

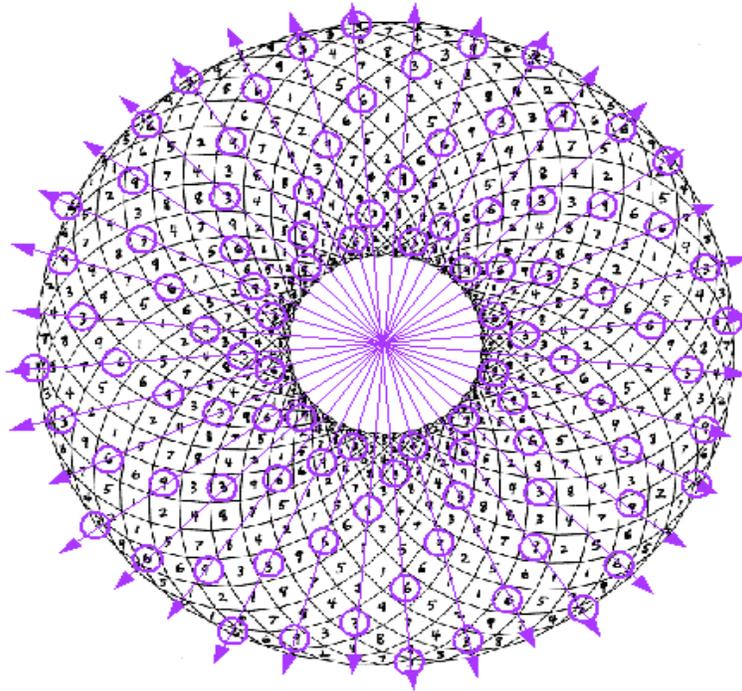
On another front, university scientists applying the Rodin Solution to biology and plant life have discovered that it reveals the secret of cellular communication.

RESEARCH OF SPECIAL INTEREST TO MARKO RODIN

While all areas of the Rodin Solution Project are under the direction and close supervision of Marko Rodin and of great interest to him, several frontiers of research are of special personal interest to Rodin:

MICROSCOPIC UNDERPINNING NESTED VORTICES

Every continuous medium has the inherent capability to be superconductive based on *harmonic cascading*. Examples of continuous mediums, in the form of a toroidal matrix, are tornados, hurricanes, water spouts, solar systems, galaxies, black holes/white holes and maelstroms. There are many other examples of localized space-time implosions which Rodin refers to as *underpinning nested vortices*. Whether energy is maintained and survives in the form of a toroid, or spiral helix, or goes through mitosis and duplicates itself, is determined by whether or not nested underpinning vortices are staggered or aligned in their *World Boundary Condition*. A *World Boundary Condition* is represented in Vortex-Based Mathematics by the harmonic shear which, in the Rodin Torus Coil, turns into an electrical shear and allows for two electrical conducting wires to be touching each other side by side without shorting out regardless of the total amount of energy output. In a Rodin Coil, no insulation is ever needed to protect it from short-circuiting.



Family Number Group +3 +6 +9 Activated by the Spirit-Energy Emanations, Creating Negative Draft Counter Space, Motion and Nested Vortices

The area of microscopic underpinning nested vortices needs considerable further research as it applies to biology and genetics, motors, power generation and propulsion systems.

NEW AUDIOPHILE SPEAKER TECHNOLOGY

Any tone input into a Rodin Torus Coil can be reproduced without a diaphragm. Thus, a radical new type of speaker can be made with sounds produced directly from Rodin Coils, eliminating the use of a diaphragm.

BIOPHYSICAL HARMONICS

Biophysical harmonics, which is the same as neurogenesis, is the secret of how to repair or regenerate areas of the brain damaged through injury or disease. In 2005, medical researchers were able to achieve regeneration of mammal organs, bones and tissue, but not of brain tissue. In his early research, Marko Rodin began exploring how sound effects the human brain, and using the

biophysical harmonics of the Rodin Torus Coil to treat autism and brain damage. The foundation of understanding the human brain's neurosynaptic connections resides in the mathematical patterns Rodin has discovered, which model how the brain – a form of a torus - wires itself.

APPLYING VORTEX-BASED MATHEMATICS

Rodin desires to use his Vortex-Based Mathematics to :

- *Accurately model the secret of how water crystallizes*
- *Accurately model the periodic table of elements*
- *Solve all mathematical enigmas*
- *Rewrite all math textbooks from elementary school to university level*

NEW DESIGN OF THERMAL NUCLEAR FUSION REACTORS

Existing technology for thermal nuclear fusion reactors uses a bandaid approach. Electricity is forced into pathways because no one knows electricity's natural pathways. However, Rodin does. He creates *toroidal pinch*, using Vortex-Based Mathematics, to create radical new designs that eliminate all the peripheral equipment currently used, such as cryogenics and massive correcting magnets. He is capable of achieving the same results for a negligible investment.



Toroidal Fusion Research is the Most Expensive International Scientific Project in History

OBJECTIVES OF THE RODIN SOLUTION PROJECT

The primary goals of the Rodin Solution Project are educational and curatorial. That is, to document and present these discoveries to mathematicians, scientists and other specialists to enable them to make advances in their work; to educate the general public, with a special emphasis on developing curriculums for children, and to assemble research teams to explore and develop further applications of the Rodin Solution. It is anticipated that marketable and potentially lucrative products will result from the work of Rodin Solution Project. We envision developing for-profit ventures based on these prototypes and products as well as using revenues to further the ongoing work and educational goals of the Rodin Solution Project as follows:

- Preserving and disseminating the work of Marko Rodin in order to liberate scientists to freely discover new breakthroughs in their fields by providing them with the mathematical tools of the Rodin Solution;
- Assembling teams of scientists and mathematicians in a diverse range of fields to carry out research and testing of the Rodin Coil Torus as well as development of evolutionary and revolutionary applications of the Rodin Solution
- Developing the most promising applications into marketable, profitable products.
- Making the Rodin Solution accessible to the general public - children, in particular – through publishing written works, digital media and educational materials that explain vortex-based mathematics and its significance

WORKPLAN

Executive Team Leader, Marko Rodin, will assemble and lead a team working in three major areas : multimedia production, research and development, marketing and promotions. Manufacturing based on any prototypes developed, will be outsourced. A general counsel will also be retained.

During this first two-year startup phase of the Rodin Solution Project, the following projects and activities will be undertaken:

- Scanning, cataloging, illustrating and otherwise documenting Marko Rodin's existing body of work
- Writing and producing articles, books, DVDs, films and other media for the scientific community as well as the general public, including an animated digital presentation of the Rodin Solution, educational and curriculum materials for young people, and the development of educational video games and a dramatic feature film;
- Creating a Rodin Coil precisely conforming to Rodin's exacting criteria and testing the effects of a precisely constructed Rodin Coil;
- Creating and testing evolutionary applications of the Rodin Coil in the areas of motors, antennae, transformers and electromagnets;
- Researching and developing applications of the Rodin Solution to computer operating systems;
- Cataloging the complete set of 3D Rodin Tori and researching the strong probability of 4D and higher-dimensional Rodin Tori;

- Researching the applications of various fields of mathematics – matrix algebra, vector calculus, topology and time-series analysis, which in turn render much of physics available, including classical electrodynamics – to the Rodin Torus. This has been made possible by the preliminary work of Russell Blake in formalizing the mathematics of the Rodin Torus;
- Establishing a state of the art digital teleconferencing and teaching facility to convene teleconference seminars and teach symposiums to train researchers, scientists, engineers, etc., and provide them new mathematical tools to make discoveries and breakthroughs in their own work;
- Promoting and publicizing the work of the Rodin Solution Project through a website, television, radio, print media and public presentations.
- Strategic planning for the development of for-profit ventures based on successful prototype research and development.

CONTRIBUTORS and SUPPORTERS

Marko Rodin has published, "The Quantum Mechanic State of DNA Sequencing", in the proceedings of the International Bio-Technology Expo (IBEX), which is the largest genetic engineering conference in the world and is heavily attended by the Japanese. He was also invited to present his paper, "Low Cost Propulsion Systems Based Upon the Re-evaluation of the Physics of Matter", at the Air Space America convention, the largest U.S. convention of its type. The Rodin Coil Antenna won a U.S. military design contest as the most powerful antenna with the greatest pickup over the longest distance and was awarded a government contract for incorporation into the nation's first alert warning system.

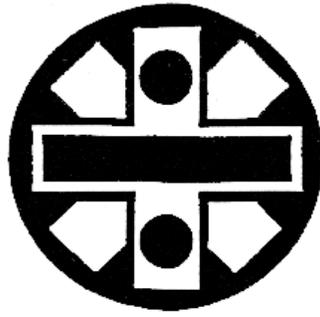
Rodin has standing offers from top engineers and scientists at high-tech corporations and agencies, including Microsoft, NASA, Boeing, as well as leading university academics. They all say the same thing – that their existing work has little meaning to them in light of the Rodin Solution and that what they most desire is to dedicate themselves fulltime to working on the Rodin Solution. As a result, Rodin is capable of assembling a team of the finest scientists, mathematicians, engineers and academics from the ranks of the most advanced scientific and technology companies and universities in America.

Rodin has been an instructor at three of the top schools in the state of Hawai'i: Punahou School on Oahu, Seabury Hall on Maui and The Parker School on the Big Island, where he taught physics and junior honors math as part of his project to design new math curriculums for secondary school students.

