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Is Time the Missing Link?

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is time the missing link?



PART 1—DISPLACEMENT ENERGY

by Helmut Hoepfner and
B. Spencer Isbell

Helmut Hoepfner (left) was born in Ueskaub, Turkey, in 1911 and attended the Technical Academy, Chemnitz, Germany, and the Technical University, Dresden. After graduation, he worked for the Klemm Aircraft Company in Stuttgart, Germany. He served a short tour in the German Luftwaffe and then became an associate of Dr. Werner von Braun at Peenemunde, where he worked on the development of the V-2 and other rockets. He became an engineer for the Messerschmitt Aircraft Company, Augsburg, and helped to develop the ME-163 and ME-262 jet aircraft. From 1951 to 1954, he was employed by the International Business Machine Corporation in Stuttgart. In 1954, at the suggestion of Dr. Walter Dornberger, he came to America as an aeronautical engineer for the Bell Aircraft Corporation, Buffalo, New York. In 1956, he joined his former co-workers at Peenemunde at Redstone Arsenal in Huntsville, Alabama. He is presently a Senior Scientist for Astronautics with the Chrysler Corporation in Detroit, Michigan. A member of the German Rocket Society, the British Interplanetary Society, and the American Rocket Society, he has published many articles and reports in the field of astronautics. **B. Spencer Isbell** (right) is a native of Birmingham, Alabama, and attended the University of Alabama, where he majored in both mechanical and aeronautical engineering. Since 1951 he has been employed as an Aeronautical Engineer at Redstone Arsenal, Huntsville, Alabama. He presently serves on the technical staff Office of Director, Development Operations Division, Army Ballistic Missile Agency. He is a member of the American Rocket Society, the British Interplanetary Society, the American Association for the Advancement of Science, and the American Astronautical Society. He is on the editorial staff of *Astronautical Sciences Review* and is editor of *SPACE Journal*.

Why shouldn't we admit it? Whenever we attempt to unify our present knowledge in the Natural Sciences to provide an acceptable overall picture (Unified Field Theory), we face a great dilemma. Why? Is it because there are still unknown qualitative phenomena or natural laws to be discovered before the missing link can be formulated? Must we conduct more quantitative research, compile more statistics, and look for more nuclear particles? Or should we re-examine the adequacy of our scientific methods and tools?

The answer, which is neither new nor obviously indicative of any new way to go, was given by Albert Einstein when he said:

"The answers to most, if not to all, of the unknowns in science can be found by the formulation and derivation of the knowns into their correct relationships."

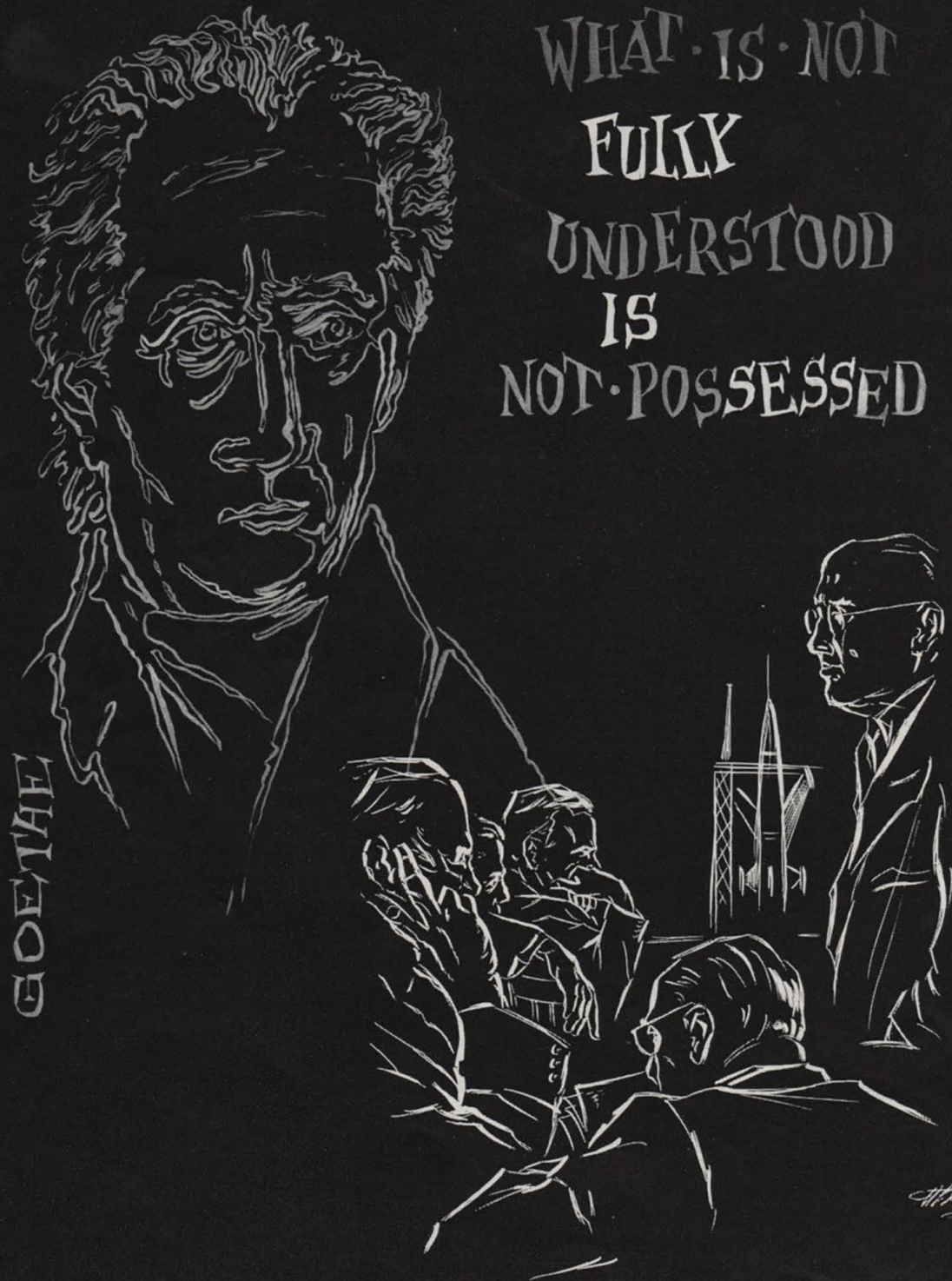
This sounds rather disappointing instead of encouraging, when we consider our intense, enthusiastic, and persistent efforts in research; our studies, developments, and technical achievements.

"I studied Philosophy and Law and Medicine, too, and also Theology, but here I am standing now, a poor fool, not wiser than before."

—Faust (Goethe)

We are turning out more and more and bigger and bigger progress reports, articles, books, and more speeches at more meetings, conferences, symposiums, etc. And the results of our "progress"? Nothing fundamentally new, just more quantity, more paper to file, more words. Quantity is already replacing quality in science, in philosophy, in society, and even in our way of life.

What is wrong? Is Einstein's statement, about deriving the unknowns from the knowns, wrong? Should we look for more new phenomena? If new postulates and laws could