Supporters of the Rodin Solution and **contributors** to the work include :

- Top scientist and senior research engineer at Microsoft;
- Dennis Watts, Senior Engineer of Communications for NASA and leading engineer for Boeing Aerospace;
- Dr. Jonas Salk, offered to be Rodin's personal physician and told him his work was so advanced he'd never complete it in his lifetime unless he cloned himself;
- Dr, Hans Nieper, world renown cancer doctor and former physician to President Reagan, invited Rodin to submit a paper to the prestigious medical journal he is president of because he believed in Rodin's work;
- Christine Jackson, editor of "Explore More", the most cutting edge medical journal in the U.S.;
- Keith Watson, in charge of the Bikini Atoll nuclear testing research project for the U.S. government, believes in Rodin's work and introduced Rodin before his presentation on power and propulsion systems at the Air Space America convention in 1988;
- James Martin, the editor of Defense Science Magazine - the largest U.S. military journal calls Rodin's work "the most revolutionary propulsion system ever created for outer space";
- Sal Rosenthal, inventor and patent holder of the tuberculosis test, regularly invited Rodin to participate in his California think tanks;
- Tom Bearden, an alternative energy expert considered one of the world's foremost experts in zero point energy says Rodin has "accomplished what he has been advocating for over 20 years and should continue his work";

- Oscar Hu, the astrophysicist at NASA who successfully recovered the Probe when it was lost going into the magnetic field of Neptune, has written papers on how Rodin Torus Coils can be used to create an artificial man-made black hole and an electrical wheatstone bridge that creates a gravity well on a laboratory bench top;
- Jean Louis Naudin, the foremost international expert in vertical lift space and aircraft, uses Rodin's work as proof that the B-Field Torsion Effect is real;
- Maury King, author of "Zero Point Energy";
- Robert Emmerich, head of the Materials Testing Department at Hewlett Packard, tested the Rodin Torus Coil and concluded it had more than 60% greater output than anything presently existing or being used in antennas.



RODIN AERODYNAMICS

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APPENDIX

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APPENDIX

ENDORSEMENTS and PAPERS

1. RUSSELL P. BLAKE

Wed, 14 Nov 2001 22:16:11
Subject: The Rodin Coil

To Whom It May Concern:

Two years ago I met Marko Rodin through a mutual acquaintance. Mr. Rodin shared some of his results with me at that time. It became clear to me that Mr. Rodin's work was a synthesis of numerical patterns which had previously been overlooked by conventional science and mathematics. In hopes of bridging the gap between Mr. Rodin's discoveries and conventional science, I put forth an analytical framework in which mathematical formulae generate the numerical patterns of the Rodin Torus. These formulae suggested that the Rodin Torus lies not just on the surface of the "doughnut" shape, but into the interior as well; in other words, the Rodin Torus is three dimensional.

This mathematical formulation is as yet incomplete, and the physical meaning of these numerical phenomena remain unexplored still. Yet in my career I have several times discovered new mathematical formulations which have led to new products. In the late 1970's I discovered Atomic Modeling which revolutionized computer performance modeling, measurement, and sizing. In the early 1990's I discovered new ways to express the time-dependent behavior of program code, which led to reductions of program code size of 50% of the original size for all programs to which it was applied. I mention these facts merely to convince the reader that my intuition has a history of success in the practical application of new mathematics.

Now I am completely convinced that the Rodin Torus will likewise lead to new and revolutionary advances in art and science. Mr. Rodin's work has suffered from a lack of adequate scientific attention, and I am sure that as the research momentum builds and the proper relationship between the Rodin Torus and conventional science is fully understood, both areas of endeavor will attain new heights. I am very much looking forward to playing a role in this adventure.

Russell P. Blake
Former Senior Researcher
Microsoft Research

RUSSELL P. BLAKE RESUME

MoneyFacts, Inc. (1/99 – present) *President.* Create and implement fee-only investment advisory and computerized investment consulting company.

Microsoft Corporation (10/1/88-1/3/96) *Senior Researcher, Advanced Technology (9/93-1/96).* Develop performance tools for optimizing all Microsoft products. Develop a Decision Theoretic system for the automatic detection of bottlenecks in computer systems (US patent pending). *Systems Performance Manager, Advanced Operating Systems (10/88-9/93).* Build and lead team for benchmarking, analysis, and tools for OS/2 and Windows NT performance optimization. Invent and co-develop Windows NT Performance Monitor. Invent Windows NT Code Profiler, Working Set Tuner (US Patent), and Synthetic Performance Test Bed (US Patent). Create the Winstone industry standard benchmark. Author the book *Optimizing Windows NT*: over 100,000 copies sold, translated into French, German, and Chinese.

Sun Microsystems, Inc. (1/87-10/88) *Director of Operations, Software Products Division.* Architect & create a department to handle software quality, release, publications, and facilities during explosive growth from 2 to 140 employees. Develop software life cycle process. Work with AT&T to develop a unified version of Unix.

Adaptive Intelligence Corp. (8/84-1/87) *Vice President, Engineering.* Manage software, electrical, and mechanical engineering to complete the construction of a high-precision assembly robot. Manage manufacturing, facilities, and field service for the construction of unique, high technology, turnkey automation systems.

Solaris Computer Corp (7/83-8/84) *Vice President, Software Development.* Recruit and manage a cohesive team of strong software professionals. Participate in corporate planning, including strategies, organization, philosophy, benefits, and departmental budgeting.

Tandem Computers, Inc. (8/77-7/83) *Manager of Software Performance Quality, Future Systems Division.* Design and implement the Xray Performance Monitor for a closely coupled, non-stop, expandable, multiple computer system. Design and lead development of the Envision Synthetic Workload Generator for system sizing. Design and develop language for predicting system size, and for evaluating and partitioning advanced designs. Build teams to assure performance and quality of new systems.

Hewlett Packard (1/73-8/77) *Project Manager, Performance Modeling and Analysis.* Build team and design plan for quality assurance of new operating system. Design and implement spooling facility as part of the system. Develop integrated batch/timeshare scheduling system for processor and virtual memory.

MS Computer Science (1972) University of Wisconsin, Madison, WI

BA Philosophy (1969) Antioch College, Yellow Springs, OH

RUSSELL P. BLAKE PUBLICATIONS

"Method and System for Automatic Bottleneck Detection", US Patent awarded November 1999, US Patent 6,067,412, May 2000.

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"Method and System for Simulating the Execution of a Computer Program", US Patent 5,574,854, November 1996.

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Analysis of the Rodin Coil and it's Applications

Russ Blake

Introduction

I have reviewed previous and current work on the theories of Marko Rodin. Mr. Rodin has discovered a series of regularities in the decimal number system heretofore undocumented in mathematics. These patterns lay out on the surface and within the internal volume of a torus.

A number of scientists and engineers have voluntarily joined with Mr. Rodin over recent years to explore the implications of his findings.

The Rodin Coil

The Rodin Coil is a toroidal—or doughnut-shaped—form wound by wires in a pattern consistent with the number patterns discovered by Mr. Rodin. Toroidal shapes wound with wires are commonly used for inductors in electrical circuits, often for use in transformers. However the pattern of winding in a Rodin Coil is radically different from conventional toroidal coils. Experimenters have produced some samples of the Rodin Coil to measure the effects of this new approach to winding wires around a torus.

To understand these effects it is necessary to review just a little electrical theory. When a current is passing through a wire it creates a magnetic field around the wire. When a wire is coiled like a cylindrical spring, as though wrapped around a pencil, the magnetic fields from the turns of the coil reinforce each other to increase the strength of the magnetic field. When the coil is bent into a circle, so that the ends meet, the majority of the magnetic force is concentrated inside the coil. This is considered a benefit in electrical circuit design, since stray magnetic fields can upset the operation of other parts of the circuit.

In a conventional coil the windings lay one after another just like the windings of a cylindrical spring. In a Rodin Coil, the windings lie on the surface of the torus, but do not lie consecutively adjacent to each other. Instead they reach along the surface, through the central, doughnut hole area, and 30 degrees short of directly across the torus. This forms, in addition to the wires on the outer surface, a crisscrossing circle of wires in the center of the torus. (The central figure formed by the wires in the doughnut hole is really a polygon of 24 sides for each completed wrap of the coil: so many sides it is considered a circle.)

Due to the central circle of wires in a Rodin Torus, it naturally creates a greatly increased magnetic field in the center of the torus, when compared to a conventional coil wound with the same amount of wire. In addition the field generated is much more coherent, in the sense of being much more sensitive to a particular frequency of applied current. These properties are the basis for useful applications of the Rodin Coil, as well as for any limitations in its use.

All this having been said, it is worth noting that no one has as yet created a coil precisely conforming to Mr. Rodin's exacting recommendations, all of which derive from the numerical patterns he has discovered in the decimal number system. The effects of a really well constructed Rodin Coil remain untested.

Evolutionary Applications

There are a number of practical applications of the Rodin Coil that have the potential (no pun intended) for producing new, more efficient electrical devices. Producing these devices seems to require in some cases significant engineering effort, but no revolutionary scientific discoveries beyond what is known to date. These seem at first glance to fall into two distinct categories: motors and antennae; other possibilities may also exist.

Before enumerating these practical possibilities, we should mention that they all require using the Rodin Coil in a more or less conventional fashion. We do not intend here to describe in complete detail how a Rodin Coil is wrapped, as this is covered to some extent in supporting documentation. (Detailed engineering work on Rodin Coil design specification still needs attention.) Here we only wish to point out that in a "real" Rodin Coil, there are two wires used to form the wrap; these are not connected to each other, but rather each wire is connected to itself to complete a loop at the end of the wrap. Thus there is no way to extract current directly from these wires or to energize them directly with an external current. In this section on Evolutionary Applications we divert from the strict Rodin Coil design, and energize the coils in a more conventional fashion, by connecting the ends of the two loops to one or two current sources or sinks, so we can utilize and measure the coil's properties along the lines of conventional electrical engineering. In the next section, on Revolutionary Applications, we revert to the true coil design as envisioned by Mr. Rodin.

Motors

The increase in magnetic field over a conventional coil that is found with a Rodin Coil has been observed to be limited if the hollow torus is replaced by the ferrite core used in conventional electric motors. The reason is that the ferrite core reaches magnetic saturation, beyond which no additional magnetic field can be produced. Assuming this difficulty can be overcome by judicious choice of core materials, or that hollow cores can produce enough current, a motor based on the Rodin Coil could be markedly more efficient at generating electrical energy than a conventionally constructed electric motor. (The possibility of a hollow core electric motor is exciting due to the light weight of such a design.) Under this assumption, Rodin Coil motors would be useful in any application where energy consumption must be limited, such as marine, caravan, and space environments where available power sources are restricted; high pollution zones where fossil fuel consumption must be conserved; isolated or unmanned stations with limited fuel capacity and refueling difficulties; and portable motor-driven equipment of every description where battery weight is an issue.

No work has yet been done to create a motor using a Rodin Coil as a building block.

All of the work on Rodin Coils to date has been with 2D coils wrapped on the surface of a torus. Starting with the fact that the numerical patterns of the Rodin Torus has resulted in more efficient 2D coils, one can easily surmise that a layered torus wrapped in 3D

would achieve an even much higher efficiency. No work has yet been done on 3D toroidal coils.

Antennae

Rodin Coil antennae would be useful in any application where sensitivity to a particular frequency was important, and the form-factor of the Rodin Coil was acceptable. Portable communication devices for use in a wide variety of applications should benefit, since power requirements for boosting the antenna signals should be greatly reduced from standard antenna designs. By varying the points at which the coil is tapped, it may be possible to tune the antenna to a wide range of desired frequencies.

Work has been done in this area already, with significant successes reported.

No work has been done using 3D Rodin Tori for antennae.

Transformers

It might be possible to arrange multiple Rodin Coils so as to take advantage of the increased magnetic field at the center. This could result in more efficient, lower weight transformers.

Use of Rodin Coil transformers in standard electrical circuits may be difficult, however, since the very presence of the increase in magnetic field might cause a problem with other circuit elements. Significant shielding of Rodin Coil transformers would be required in any application involving multiple circuits, such as a radio receiver.

Electromagnets

There are a variety of applications for large electromagnets. These include mundane applications such as cargo transfer, scrap iron handling, and monorails, as well as the more exotic fields such as particle accelerators, magnetic cannon, and ion beam sources (including ion beam space drives.) Rodin Coil electromagnets would presumably produce a higher magnetic field than an equivalent conventional electromagnet, possibly benefiting these applications if form factor issues can be overcome. New applications may also be possible, since the orientation of the magnetic field is perpendicular to the field of conventional coils.

Revolutionary Applications

Various researchers have seen the Rodin coil as a solution to interesting problems in their diverse areas of expertise. Some of these ideas have little support in conventional scientific thinking. Nonetheless there are interesting possibilities which, should they bear fruit, would unlock new technologies.

The most compelling of these is the notion of a point energy source, or the extraction of energy from a vacuum. To most of us reared on the wisdom of conventional science, this is a fairly outlandish idea. One researcher, however, has presented detailed citations from a variety of physicists who support the notion, and base their support on what at first blush appear to be both established scientific experimental evidence, and sound theoretical principles.

If this idea were to bear fruit, it would usher in a new age of technology surpassing those brought on by such inventions as the steam engine, the internal combustion engine, and the electric power generator. It would surpass those important inventions because no fuel would be consumed in the creation of energy; instead, ambient energy would be focused on the desired application.

Theoretical Issues

Although considerable effort has been expended on diagramming the numerological patterns in Mr. Rodin's findings, little effort has been made in a number of areas which need further examination before the importance of the findings are fully comprehended.

For example research shows that there are 6 different combinations of series, which produce distinct implementations of Rodin's toroidal pattern in 2 dimensions. Nothing however indicates the physical meaning, if any, of thinking in terms of one series or another.

Additionally it remains unknown how many different ways there are to enumerate these series into 3D tori. Three such combinations have been enumerated, but it is unknown if there are more, and if so, how many. Also, as with 2D tori, it is not known what the physical implications of these various ways of building 3D tori are.

Finally, nothing has yet been accomplished which links Mr. Rodin's patterns to conventional scientific theories. The fact that utilizing this pattern does result in effective coil design is probably not an accident, but there remains an enormous gap between what is considered "known science" and Mr. Rodin's patterns. This remains true in spite of the application of these patterns to such diverse areas as plant growth and musical harmonics. Until a clear link between the Rodin Torus and known scientific theory is established, it may prove difficult to bring the full attention of the conventional scientific community to bear on solving any remaining problems.

These points are raised not to criticize a field in its infancy, but to illustrate the rich arena of study that remains immediately accessible to research. Doubtless any discoveries made in answering these questions will result in new areas of study to explore.

Prognosis

This report, and the supporting documentation on experiments using the Rodin Coil, should be submitted for review by a panel of technical experts from the fields of electric motor, antenna, transformer, and electromagnet design and manufacture. If these industry experts agree in principle with the prospects for Evolutionary Applications, there are sufficient immediate practical applications of the Rodin Coil to warrant the expenditure of funds. This is so much the case that funding should be considered more a venture capital investment than a charitable donation to a worthy cause, worthy though it may be.

In this case the strategic order of business is clear. First develop the most promising evolutionary applications into marketable products. Use the profits from these products to fund both less accessible evolutionary product development, and also theoretical

research and Revolutionary Application development. Should the latter bear fruit, the potential technological impact is, as previously discussed, enormous.

A detailed Business Plan, including the usual *pro forma* financial statements, should determine the precise level of funding required.

If the industry experts conclude that there are no evolutionary practical applications of the Rodin Coil, due perhaps to issues of manufacturing cost or insurmountable application difficulties, then the effort would perforce become somewhat more speculative. The more Revolutionary Applications of the design would remain to be explored, along with the more theoretical questions posed above. Nonetheless, although the effort might lose some of the self-funding appeal of the venture capital approach, the potential technological impact is still enormous. And that goal may be achieved more rapidly, since the effort would, at the outset, be focused on the ultimate objective, rather than giving priority to the more immediate concerns surrounding the development of a self-propelled start-up business enterprise.

In either case the effort requires a strong business manager of competent scientific training. The setting of priorities and the proper sequencing of the research efforts, along with the timely and appropriate expansion of research and development staff, require all the skills normally found in a high-tech start-up entrepreneur. This is essential for a proper utilization of funds devoted to the effort, as well as the most rapid development of results.

Towards a Mathematical Formulation of the Rodin Coil Torus

Russell P. Blake

Introduction

The following is an attempt to formalize the mathematics of the Rodin Torus. The goal is to attain a higher level of understanding of the Rodin Torus than can be obtained merely by observing the numerical sequences generating the Torus.

Key to the development is the use of decimal parity. Decimal parity is an operation that sums the digits in a number repeatedly to yield a single digit, the decimal parity digit for the original number.

For example the digits in the number 2,048 sum to $2+0+4+8 = 14$, and the digits in 14 sum to $1+4 = 5$. The decimal parity digit of 2048 is therefore 5.

It is interesting that all of the same results can be derived if the modulo operator is used in place of the decimal parity operator. The modulo operator is the remainder operator: $x \bmod y$ is the remainder of x divided by y . The difference in the resulting patterns of digits is that everywhere there is a 9 decimal parity, there would be a 0 modulus. Since there is a one-to-one correspondence between the two approaches, the difference is apparently merely symbolic. Nonetheless, we shall use the decimal parity operator in this development, and leave the modulo development as an exercise for the bored reader with too much time on his or her hands.

In the development we discuss various series of numbers. Each such series has an *index*, which we start at 1 and number sequentially, one element at a time. (The series index could start at 0, but we are going to end up in matrices, which have an index starting at 1, so we'll start at 1 with our series.) The modulo operator is used for index arithmetic, since this is a more conventional approach. However, a purely decimal parity development is possible merely by substituting "decimal parity = 9" anywhere "modulus = 0" is used.

The Multiplicative Series

Let m_i denote the infinite series with each element the decimal parity of the multiplication series for digit i , $i = 1, \dots, 9$. E.G. for $i = 2$,

$$m_2 = \{ 2, 4, 6, 8, 1, 3, 5, 7, 9, 2, 4, 6, 8, 1, 3, 5, \dots \} \quad [1]$$

Observation O1:

$$\text{The series } m_i \text{ repeat with period 9.} \quad [O1]$$

Denote the j^{th} element of the series as a_{ij} , with j starting at 1. Observation 1 means

$$a_{ij} = a_{ik} \quad \text{iff } j \bmod 9 = k \bmod 9 \quad [2]$$

Now consider the pair of series m1 and m8.

$$m1 = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9, 1, 2, \dots \} \quad [3]$$

$$m8 = \{ 8, 7, 6, 5, 4, 3, 2, 1, 9, 8, 7, \dots \} \quad [4]$$

Notice that

$$a1_9 = a8_9 = 9$$

$$a1_1 = a8_8$$

$$a1_2 = a8_7$$

$$a1_3 = a8_6$$

...and so on. We can state this more tersely (with the modulo operator taking precedence over the subtraction operator):

$$a1_{j \bmod 9} = a8_{(9-j \bmod 9)} \text{ when } j \bmod 9 \neq 0, \quad [5]$$

and

$$a1_j = a8_j = 9 \text{ when } j \bmod 9 = 0$$

Similarly,

$$a8_{j \bmod 9} = a1_{(9-j \bmod 9)} \text{ where } j \bmod 9 \neq 0 \quad [6]$$