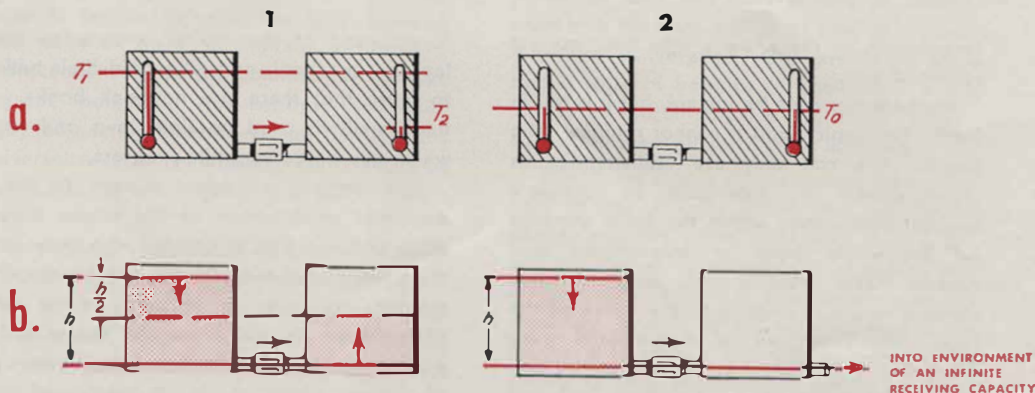


FIGURE 1

DEMONSTRATION OF ENTROPY ("AVAILABILITY" OF ENERGY)

not be derived from the known ones, we would have to wait until by accident we could stumble upon a new discovery—just by continuing or increasing our statistical efforts. Then we really would be caught in a dilemma. The probability that our already intense efforts in quantitative research will accidentally discover a new phenomenon which will provide the missing link in our over-all physics picture is far from encouraging. For example, we already have quite a number (32) of elementary nuclear particles which show, or do not show, individual characteristics; but which, nevertheless, cannot be combined into one acceptable picture. The discovery of additional new particles would only complicate and add to the present state of confusion in nuclear physics.

Very often, in scientific research, the quantity and even quality of a missing link can be logically predetermined. This has been attempted in nuclear physics. When the old Law of Conservation of Energy is applied, a "particle" which has a variable quantity of energy and no mass or charge is required to satisfy the lack of energy balance (impulse input and output) in nuclear physics. This "particle" is sometimes called "neutrino". Other scientists call it a "ghost particle" because it does not really "exist", but "it shows its existence twice; namely, when it appears and when it disappears" according to a recent remark by Professor J. Robert Oppenheimer. This almost desperate search for a "ghost

particle neutrino" is about to create a new type of philosophy, where anything (which in physics seems to be unexplainable) is possible and can be "explained".

Currently the newest arm of the Metaphysical Octopus is the so-called "Time Dilatation" Theory. This "fountain of youth" ideology advertises round trip Space tickets: Put \$1.00 in your savings account, take off, enjoy your trip around Mars, Venus, or Centauri, and return after a year or so to Huntsville, Alabama, or any other place on Earth and you will own the whole globe. Just go fast enough and your own individual time, compared with the time on Earth, runs a hundred—or a thousand—or a million times slower. And you won't even notice this because every occurrence around you and traveling with you (including your watch), slows down in the same scale. Upon return from your "one year" in Space the accumulated interest on your \$1.00 bank investment will have consumed all the money on Earth. Just go fast enough!

But before you contact your travel agent about a "Round Trip Space Ticket", let us analyze the third question at the beginning of this article; namely: "Should we re-examine the adequacy of our scientific methods and tools?" With all due respect to mathematics and to the great mathematicians whom we sincerely admire, we must place mathematics in a secondary position to pure logic as a necessary tool or method for "deriving and

formulating of the knowns into their correct relationships".

Mathematics must be logical, but it is not in itself "The Logic" and it cannot replace "The Logic". We can only use mathematics as stenographers use shorthand, to formulate logical relationships within the limits dictated by the initial input of assumptions and reason. The validity of mathematically derived results is relative to the value of the input. The limitations of mathematics were once clearly illustrated to the authors by one of the pioneers of astronautics, Professor Hermann Oberth, when he remarked: "Mathematics also proves that when three persons are in one room and four persons leave that room, then a negative (or minus one) person is still in the room".

Sir Arthur Eddington indicated the need to re-evaluate our scientific methods in his "The Philosophy of Physical Science" (1939) with the following remarks: "If sometime someone would claim that he produces neutrinos, I just would have to accept this. But I always would doubt that he plays a fair game. He would not be punished for producing neutrinos, namely: For having violated the fundamental rules. He simply invented a new game by *changing* the rules, which, when accepted, helped to overcome a dilemma".