The same observations of the series m4 and m5 lead to a similar conclusion:

$$m4 = \{ 4, 8, 3, 7, 2, 6, 1, 5, 9, 4, 8, \dots \} \quad [7]$$

$$m5 = \{ 5, 1, 6, 2, 7, 3, 8, 4, 9, 5, 1, \dots \} \quad [8]$$

$$a4_{j \bmod 9} = a5_{(9-j \bmod 9)} \text{ when } j \bmod 9 \neq 0 \quad [9]$$

$$a4_j = a5_j = 9 \text{ when } j \bmod 9 = 0$$

And

$$a5_{j \bmod 9} = a4_{(9-j \bmod 9)} \text{ where } j \bmod 9 \neq 0 \quad [10]$$

And finally the same observations of the series m2 and m7 lead to a similar conclusion:

$$m2 = \{ 2, 4, 6, 8, 1, 3, 5, 7, 9, 2, 4, \dots \} \quad [11]$$

$$m7 = \{ 7, 5, 3, 1, 8, 6, 4, 2, 9, 7, 5, \dots \} \quad [12]$$

$$a_{2_{j \bmod 9}} = a_{7_{(9-j \bmod 9)}} \text{ when } j \bmod 9 \neq 0 \quad [13]$$

$$a_{2_j} = a_{7_j} = 9 \text{ when } j \bmod 9 = 0$$

And

$$a_{7_{j \bmod 9}} = a_{2_{(9-j \bmod 9)}} \text{ where } j \bmod 9 \neq 0 \quad [14]$$

Next consider a different pattern in multiplication series, the m3 and m6 series.

$$m3 = \{ 3, 6, 9, 3, 6, 9, 3, 6, 9, 3, 6, 9, \dots \} \quad [15]$$

$$m6 = \{ 6, 3, 9, 6, 3, 9, 6, 3, 9, 6, 3, 9, \dots \} \quad [16]$$

This leads to the conclusions that, first, the series repeat,

$$a_{3_j} = a_{3_{(j \bmod 3)}} \quad [17]$$

$$a_{6_j} = a_{6_{(j \bmod 3)}} \quad [18]$$

and, second, that the series are related as follows:

$$a_{6_j} = a_{3_{(3-j \bmod 3)}} \quad \text{iff} \quad j \bmod 3 \neq 0 \quad [19]$$

$$a_{6_j} = a_{3_j} \quad \text{iff} \quad j \bmod 3 = 0 \quad [20]$$

From these two series we can construct a new, artificial series, e, fabricated as follows:

$$e = \{ a_{6_1}, a_{3_2}, a_{3_3}, a_{3_4}, a_{6_5}, a_{6_6}, a_{6_7}, a_{3_8}, a_{3_9}, a_{3_{10}}, \dots \} \quad [21]$$

Or, numerically,

$$e = \{ 6, 6, 9, 3, 3, 9, 6, 6, 9, 3, 3, 9, 6, 6, 9, 3, 3, 9, \dots \} \quad [22]$$

This series, which we call the *equivalence series*, has the representative term of

$$e = \{ \dots, aX_j, \dots \} \quad [23]$$

where $X = 3$ if $\text{int}((j+2)/3)$ odd
and $X = 6$ if even

Now consider the *doubling series*:

$$\{ 2, 4, 6, 8, 16, 32, 64, 128, 256, 512, 1024, \dots \} \quad [24]$$

which has decimal parity of

$$d = \{ 2, 4, 8, 7, 5, 1, 2, 4, 8, 7, 5, \dots \} \quad [25]$$

Observation:

This is a repeating series with period 6.

Or in other words, denoting the j^{th} element of this series by d_j ,

$$d_j = d_k \quad \text{iff} \quad j \bmod 6 = k \bmod 6. \quad [26]$$

Let the *reversed doubling series* be denoted by b :

$$b = \{ 1, 5, 7, 8, 4, 2, 1, 5, 7, 8, 4, \dots \} \quad [27]$$

This also repeats with period 6. With the j^{th} element of b denoted by b_j ,

$$b_j = d_{(7-j \bmod 6)} \quad \text{if} \quad j \bmod 6 \neq 0 \quad [28]$$

and

$$b_j = d_1 = 2 \quad \text{if} \quad j \bmod 6 = 0 \quad [29]$$

The Torus

The torus is constructed from the above series.

Each element of the torus is an element of multiple series.

We will begin by considering the 2-dimensional surface of the torus. In two dimensions, each element of the torus is also an element of either the doubling circuit, the reverse doubling circuit, or the series e . Each element is also a member of two multiplicative series that are not pairs (in the sense that m_1 and m_8 are pairs.)

Let's first examine the 8154 torus. The surface of this torus contains the series m_8 , m_1 , m_5 , and m_4 .

Here is a fragment, with rows and columns numbered:

	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1	1	1	1
										0	1	2	3	4	5	6	7	8	9
1	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6
2	5	1	2	4	8	7	5	1	2	4	8	7	5	1	2	4	8	7	5
3	2	1	5	7	8	4	2	1	5	7	8	4	2	1	5	7	8	4	2
4	9	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9
5	7	5	1	2	4	8	7	5	1	2	4	8	7	5	1	2	4	8	7
6	4	2	1	5	7	8	4	2	1	5	7	8	4	2	1	5	7	8	4
7	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3
8	8	7	5	1	2	4	8	7	5	1	2	4	8	7	5	1	2	4	8
9	8	4	2	1	5	7	8	4	2	1	5	7	8	4	2	1	5	7	8
1	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3
0																			
1	4	8	7	5	1	2	4	8	7	5	1	2	4	8	7	5	1	2	4
1																			
1	7	8	4	2	1	5	7	8	4	2	1	5	7	8	4	2	1	5	7
2																			
1	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9
3																			
1	2	4	8	7	5	1	2	4	8	7	5	1	2	4	8	7	5	1	2
4																			
1	5	7	8	4	2	1	5	7	8	4	2	1	5	7	8	4	2	1	5
5																			
1	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6	6
6																			
1	1	2	4	8	7	5	1	2	4	8	7	5	1	2	4	8	7	5	1
7																			
1	1	5	7	8	4	2	1	5	7	8	4	2	1	5	7	8	4	2	1
8																			
1	6	6	9	3	3	9	6	6	9	3	3	9	6	6	9	3	3	9	6
9																			

Imagine the surface of the torus as a matrix, starting at the element $t_{1,1}$, which is in the upper left corner: a 6. The first subscript is the row, and the second is the column.

For the 8154 torus, the following conditions hold:

$$t_{1,x} = e \quad [30]$$

where $t_{1,x}$ refers to the first row of the matrix.

(Taking e_1 as the first element of the matrix is arbitrary. We could have taken any element in e , d , or b as the first element, and still have been able to construct the following formulae. You can see this is so because e_1 , d_1 , and b_1 all appear in the first column in some row (look at rows 14 and 18 for d and b .) In fact there is no reason to start with the first element of either of these three series, since there is a row starting with

each element of each of the series, and any row could be the first row. If a different origin were chosen, certain constants in the following development would be different, but the results would otherwise be the same. These are some of the constants which are added to indices to make them match the matrix pattern. Therefore do not focus overly on constants used as addends in index arithmetic. Many of the multiplicative constants, on the other hand, are structural and would not change.)

Also,

$$t_{2\ 1} = d_5 \quad [31]$$

and in general,

$$t_{2\ j} = d_{j+4} \quad [32]$$

Similarly:

$$t_{3\ j} = b_{j+5} \quad [33]$$

Further examination of the 8154 torus shows that

$$t_{4\ j} = e_{j+5} \quad [34]$$

Notice that the next element of the 4th row $t_{4\ 2} = e_1$, and $t_{5\ 2} = d_5$, and $t_{6\ 2} = b_6$. In other word $t_{4\ 2} = t_{1\ 1}$, $t_{5\ 2} = t_{2\ 1}$, and $t_{6\ 2} = t_{3\ 1}$. The second set of three rows is the same as the first set, shifted one column to the right. This shift is the reason why the matrix we are examining lies on the surface of a torus. Continuing,

$$t_{5\ j} = d_{j+3}$$

$$t_{6\ j} = b_{j+4}$$

$$t_{7\ j} = e_{j+4}$$

$$t_{8\ j} = d_{j+2}$$

$$t_{9\ j} = b_{j+3}$$

$$t_{10\ j} = e_{j+3}$$

$$t_{11\ j} = d_{j+1}$$

$$t_{12\ j} = b_{j+2}$$

$$t_{13\ j} = e_{j+2}$$

$$t_{14\ j} = d_j$$

$$t_{15\ j} = b_{j+1}$$

$$t_{16\ j} = e_{j+1}$$

$$t_{17j} = d_{j+5}$$

$$t_{18j} = b_j$$

After row 18, the rows repeat: $t_{19x} = t_{1x}$, $t_{20x} = t_{2x}$, so that in general

$$t_{jx} = t_{(j \bmod 18)x} \quad [35]$$

Also, after 18 columns, the columns repeat:

$$t_{xk} = t_{x(k \bmod 18)} \quad [36]$$

so that

$$t_{jk} = t_{(j \bmod 18)(k \bmod 18)} \quad [37]$$

We now take the rather unconventional step (from the viewpoint of matrix algebra) of reading across the rows and columns diagonally. For this to work we need to establish an equivalent to a left-to-right direction. We arbitrarily designate up-and-right as left-to-right, and up-and-left as left-to-right. This tells us which direction in which to number our series as they increase. (This convention can be reversed without loss of results, but the m8 series would become the m1 series, and vice-versa, and the m5 series would become the m4 series, and vice-versa. This follows from the fact that they are the reverse of each other, so reversing the direction convention would exchange the series.)

Using this convention, we note the following:

$$m8_1 = t_{91} \quad [38]$$

$$m8_2 = t_{82}$$

$$m8_3 = t_{73}$$

and in general

$$m8_j = t_{(10-j)j} \quad \text{while } j < 10 \quad [39]$$

Furthermore, this diagonal series repeats with period 6:

$$m8_1 = t_{97}, m8_2 = t_{88} \quad [40]$$

Even more interesting is that the m8 series lies in every other diagonal row. For example,

$$t_{91} = m8_1 \quad [41]$$

$$t_{93} = m8_7$$

$$t_{95} = m8_4$$

and so on.