The answer to the question about the adequacy of our scientific methods and tools is: No, they are not adequate! We must re-evaluate our fundamental assumptions.

The scientific dilemma is further complicated by an unhealthy condition which is entirely unscientific, even anti-scientific, and therefore, difficult to solve. This condition stems from a division of the scientists of today into at least two categories according to the methods and tools they prefer to use for solving scientific problems.

The majority of scientists (and not only scientists) paid their tuition for what they carried home from their schools in "black on white". They bought all their scientific equipment, all their methods and tools from their universities. And since they spent money for it, they keep it neat and clean and dogmatically protect it against change.

In the other category, and unfortunately it seems to be a small minority, are those who

forgot most of the "pure" knowledge they learned in school, and who paid their tuition to learn that there are no cook books, no fixed methods, and no rigid laws and tools which guarantee scientific progress.

The majority considers science to be a dogmatic combination of the whole knowledge and scientists as persons who know very much (sometimes everything!). For the minority, science, according to Socrates, is the total of what we do not know. All the scientific equipment the minority has from its schools of higher education, is its awakened and educated intelligence, and scientific enthusiasm. However, in spite of, or perhaps because of, its expulsion from the majority, the scientific discipline of a few honest non-conformists who apply reason and logic before mathematics has always "moved the Earth."

In order to demonstrate the value of taking an open-minded "second look" at our rigid scientific laws, methods and tools, and to illustrate why it is not necessary that science must resort to abstract philosophy for the answers; let us momentarily go back 100 years to one of the greatest discoveries in the history of science. At that time Helmholtz formulated the Law of Conservation of Energy, which, as any "law" in physics, is an empirical law. Only a little later, Clausius introduced the concept of "Entropy" and Maxwell formulated "Displacement Current" as two kinds of restrictions to the energy law.

The Law of Conservation of Energy says, simply, that energy cannot be created or destroyed. In other words, the sum total of energy in any transformation or transfer remains constant. You can throw a ball and give it kinetic energy, but you do not create the energy. All you do is transfer it from your body to the ball. This law is based upon a constant energy and a state of equilibrium or balance.

Entropy is the scientific term for the "availability of energy." The relation of entropy to conservation of energy extends all the way to the basic scientific question of whether the Universe is an infinite environment which allows us to use up our total initial energy or only part of it, according to a final dynamic or even static equilibrium, which would be the

final state of a finite Universe. In any case, finite or infinite Universe, or finite Universe with another finite or infinite environment (transcendence), we are continuously consuming our "potential". And entropy, the availability of energy, determines the time for the universal occurrence. Actually, entropy can be defined as the consumption of time, or "time", itself.*

In a closed system such as a finite Universe with an internal and initial "potential" and a finite environment or the theoretical model of a system shown in Figure 1-A losses its internal potential while the system is delivering work (energy), because of the non-reciprocal process of mixing or leveling.

The loss of internal potential or "available" energy in a closed system is due to the time or period the system allows for the mixing or leveling to occur. In other words, the universal tendency of matter or energy to mix or level is limited by the time it takes in a closed system. When the balance in both the "transmitter" and the "receiver" sides of a closed system is reached, the delivery of work stops and a state of equilibrium exists.

Since all practical systems are closed systems and since all closed systems lose their

potentials and available energy in accordance with the consumption of time or entropy, then the delivery of work eventually stops and a state of balance or equilibrium exists. This is the reason why it is impossible for man to create a perpetual motion machine.

This shows that a closed system fundamentally cannot actually deliver the total initial energy capacity. The amount of work a system can deliver, or the amount of energy that is "available" from a system, depends on the receiving capacity of the receiver part of the system. It is evident that only by opening our system to an environment of infinite receiving capacity or, in other words, by providing an exchange between a specific system and an on infinite environment (Figure 1-B) the total initial energy capacity is also the actual "available" energy.