On the next row,

$$t_{10\ 2} = m8_6 \quad [42]$$

$$t_{10\ 4} = m8_3$$

$$t_{10\ 6} = m8_9$$

and on row 11:

$$t_{11\ 1} = m8_5 \quad [43]$$

$$t_{11\ 3} = m8_2$$

$$t_{11\ 5} = m8_8$$

These triples then repeat. (The $m8$ indices in these series are called the *family number groups* by Marko Rodin.)

A similar pattern exists for $m1$, where $t_{17\ 1} = m1_1$, and so forth. Therefore each element of each row is also an element of either $m1$ or $m8$. If the first element of the row is a member of $m1$, the next element is a member of $m8$, and vice-versa.

Denote by “dep(n)” the function of taking the decimal parity of the number n , as defined in the Introduction. Notice the general form for a row x starting with element $m8_h$ followed by element $m1_i$

$$t_{x\ k} = m8_{\text{dep}(h+3(k-1))} \quad \text{for } k \text{ odd} \quad [44]$$

$$t_{x\ k} = m1_{\text{dep}(i+3(k-2))} \quad \text{for } k \text{ even} \quad [45]$$

Similarly, if a row x starts with $m1_h$ followed by $m8_i$, then

$$t_{x\ k} = m1_{\text{dep}(h+3(k-1))} \quad \text{for } k \text{ odd} \quad [46]$$

$$t_{x\ k} = m8_{\text{dep}(i+3(k-2))} \quad \text{for } k \text{ even} \quad [47]$$

Observe next the first element of the 8154 torus. This must be an element of $m8$ because $t_{2\ 1}$ and $t_{1\ 2}$ are the $m1_5$ and $m1_6$ elements of $m1$, so $t_{1\ 1}$ must be in a diagonal containing the series $m8$. Therefore, since $t_{1\ 1}$ is a 6,

$$t_{1\ 1} = m8_3 \quad t_{1\ 2} = m1_6 \quad [48]$$

We also observe the following pattern along the rows of the torus:

$$t_{2\ 1} = m1_5 \quad t_{2\ 2} = m8_8 \quad [49]$$

$$t_{3\ 1} = m8_7 \quad t_{3\ 2} = m1_1$$

$$t_{4\ 1} = m1_9 \quad t_{4\ 2} = m8_3$$

$$t_{5\ 1} = m8_2 \quad t_{5\ 2} = m1_5$$

$$t_{6\ 1} = m1_4 \quad t_{6\ 2} = m8_7$$

$$t_{7\ 1} = m8_6 \quad t_{7\ 2} = m1_9$$

$$t_{8\ 1} = m1_8 \quad t_{8\ 2} = m8_2$$

$$t_{9\ 1} = m8_1 \quad t_{9\ 2} = m1_4$$

$$t_{10\ 1} = m1_3$$

$$t_{11\ 1} = m8_5$$

$$t_{12\ 1} = m1_7$$

$$t_{13\ 1} = m8_9$$

$$t_{14\ 1} = m1_2$$

$$t_{15\ 1} = m8_4$$

$$t_{16\ 1} = m1_6$$

$$t_{17\ 1} = m8_8$$

$$t_{18\ 1} = m1_1$$

In general we see that

$$t_{j\ 1} = m8_{\text{dep}(2j+1)} \quad \text{and} \quad t_{j\ 2} = m1_{\text{dep}(2(j+2))} \quad \text{when } j \text{ is odd} \quad [50]$$

$$t_{j\ 1} = m1_{\text{dep}(2j+1)} \quad \text{and} \quad t_{j\ 2} = m1_{\text{dep}(2(j+2))} \quad \text{when } j \text{ is even} \quad [51]$$

From [44-47] and [50-51] we can see the general term of the 8154 torus for any element $t_{j\ k}$ is

$$t_{j\ k} = m8_{\text{dep}(\text{dep}(2j+1)+3(k-1))} \quad \text{for } j \text{ odd and } k \text{ odd} \quad [52]$$

$$t_{j\ k} = m1_{\text{dep}(\text{dep}(2j+2)+3(k-2))} \quad \text{for } j \text{ odd and } k \text{ even} \quad [53]$$

$$t_{j\ k} = m1_{\text{dep}(\text{dep}(2j+1)+3(k-1))} \quad \text{for } j \text{ even and } k \text{ odd} \quad [54]$$

$$t_{j\ k} = m8_{\text{dep}(\text{dep}(2j+2)+3(k-2))} \quad \text{for } j \text{ even and for } k \text{ even} \quad [55]$$

At this point we see that any element $t_{j,k}$ is determined both by [30-34] and also by [52-55]. Next we will show that the same element is also determined by m_4 and m_5 in similar fashion.

It is not difficult to see that the diagonal to the upper left is m_5 , with

$$t_{1,1} = m_5$$

Let's look at the m_5 series lying in every other row element. For example,

$$t_{9,1} = m_5 \tag{58}$$

$$t_{9,3} = m_4$$

$$t_{9,5} = m_5$$

which then repeats as the row continues. Likewise on the next row,

$$t_{10,2} = m_5 \tag{59}$$

$$t_{10,4} = m_4$$

$$t_{10,6} = m_5$$

and on row 11:

$$t_{11,1} = m_5 \tag{60}$$

$$t_{11,3} = m_4$$

$$t_{11,5} = m_5$$

Once again we see the family number groups in the indices here.

If a row x starts with m_5 and is followed by m_4 , the general expression for the k^{th} element is

$$t_{x,k} = m_{5_{\text{dep}(h+3(k-1))}} \quad \text{for } k \text{ odd} \tag{58}$$

$$t_{x,k} = m_{4_{\text{dep}(i+3(k-2))}} \quad \text{for } k \text{ even} \tag{59}$$

Similarly, if a row x starts with m_4 followed by m_5 , then

$$t_{x,k} = m_{4_{\text{dep}(h+3(k-1))}} \quad \text{for } k \text{ odd} \tag{60}$$

$$t_{x,k} = m_{5_{\text{dep}(i+3(k-2))}} \quad \text{for } k \text{ even} \tag{61}$$

These are identical in form to equations [44-47].

Now let's continue as before, taking a look at how h and i are determined for a row starting with $m5_h$ followed by $m4_i$, or vice-versa.

$$t_{1\ 1} = m5_3 \qquad t_{1\ 2} = m4_6 \qquad [62]$$

We also observe the following pattern along the rows of the torus:

$$t_{2\ 1} = m4_8 \qquad t_{2\ 2} = m5_2 \qquad [63]$$

$$t_{3\ 1} = m5_4 \qquad t_{3\ 2} = m4_7$$

$$t_{4\ 1} = m4_9 \qquad t_{4\ 2} = m5_3$$

$$t_{5\ 1} = m5_5 \qquad t_{5\ 2} = m4_8$$

$$t_{6\ 1} = m4_1 \qquad t_{6\ 2} = m5_4$$

$$t_{7\ 1} = m5_6 \qquad t_{7\ 2} = m4_9$$

$$t_{8\ 1} = m4_2 \qquad t_{8\ 2} = m5_5$$

$$t_{9\ 1} = m5_7 \qquad t_{9\ 2} = m4_1$$

$$t_{10\ 1} = m4_3 \qquad \dots$$

$$t_{11\ 1} = m5_8$$

$$t_{12\ 1} = m4_4$$

$$t_{13\ 1} = m5_9$$

$$t_{14\ 1} = m4_5$$

$$t_{15\ 1} = m5_1$$

$$t_{16\ 1} = m4_6$$

$$t_{17\ 1} = m5_2$$

$$t_{18\ 1} = m4_7$$

In general we see that

$$t_{j\ 1} = m5_{\text{dep}(3+(j-1)/2)} \text{ and } t_{j\ 2} = m4_{\text{dep}(6+(j-1)/2)} \text{ when } j \text{ is odd} \qquad [64]$$

$$t_{j\ 1} = m4_{\text{dep}(8+(j-2)/2)} \text{ and } t_{j\ 2} = m5_{\text{dep}(2+(j-2)/2)} \text{ when } j \text{ is even} \qquad [65]$$

Equations [64-65] are in a form where it is pretty easy to see where they came from, by looking at the patterns in [63], but they are long-winded, and can be simplified to the equivalent

$$t_{j1} = m5_{\text{dep}((j+5)/2)} \text{ and } t_{j2} = m4_{\text{dep}((j+11)/2)} \text{ when } j \text{ is odd} \quad [66]$$

$$t_{j1} = m4_{\text{dep}((j+14)/2)} \text{ and } t_{j2} = m5_{\text{dep}((j+2)/2)} \text{ when } j \text{ is even} \quad [67]$$

From [58-61] and [64-65] we can see the general term of the 8154 torus for any element t_{jk} is

$$t_{jk} = m5_{\text{dep}(\text{dep}((j+5)/2)+3(k-1))} \quad \text{for } j \text{ odd and } k \text{ odd} \quad [68]$$

$$t_{jk} = m4_{\text{dep}(\text{dep}((j+11)/2)+3(k-2))} \quad \text{for } j \text{ odd and } k \text{ even} \quad [69]$$

$$t_{jk} = m4_{\text{dep}(\text{dep}((j+14)/2)+3(k-1))} \quad \text{for } j \text{ even and } k \text{ odd} \quad [70]$$

$$t_{jk} = m5_{\text{dep}(\text{dep}((j+2)/2)+3(k-2))} \quad \text{for } j \text{ even and } k \text{ even} \quad [71]$$

We see now that [52-55] and [68-71] describe the same elements of the torus, the first set of equations using $m8$ and $m1$, the second set using $m5$ and $m4$. This is in addition to the same elements being described by the doubling, reverse doubling, and equivalence series as shown in [30-37]. Each element is therefore triply determined.