The second classical restriction of the Law of Conservation of Energy, was discovered by Maxwell in the field of Electrodynamics. He found that the conventional equations which equilibrium did actually prove that there can be no electric current. Yet, Maxwell knew that electric currents do exist, so he added a fundamental parameter* to the Conservation of Energy Law and called it "Displacement Current" in Electrodynamics.

*Part II of this article, appearing in the next issue of SPACE Journal, discusses "time" as the fundamental parameter in physics and explains how it has been incorrectly applied in the current scientific debate over the "Time Dilatation Theory".

*Maxwell wrote the electric current balance as follows:
 $H = i_r$ (equilibrium) $+ i_d$ (displacement current)

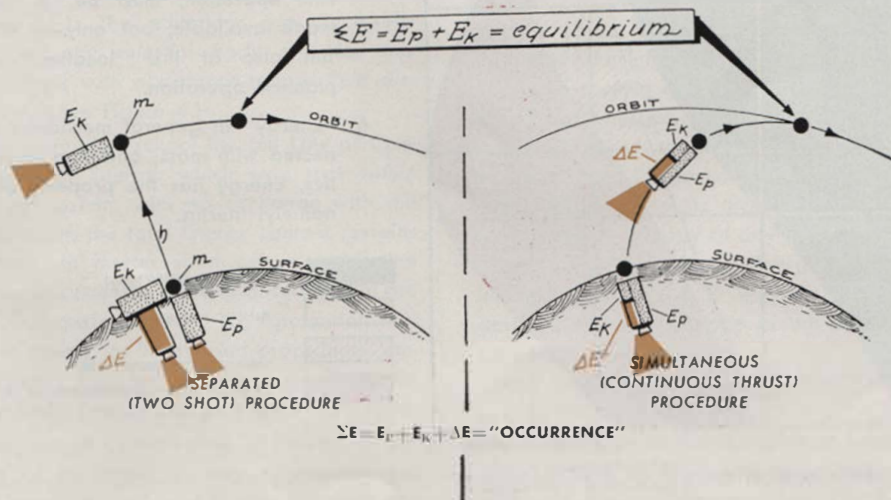


FIGURE 2

DEMONSTRATION OF DISPLACEMENT ENERGY (ΔE) IN ASTRODYNAMICS

In addition to the two classical restrictions to the Energy Law, the authors recently introduced an analogy to "Displacement Current" into the field of Astrodynamics. The new parameter, called "Displacement Energy", is also a "time" parameter since it is the energy required to move, redistribute, or displace pure energy during an occurrence (state of non-equilibrium).

The formulation of displacement energy in Astrodynamics "brought home" to the authors the importance of the primary position that "The Logic" behind mathematics holds.

The following considerations summarize the reasoning necessary before a mathematical derivation could lead to the confirmation of Displacement Energy in Astronautics. And, as we will discuss further on in this article, these initial thoughts may lead to a confirmation of our belief that "time" is the missing link to a Unified Field Theory.

1. "Displacing" is an occurrence for which "Time" cannot become zero. The cri-

teria, or even the definition of occurrence is "Change" or "Redistribution" or "Displacement" or "Time".

2. In order to establish an orbit at an altitude around the Earth there are only two possibilities. Either two instantaneous "shots" are required; namely, one shot at the Earth's surface and the second shot at orbital altitude. Or, one continuously powered ascent with attitude control to the orbital altitude. This is simply because any unpowered motion in the gravitational field is a "free fall", which—when below escape velocity—falls back through the point of the last power cut-off.
3. It is self-explanatory that the (above) required two shots cannot, for the same mission, be combined into one shot, because shot No. 1 and shot No. 2 must be separated by a time element, which must be greater than zero.
4. Any approaches to an infinite Specific Impulse and a Mass Ratio of ONE are not applicable in any determination of a performance, simply because this would mean the undeterminable approach of zero times infinity, which is a "point" where no law or any law is applicable.
5. "Energy" which is required for a specific operation, must be, or must be made available, not only at the time but also at the "location" of the planned operation.
6. "Energy" in general mechanics is connected with mass; and also in relativistics, Energy has the property of mass, namely: Inertia.

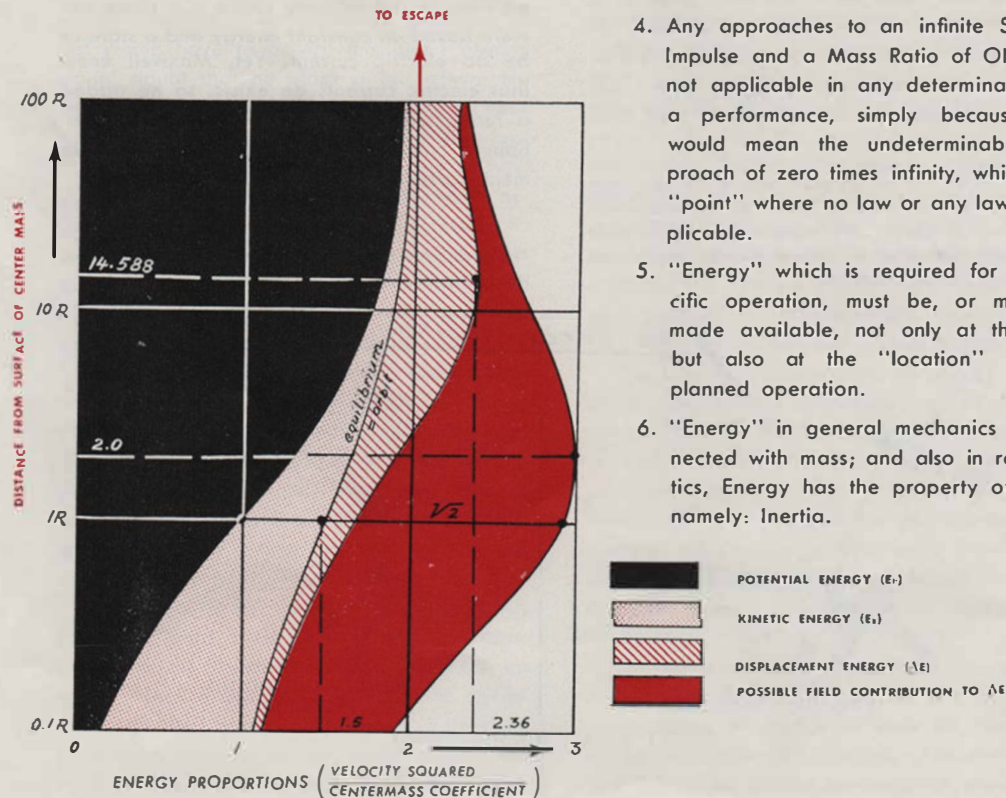


FIGURE 3

UNIVERSAL ENERGY PARAMETERS

7. For placing a unit mass (m) into orbit around the earth at an altitude (h), the following energies are required (as shown in Figure No. 2).

- "Potential Energy" (E_p) for placing or lifting the mass into altitude (h). This E_p is required at the Earth's surface.
- "Kinetic Energy" (E_k) for accelerating the mass into orbital velocity (V_k). This E_k is required at orbital altitude.
- "Displacement Energy" (ΔE) for transporting, lifting or "displacing" of the Kinetic Energy (E_k) from the Earth's surface to orbital altitude.
- The sum (Σ) of the total Energy requirement for placing a unit mass into orbit is therefore:

$$\Sigma E = E_p + E_k + \Delta E$$

With the above considerations and assumptions, it is possible to enter mathematical derivations* which, in a routine procedure, give the quality and quantity of the three required Energy terms. The mathematical equations and the Astronautical characteristics (see Figure No. 3) show the remarkable fact that displacement energy is a pure function of the gravity field because the equations contain only distance relationships ($\frac{h}{R}$) and two constant factors, the radius (R) and the gravity acceleration on a body's surface (g_s). The equations are *universally valid for any celestial body and for any center mass with a distance-square field distribution*. (See Figure 4.)