Enumeration of the Rodin Tori

We have discussed the 8154 Rodin Torus. Is it the only torus surface which can be created so that each point is multiply determined? Simply put the answer is, "No."

Consider the torus constructed as follows:

$$e_2 \quad [72]$$

$$d_6$$

$$b_1$$

The first few elements of this torus look like:

e_2	6	9
d_6	1	2
b_1	1	5
e_1	6	6

In this picture we show the first two elements of e_2 , d_6 , and b_1 , followed by e_1 which forms the next row. (Our primitive tools do not permit us to use subscripting for indexes in the pictures: sorry. Please use your imagination.) Refer to Appendix A for the d, b, and e series. This is the 1845 torus, since m_1 passes diagonally to the upper right through the e_2 's 6, and m_4 passes diagonally to the upper left:

e_2	6	9
d_6	1	2
	1	5
b_1		
e_1	6	6

Note that it is redundant to call this 1845, since if m_1 is passing diagonally up and right through $t_{1,1}$ then m_8 must be parallel through $t_{2,2}$. Similarly if m_4 is passing diagonally up and left through $t_{1,1}$, then m_5 must be passing parallel through $t_{2,1}$. Since m_8 is implied by the existence of m_1 , and m_5 is implied by the existence of m_4 , we can call this the 14 torus and say just as much as if we called it the 1845 torus.

The observant reader will have noticed that the above torus is in fact only rows 16 through 19 of the 8154 discussed in the previous section torus (aka 85 torus by in our new, abbreviated nomenclature.) The only difference is in the choice of origin. In fact we do not really think of these as being separate tori at all, since they differ only in point of origin, and after all we did choose to start with e_1 arbitrarily. So the 14 torus is equivalent—if not identical—to the 85 torus.

Thus far we really have only one torus. Are there others that are truly different? The simple answer is “Yes.”

Let's start by referring to Appendix A, which shows the doubling, backwards, and equivalence series for reference. If a torus were to have any two rows one after the other with both starting with d_1 , it would look like

2	4
2	4

By referring to Appendix B, you can easily verify that there is no m-series with the sequence ...4,2,... Therefore this does not define a Rodin torus .

The same can be said for the rows starting with d_1 followed by d_2 , and so on. This leads to the conclusion that the d row must not be followed by a d row for a Rodin torus to emerge.

A similar set of observations leads to the conclusion that a b row must not be followed by another b row.

Even if a d row is followed by a b row, a Rodin torus is not always created. For example if a d_1 row is followed by a b_1 row, the result is not a Rodin torus:

2	4
1	5

There is no m-series with 1 followed by 4, or with 5 followed by 2 (see Appendix B again).

In Appendix C we have listed exhaustively the rows starting with d_j , $0 < j < 7$, and then following with each possible row b_k with $0 < k < 7$. These entries look like:

			2			
		<i>e6</i>	9	6		
	1		4	8		
			1	5		
		<i>e5</i>	3	9	28	

The red (if you have a color copy) outer numbers in bold indicate the indices for d (on the top) and b (to the left.) In this case we have d_2 and b_1 . The intersection of the column for the d index and the row for the b index is the origin of the matrix in each case. (We abandon at this point the notion that the origin must be e_1 . Since it is arbitrary we can set it where we like.) This d_1 element is below the e_6 line in this example, and contains a 4 as d_2 . The next cell to the right is $d_3 = 8$. Below are the first two elements of b_1 : 1, 5 (see Appendix A.)

These 4 cells define the torus: reading from b_1 up and to the right we see the m-series 1,8, which is m_7 . Since this diagonal is one diagonal below the origin, we know the diagonal up and right through the origin must be m_2 . Up and left through the origin is the series 5,4, which is m_8 . This is therefore the 28 Rodin torus.

Knowing this is the 28 torus permits us to deduce the e rows above and below the d-b row pair. For example we know the up-right diagonal through the 5 cell must be an m_2 , and 5 is preceded by 3 in m_2 , so below the 1 we can write a 5. Similarly we can fill in the other e series slots, and deduce that e_5 is following b_1 , while e_6 is preceding d_2 . The e-series are a result of this being a 28 torus; it is not hard to see that nothing else will work.

Appendix C therefore contains an exhaustive list of Rodin tori which can be constructed from rows in which a d row is followed by a b row.

Similarly Appendix D contains an exhaustive list of Rodin tori which can be constructed from rows in which a b row is followed by a d row.

Now the m-series that map onto the Rodin torus are the m_1 & m_8 , m_4 & m_5 , and m_2 & m_7 pairs. It is not hard to show that the two m-series passing through the origin in a Rodin torus cannot be pairs. In other words an 88 or an 81 torus is not possible.

You have only to try it to see it: here is an 88 torus:

7		7
	8	
6		6

If the 8 is in the origin, you see that we would have to have a d or b row with 7, x, 7, where x is any d or b series number. But no such sequence exists. (Similarly 6, x, 6 is not an e series.) So an 88 torus cannot be built. Similar trials show that a torus must have components from two separate number pairs.

Therefore, although there are 6 m-series, there are not 36 possible Rodin tori. Here is a table, with blank entries for those we know cannot be built.

	<i>1</i>	<i>2</i>	<i>4</i>	<i>5</i>	<i>7</i>	<i>8</i>
<i>1</i>		12	14	15	17	
<i>2</i>	21		24	25		28
<i>4</i>	41	42			47	48
<i>5</i>	51	52			57	58
<i>7</i>	71		74	75		78
<i>8</i>		82	84	85	87	

So there are 24 possible Rodin tori, at least from this point of view. But we have shown that restrictions on the placement of rows, such as adjacent d and b rows, prevents the formation of all possibilities. In fact only 6 Rodin tori can actually be constructed, as shown in Appendices C and D.

It may appear to you that there are actually 12 tori in the Appendices. Remember that because of pairing of series, some tori which look different at the origin are actually identical: 85 torus = 14 torus, for example. Here is the above table, with the possible tori only in large font, and the impossible ones smaller:

	<i>1</i>	<i>2</i>	<i>4</i>	<i>5</i>	<i>7</i>	<i>8</i>
<i>1</i>		12	14	15	17	
<i>2</i>	21		24	25		28
<i>4</i>	41	42			47	48
<i>5</i>	51	52			57	58
<i>7</i>	71		74	75		78
<i>8</i>		82	84	85	87	

Here are the possible equivalent Rodin tori:

14	85
17	82
25	74
28	71
41	58
47	52

We will use either of these pair members to denote them both interchangeably.

The 3D Rodin Torus

Now that we know how many different 2D tori can be constructed, it is tempting to try to construct a 3D torus.

Consider the 85 torus we discussed first. We can represent this as a vector of series going down the page. Above we showed this as extending off to the right:

$$\begin{array}{cccc}
 e_1 & e_2 & e_3 & \dots \\
 d_5 & d_6 & d_1 & \dots \\
 b_6 \dots & & & \\
 e_6 \dots & & & \\
 d_4 \dots & & & \\
 b_5 \dots & & & \\
 e_5 \dots & & & \\
 \dots & & &
 \end{array} \quad [73]$$

Suppose instead we look at this series from the left edge:

$$\begin{array}{cccc}
 e_1 & e_2 & e_3 & \dots \\
 d_5 & d_6 & d_1 & \dots \\
 b_6 \dots & & & \\
 e_6 \dots & & & \\
 d_4 \dots & & & \\
 b_5 \dots & & & \\
 e_5 \dots & & & \\
 \dots & & &
 \end{array} \quad [74]$$

We see the starting element of each row, but the other elements extend down into the paper and are hidden from view. This is no disadvantage, however, since we know from the starting element all the elements that must follow in the series:

$$\begin{array}{l}
 e_1 \\
 d_5 \\
 b_6 \\
 e_6 \\
 d_4 \\
 b_5 \\
 \dots
 \end{array}
 \qquad [75]$$

Now lets try to build the same series off to the right, remembering that we see only the first element of each row: each row will extend down into the paper:

$$\begin{array}{l}
 e_1 \quad d_5 \quad b_6 \quad e_6 \quad d_4 \quad b_5 \quad e_5 \quad \dots \\
 d_5 \\
 b_6 \\
 e_6 \\
 d_4 \\
 b_5
 \end{array}
 \qquad [76]$$

We now have two intersecting tori; they intersect at the e_1 series in the corner. To really have a 3D torus, we need to fill in the blanks.

According to Appendix C, d_5 can be followed by either of e_1 , e_3 , or e_5 . Let's plunge in and choose e_1 arbitrarily. (We will see in a moment that this choice is not crucial.)

$$\begin{array}{l}
 e_1 \quad d_5 \quad b_6 \quad e_6 \quad d_4 \quad b_5 \quad e_5 \quad \dots \quad \mathbf{14} \\
 d_5 \quad \mathbf{e_1} \quad ? \\
 b_6 \\
 e_6 \\
 d_4 \\
 b_5 \\
 \dots \\
 \mathbf{14}
 \end{array}
 \qquad [77]$$

The number in bold is the torus number, found using the first complete d-b or b-d pair in the row or column, then looking it up in Appendix C or D, respectively.

Now notice the $?$: b_6 must be followed by a d in its column. But notice also that the e_1 we just added must be followed by a b in its row, since it is preceded by a d. So in the spot marked with a $?$, there is no row that can work.

Hence we cannot build a 3D torus if both original intersecting tori are in the d, b, e sequence.

We speculate that the same will hold true if both are in the b, d, e sequence.

Let's therefore try to build one by adding a b, d, e sequence to the right instead. We'll choose the sequence to the right as a 25 (aka 74) torus.

It is useful to notice from Appendices C and D that d, b, e sequence indices always decrease while the b, d, e indices always increase. In a d, b, e sequence, if we have d_i, b_j, e_k , then next we'll see $d_{i-1}, b_{j-1}, e_{k-1}$ (unless i, j , or $k=1$, in which case we'll see a 6 next. Similarly if we have b_i, d_j, e_k we'll see next b_{i+1}, d_{j+1} , and e_{k+1} , (unless i, j , or $k=6$, in which case we'll see a 1 next.) These observations help us construct the tori as we proceed.

Choose again e_1 for the first blank position:

e_1	b_5	d_2	e_2	b_6	d_3	\dots	25	[78]
d_5	e_1	$?$						
b_6								
e_6								
d_4								
b_5								
\dots								
14								

From Appendix C possible followers of d_2 for the ? spot are b_1 , b_3 , or b_5 . From Appendix D each of these may have a predecessor of e_1 on the second row. Choose b_1 ; this determines the rest of the row to the right:

e_1	b_5	d_2	e_2	b_6	d_3	...	25	[79]
d_5	e_1	b_1	d_6	e_2	b_2	...	58	
b_6	?							
e_6								
d_4								
b_5								
...								
14								

There are no more choices: the tori are now completely determined.

For example the spot where the ? rests now is also determined. b_5 followed by e_1 must be (from Appendix C) a 52 (aka 47) torus. The question mark must therefore be d_1 followed downwards by b_4 ; the remainder of this column is now determined:

e_1	b_5	d_2	e_2	b_6	d_3	...	25	[80]
d_5	e_1	b_1	d_6	e_2	b_2	...	58	
b_6	d_1							
e_6	b_4							
d_4	e_6							
b_5	d_6							
...	...							
14	47							

On the third row b_6, d_1 defines a 17 torus, so we get:

e_1	b_5	d_2	e_2	b_6	d_3	\dots	25	[81]
d_5	e_1	b_1	d_4	e_6	b_6	\dots	58	
b_6	d_1	e_5	b_1	d_2	e_6	\dots	17	
e_6	b_4							
d_4	e_6							
b_5	d_6							
\dots	\dots							
14	47							

Filling out the remainder of the grid we get:

e_1	b_5	d_2	e_2	b_6	d_3	\dots	25	[82]
d_5	e_1	b_1	d_6	e_2	b_2	\dots	58	
b_6	d_1	e_5	b_1	d_2	e_6	\dots	17	
e_6	b_4	d_1	e_1	b_5	d_2	\dots	74	
d_4	e_6	b_6	d_5	e_1	b_1	\dots	41	
b_5	d_6	e_4	b_6	d_1	e_5	\dots	82	
\dots	\dots	\dots	\dots	\dots	\dots	\dots	\dots	
14	47	28	85	52	71			

Each of the bold numbers is labeling an infinite plane extending down from the surface of the paper, each holding the surface of a Rodin torus. This means that each point is determined by 4 multiplicative series as well as 2 of the d, b, or e series of which it is an element. *Thus each element is locked into place by being a member of no less than 6 series at once.* This is no small amount of regularity!

Notice also that we have used all twelve of the permissible Rodin tori so far. Let's go one more in each direction and see what happens:

e ₁	b ₅	d ₂	e ₂	b ₆	d ₃	e ₃	...	25	[83]
d ₅	e ₁	b ₁	d ₆	e ₂	b ₂	d ₁	...	58	
b ₆	d ₁	e ₅	b ₁	d ₂	e ₆	b ₂	...	17	
e ₆	b ₄	d ₁	e ₁	b ₅	d ₂	e ₂	...	74	
d ₄	e ₆	b ₆	d ₅	e ₁	b ₁	d ₆	...	41	
b ₅	d ₆	e ₄	b ₆	d ₁	e ₅	b ₁	...	82	
e ₅	b ₃	d ₆	e ₆	b ₄	d ₁	e ₁	...	<u>25</u>	
...		
14	47	28	85	52	71	<u>14</u>			

At this point we can't be too surprised that the series of tori looks like it is going to repeat.

It is worth pointing out that the columns are filled with d, b, e series, while the rows are filled with b, d, e series.

Having constructed a 3D Rodin torus, it is worth asking whether there is more than one. This should be our next issue.

Let's upgrade our torus notation to 3 dimensions. t_{ijk} is now the torus element, with i denoting the index of the row down the page, j denoting the index of the column across the page, and k denoting the index of the element extending perpendicular to the surface of the page.

Recall in [78] that after choosing $t_{121} = e_1$, we had three choices for the ? (t_{221}): b_1 , b_3 , and b_5 . We chose b_1 and found this determined the torus of [82] (no pun here with the 82 torus.)

Let's try b_3 instead of b_1 :

e ₁	b ₅	d ₂	e ₂	b ₆	d ₃	...	25	[84]
d ₅	e ₁	b₃	d ₆	...			X	
b ₆								
e ₆								
d ₄								
b ₅								
...								
14								

If $t_{231} = b_3$, then t_{241} must be d_6 , because $t_{211} = d_5$, and since this is a b-d-e sequence, the next d index must be $5+1 = 6$. But Appendix D says that in the 25 torus determined by b_3, d_6 , the preceding row must be e_5 , not e_1 as in [78]. Therefore b_3 cannot be a candidate for t_{231} .

Similarly the predecessor of b_5, d_6 must be e_3 , so $b_5 \square t_{231}$. $t_{231} = b_1$ is the only candidate that produces a 3D Rodin Torus.

What about using a different choice for t_{221} . Previously we tried e_1 , and that worked. But recall that e_3 and e_5 were legal candidates. We can see that these should work, just by the logic of the preceding two paragraphs. Let's try $t_{221} = e_3$:

e_1	b_5	d_2	e_2	b_6	d_3	...	25	[85]
d_5	e_3	b_5	d_6	e_4	b_6	...	82	
b_6	d_5	e_1	b_1	d_6	e_2	...	41	
e_6	b_4	d_1	e_1	b_5	e_2	...	74	
d_4	e_2	b_4	d_5	e_3	b_5	...	17	
b_5	d_4	e_6	b_6	d_5	e_1	...	58	
...		
14	71	52	85	28	47			

This is our second 3D Rodin torus. Notice that the m-series making up this 3D torus are the same set of 12 m-series making up [82], but in the reverse order.

We must of course try e_5 next:

e_1	b_5	d_2	e_2	b_6	d_3	...	25	[86]
d_5	e_5	b_3	d_6	e_6	b_4	...	25	
b_6	d_3	e_3	b_1	d_4	e_4	...	74	
e_6	b_4	d_1	e_1	b_5	d_2	...	74	
d_4	e_4	b_2	d_5	e_5	b_3	...	74	
b_5	d_2	e_2	b_6	d_3	e_3	...	25	
...		
14	14	85	85	85	14			

Here only 4 of the 12 possible m-series are used to build the torus, and since they are pairs, there are really only 2 in use: 25 and 14.

What's Next

From this point there are several research directions of interest. One is to understand in a precise way how the number series lay on the surface of the torus. Another is to catalog the complete set of 3D tori, much as was done for the 2D tori in Appendices C and D. It is also interesting to conjecture that a 4D or higher dimensional torus might exist.

In the long run there are a number of fields of mathematics which are—with this work—now potentially applicable to the Rodin torus. These include matrix algebra, vector calculus, topology, and time series analysis. These in turn render much of physics accessible, including in particular classical electrodynamics.

Appendix A: d, b, and e Series

	1	2	3	4	5	6
d	2	4	8	7	5	1
	1	2	3	4	5	6
b	1	5	7	8	4	2
	1	2	3	4	5	6
e	6	6	9	3	3	9

Appendix B: M-Series

	1	2	3	4	5	6	7	8	9
m1	1	2	3	4	5	6	7	8	9
	1	2	3	4	5	6	7	8	9
m8	8	7	6	5	4	3	2	1	9
	1	2	3	4	5	6	7	8	9
m4	4	8	3	7	2	6	1	5	9

Appendix D: All Possible b-d Rodin Tori

		b															
		:															
		1	2		3		4		5		6						
d :	1	X	<i>e2</i> 6 9 1 5 2 4	<i>e3</i> 9 3 41 5 7 2 4	X	<i>e1</i> 6 6 74 7 8 2 4	<i>e6</i> 9 6 8 4 2 4	X	<i>e5</i> 3 9 17 4 2 2 4	<i>e4</i> 3 3 2 1 2 4							
	2	X	<i>e5</i> 3 9 1 5 4 8	X	<i>e3</i> 9 3 58 7 8 4 8	X	<i>e1</i> 6 6 25 8 4 4 8	<i>e2</i> 6 9	<i>e4</i> 3 3 2 1 4 8	X							
	3	X	<i>e6</i> 9 6 1 5 8 7	<i>e1</i> 6 6 17 5 7 8 7	X	<i>e4</i> 3 3 41 7 8 8 7	X	<i>e5</i> 3 9	<i>e2</i> 6 9 74 4 2 8 7	X	<i>e3</i> 9 3 74 2 1 8 7						
	4	X	<i>e3</i> 9 3 25 1 5 7 5	X	<i>e1</i> 6 6 82 7 8 7 5	X	<i>e5</i> 3 9 58 8 4 7 5	<i>e6</i> 9 6	<i>e4</i> 3 3 2 1 7 5	X	<i>e2</i> 6 9 6 9 7 5						
	5	X	<i>e4</i> 3 3 1 5 5 1	<i>e5</i> 3 9 74 5 7 5 1	X	<i>e3</i> 9 3 17 7 8 5 1	<i>e2</i> 6 9	<i>e5</i> 3 9 4 2 5 1	X	<i>e6</i> 9 6 41 2 1 5 1	<i>e1</i> 6 6						
	6	X	<i>e1</i> 6 6 58 1 5 1 2	X	<i>e5</i> 3 9 25 7 8 1 2	<i>e6</i> 9 6	<i>e3</i> 9 3 8 4 1 2	X	<i>e4</i> 3 3 82 4 2 1 2	<i>e2</i> 6 9	<i>e1</i> 6 6 2 1 1 2						

2. PROFESSOR SCOTT C. NELSON

November 11, 2001

To whom it may concern:

Regarding the torus model of Mr. Marko Rodin, I hereby confirm the scientific validity of some elements of Mr. Rodin's theory. Through my work over the past 5 years with the mathematics of music and botany, I was able to arrive at an independent and scientifically valid confirmation of the mathematical principles that form the basis of the Rodin Torus model.