We learned in school the old Law of Conservation of Energy, which says that within a closed system, with no exchange with the environment, the total Energy content remains constant, no matter what occurs within the system. Occurrences within a closed system are Energy Transformations, e.g. potential into kinetic energy, or in reversed procedures, etc. No Energy can be produced or consumed (cancelled); Energy can only be transformed.

The Law of Conservation of Energy is, because of its simplicity, very convenient and easy to understand and it also simplifies the

*Should the reader be interested in a mathematical derivation, he can request it through SPACE Journal.

mathematical derivations in all fields of physics. Since it also leads, in most practical cases, to satisfying results, no one has ever desired a change as long as the results were acceptable. However, three changes, or at least restrictions, have already been introduced, but they were not defined as changes of the energy law. They are conveniently handled separately from the energy law and they are considered to be additional parameters, which are required only in those specific fields and in specific cases.

Figure No. 1 shows the delivery of work (or energy). It is evident that, for establishing or maintaining a dynamic equilibrium within a 100% efficient system exactly, the delivered energy must be put in again. This provides a continuous maintenance of the existing potential which keeps the "availability" of Energy or Entropy constant. This system does not deliver or consume energy in an exchange with environment, it just maintains its own equilibrium. If it has strictly no exchange with any environment whatsoever, which is the definition of a perfect dynamic equilibrium, then it strictly cannot even be noticed from the environment. This means that for a perfect equilibrium it does not make any difference whether it exists ("occurs") or not. It does not represent an "occurrence", which requires a changing entropy, which is consumption of time.

This discussion indicates that Energy and Entropy cannot be separated from each other and that the old Law of Conservation of Energy is correct only for a state of perfect equilibrium (perpetual motion). And since, as discussed above, there are fundamentally no equilibria, the Displacement of Energy term (ΔE), which represents the compensation for the change of Entropy of any non-equilibrium, must be included in any Energy Law as an inseparable part of it. We, therefore, suggest the following change of the old Law of Conservation of Energy:

$$\Sigma E = E \text{ (equilibrium)} + \Delta E \text{ (redistribution)} \\ = E_p + E_k + \Delta E$$

The new Law of Conservation of Energy as given above is valid for any "occurrence" and any system. The old Law ($\Sigma = E_p + E_k$) does not represent a true physical "occurrence".

Here are some of the favorable circumstances which seem to justify our efforts to obtain universal acceptance of the new Energy Law:

- (a) Since we human beings constitutional-ly belong to the macrocosmos, it is simpler for us to see or to find macrocosmical relationships, without eventually losing the possibility of "logical" control within complex pure mathematical procedures.
- (b) We are just taking off into the "Space Age," where the macrocosmos is being investigated with the combined efforts of almost all fields of physical science, including the microcosmical fields.
- (c) For this first time in the history of science, the various fields of natural sciences, which still are pretty strange to each other, seriously attempt to cooperate in the exploration of space. Actually, not the various fields of science, but rather the scientists of different fields with different terminologies have worked and lived, unintentionally, toward a separating specialization.
- (d) Since the models in atom and nuclear physics are mainly a simulation or copy of astrodynamical systems, using the same field distribution, the same energy and impulse definitions and the same units of mass in orbits, etc., it seems to be the most logical thought to derive microcosmical relationships as far as it is sensible, first within our own world (the macrocosmos). Today we are able to create functional macrocosmical atom models by establishing artificial satellites and by accelerating these satellites up to escape velocities and beyond. This enables us to derive and to measure all the involved parameters, relationships and results during the simulation of a procedure reproducing universal occurrences.