I achieved these results through mathematical transformations of musical overtone series and digital maps of plant growth patterns known as "phyllotaxis". My conclusion is that the Rodin Torus is a precise description of the spatial and temporal harmonics inherent in the formation of plant life forms. These patterns appear to be governed by the spiral series of musical overtones that interact in a system of digital circuitry that can be best described as a toroidal lattice.

In my opinion, the Rodin Coil may have more than just unusual or interesting electromagnetic properties. Mr. Rodin's model is a new way to look at the relationship between music, mathematics, and the structure of plants and animals. I believe that a study of the relationship between energy and matter could start by applying the principles of the Rodin Torus model and Rodin's "polarized fractal geometry".

Sincerely,

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3. THOMAS E. BEARDEN

Introduction to Rodin Coil Design

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Bearden, Associate Editor Alternative
Energy Research

There exists a valid Electromagnetic mechanism that will produce the *effects* reported in the article to follow and other similar effects as well. It is not magic, but electromagnetics of a special kind.

Simply, the magnetic vector potential A is "defined" by the equation $\mathbf{B} = \nabla \times \mathbf{A}$. If you "choke off" or "kill" the $\nabla \times$ operator (which is called the "curl" operator), then this leaves the curl-free A-potential to move out on its own, without being tied to a magnetic force field (i.e., to a B-field) as it almost always otherwise is. In other words, one has torn the potential away from its associated force field, and the potential propagates independently in space. However, anything you place in the path of that curl-free A-potential to interact with it, that will once again permit the $\nabla \times$ operator to occur, will provide you a normal magnetic force field (B-field) again. Since the $\nabla \times$ usually occurs in, say, something like a coil or wrapping of a conductor, then you get the E-field induced also, by the time rate of change of the A-potential, so that you wind up with a normal EM field containing both E and B fields. The E-field occurs by the interaction of $\mathbf{E} = -\dot{\mathbf{A}}$. One of the great promises of curl-free A-field utilization is that it propagates into and through media in which normal EM transmission is difficult or impossible, as pointed out in the Gelinas patents.

Obviously if you hold all the B-field inside the coils of the torus, and then put something else in the center region outside the coils, you can get some *additional* potential and field energy there in the center works. You can also get similar propagation outside the coil, with effects on distant objects.

Rodin is apparently going by elementary electricity concepts but augmented by excellent native intuition. What he really is doing is attempting to separate the A-potential (i.e., the magnetic vector potential A) from the B field, and utilize the curl-free A-potential as an independent field of nature in the central "crossover" region. It is known in physics that this is possible; the well known Aharonov-Bohm effect depends upon precisely this separation. It appears that neither Ramsay nor Rodin are aware that a tightly-wound torus performs this "curl-free" separation of the A-potential, by trapping the B-field inside the coiled wiring, so that in a very good torus coil most of the B-field can be contained within the *coil*, and the curl-free A-potential will still radiate from the coil (both to its inside or center space and outside and beyond into space.).

A great deal of work on this use of the "curl-free A-field" was done by Gelinas, who patented several patents in this area which were assigned to Honeywell, Inc., the firm for which he worked at the time. Professor William Tiller of Stanford University is also a noted and highly competent advocate of the curl-free A-field. In the late 70s and early 80s, Bill Tiller, Frank Golden and I worked

on curl-free A-potential antennas, and Golden built dozens of curl-free A-field coil antenna variants. One of the most interesting variants he built was quite similar to Ramsay's buildup of the Rodin coil. Simply, he built a coil embodiment of the diagrammatic geometry for a "twistor" that was shown by Roger Penrose. That coil antenna exhibited about what Ramsay and Rodin are reporting, and dramatically extended the communication range of a small CB radio from, say, its nominal 114 mile to about 20 miles or more. The A-potential from a dipole antenna falls off about inversely as the *square* of the distance, while the normal B-field falls off about inversely as the *cube* of the distance. There is one other fact that *deepens* the curl-free A-potential phenomenon: *Any vector* field can be replaced by (mathematically decomposed into) two scalar fields; for the proof, see Whittaker 1904. With some difficulty one can even "assemble" a curl-free A-potential from two multifrequency transmitter arrays that transmit two harmonic series of wavepairs, where each wavepair consists of a normal EM wave and its true phase conjugate (for the proof, see Whittaker 1903). Each of the arrays transmits one of the scalar fields (scalar waves) that together comprise the curl-free A-potential. So the curl-free A-potential is actually a part of the Stoney/Whittaker scalar electromagnetics I have so long advocated. At any rate, Rodin and Ramsay should certainly continue their research and experimentation.

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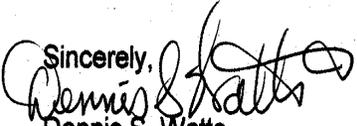
RE: Electrical Engineering. Systems Integration, Program Management

My resume is enclosed for consideration. The following professional accomplishments, which are representative of my background and experience.

1. Proficient at defining program goals and requirements; assessing operations; formulating, planning and implementing improvements; instituting effective policies/ procedures; and minimizing costs.
2. Systems and "big-picture" oriented. Able to anticipate, prevent, troubleshoot and resolve difficult technical or administrative issues which potentially impact costs and schedules.
3. Adept at applying progressive, hands-on leadership to optimize efficiency and cost effectiveness, while ensuring adherence to schedule, budget and quality standards.
4. Proven record of achievement during all phases of high value programs. Excel as an independent problem-solver/facilitator. Solid public speaking skills.
5. Assertive and decisive, yet tactful and diplomatic. Ability to establish excellent rapport and open communications channels between various disciplines.

I am confident that a personal interview would convey my strong work ethic, positive attitude, and qualifications that would meet your organizations business objectives. Thank you for your consideration and I look forward to your positive response.

Sincerely,


Dennis S. Watts

Enclosure:

DENNIS S. WATTS RESUME'

page 4

MAGNAVOX RESEARCH LABORATORY

Torrance, California

09-78 to 07-79

Senior Digital Electronic Engineer

Using an 8080 based microprocessor emulator, I was responsible for testing and debugging computer base navigation equipment that had failed in the field. This equipment was use by commercial shipping fleets.

Using a manual card test unit, oscilloscope, voltmeter and digital analyzer I had the responsibility to debug and test the optimized circuitry, for a Secret Satellite Communications system. Also responsible for redesigning existing circuitry for optimization of system performance.

ROCKWELL INTERNATIONAL

Autonetics Marine Systems Division,
Anaheim California

05-76 to 09-78

Signal Processor Engineer

Using specially designed test equipment, oscilloscopes and digital analyzer, I researched designed, developed, tested and debugged a 10 MHz 32 bit Arithmetic Logic Unit (ALU) for a Digital Filter System, used in hydrophonic ocean surveillance.

Using a PDP-11 computer, digital analyzer and oscilloscope, designed, tested and debugged a 2's complementary 32 bit multiplier unit for the Digital Filter System.

Using a broad band oscilloscope and RF techniques, designed, developed, tested and debugged both the electronic and mechanical packaging of the system for a 120 bit Universal Symbol Baud Generator operating at 100 MHz.

E D U C A T I O N

1. BS Degree, Electrical Engineering May 1976 Howard University Washington D.C.
2. A.A.S. Degree, Electronic Technology, May 1971, Washington Technical Institute, now call University District of Colombia, Washington D.C.
3. Computer Literate, Windows 95 Microsoft office suite of programs and Apple Macintosh operating systems.

References:

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DEUTSCHE GESELLSCHAFT FÜR ONKOLOGIE e.V.

German Society of Oncology

Dear Mr. Rodin,

I consider your paper of extreme importance.
To me your conclusions are very likely.

I recommend your paper for publication in the
GERMAN JOURNAL OF ONCOLOGY.

Please keep me informed of your further work.

Sincerely,

Sincerely,

(Dr H A Neiper)

Dr. Hans A Neiper

"It is clear that we have hardly scratched the surface, as far as formal systems go; it is natural to wonder about what portion of reality can be imitated in its behavior by a set of meaningless symbols governed by formal rules. Can all of reality be turned into a formal system? In a very broad sense, the answer might appear to be yes. One could suggest, for instance, that reality is itself nothing but one very complicated formal system. Its symbols do not move around on paper, but rather in a 3-dimensional vacuum (space); they are the elementary particles of which everything is composed. (Tacit assumption: that there is an end to the descending chain of matter, so that the expression 'elementary particles' makes sense.) The 'typographical rules' are the laws of physics, which tell how, given the positions and velocities of all particles at a given instant, to modify them, resulting in a new set of positions and velocities belonging to the 'next' instant. So the theorems of this grand formal system are the possible configurations of particles at different times in the history of the universe. The sole axiom is (or perhaps, was) the original configuration of all the particles at the 'beginning of time'. This is so grandiose a conception, however, that it has only the most theoretical interest; and besides, quantum mechanics (and other parts of physics) casts at least some doubt on even the theoretical worth of this idea. Basically, we are asking if the universe operates deterministically, which is an open question.

Douglas R. Hofstadter, from a discussion of meaning and form in mathematics in "Godel, Escher and Bach: An Eternal Golden Braid"