In today's physics any Energy or Impulse term, if applied to the motion or redistribution of mass, (for example):

$$E_p = mgh \text{ or } E_u = m \frac{v^2}{2}$$

or even Einstein's Energy-Mass equivalent, $E = mc^2$, and now Displacement Energy, ΔE , is the energy for moving, redistributing or displacing pure Energy. In fact, any auto-

motive vehicle is using part of its energy to transport and redistribute its own internal energy (fuel, etc.) along its travel path. The most typical vehicle for this is the "rocket," which is continuously accelerating and displacing its remaining internal propellant energy to higher altitude (potential energy) or to higher velocity (kinetic energy), thus adding every impulse to the already reached velocity, or kinetic energy level. And the Basic Rocket Equation* is the fundamental and natural relationship for any automotive (self-propelled) transfer of mass into Impulse or Kinetic Energy. Since any occurrence in the macrocosmos, as well as in the microcosmos, is a continuous redistribution of mass and energy, mainly of energy, the procedure (see Figure 2) of placing a unit mass into orbit by means of a rocket becomes the fundamental model and simulation of the universal occurrence.

There are, however, no pure rockets in nature, but by employing the rocket principle for the simulation, the various energy parameters involved can be separated and determined very clearly. Since the gravity field and the field within the atom are assumed to have the same square-distance distribution, the energy contributions from the particle propulsion (or from hits or interactions by other particles) and the energy contribution from the field can be clearly separated. What actually makes this macrocosmical model so convenient for simulating and clarifying the occurrences is that here all energies or impulses are given in terms of mass (propellants) with their accurately determined "inertia." This "Inertia of Energy," as mentioned above, could not be demonstrated and was therefore not considered in any nuclear Energy and Impulse Balance before. Since this, however, is absolutely necessary for a perfect balance, and since in fact the Displacement Energy, by considering this, leads to a perfect Energy and Impulse balance, Displacement Energy (ΔE) the logical term in the Law of Conservation of Energy which unifies the macro and the microcosmical occurrences.

Thinking this over, it becomes clear why the

*The Basic Rocket Equation is written as $M = e^{\frac{v}{c}}$ where the vehicle's Mass Ratio (M) is the ratio of the takeoff mass m_0 and the burnout mass m_1 ; c is the exhaust velocity of the vehicle; v is the vehicle velocity relative to the takeoff point; and e is a natural growth number having a value of 2.718.

research in Nuclear Physics cannot find any satisfying Energy and Impulse balance just by looking for more nuclear particles, hoping that one particle will be discovered which will exactly balance the energy input and output. The experimental and analytical research, however, led already to an accurate definition of this "missing particle". Physics here left the ground of realism in turning from rational intelligence into a meta-physical belief in a "ghost particle, neutrino" with the following properties:

Particle	Mass	Charge	Energy	Lifetime
Netutrino	0	0	Variable	Stable
Anti-neutrino	0	0	Variable	Stable

Remarkable is this hope, namely that experiments might find a "particle!", which does not exist, but which indicates its "existence" twice, namely when it appears and when it disappears, which has no mass and no charge, but which has "energy" and a stable lifetime.

Seriously, should we continue to carry on research in this direction? The whole physics of today, including this metaphysical dilemma, is based on the old version of the Law of Conservation of Energy, which led to satisfying results only until Nuclear Physics attempted

to unify the physical sciences. Now it seems that we cannot go much further in our loyal attempts to satisfy the old energy law without leaving what, up to date, is called "physics". Instead, we should try to reasonably change or modify the old regulations, at least in accordance with other regulations, which have already been established. Here again, we should recall that these other regulations, which already exist, are "Entropy" and Maxwell's "Displacement Current" and now "Displacement Energy".

Furthermore, the new "Displacement Energy" derived in Astrodynamics presents, in fact, all the qualities described above for the required neutrino—including the metaphysical ones! The only difference is that the "Displacement Energy" (ΔE) cannot be found as a "particle" of the atom, and being an irreversible consumption, it cannot be produced either, in accordance with Eddington. Instead, however, it provides a perfect energy and impulse balance, when incorporated as a new term in the old Law of Conservation of Energy, which, in accordance with Einstein, would be the link to answer the unknowns by formulating the knowns into their correct relationships.

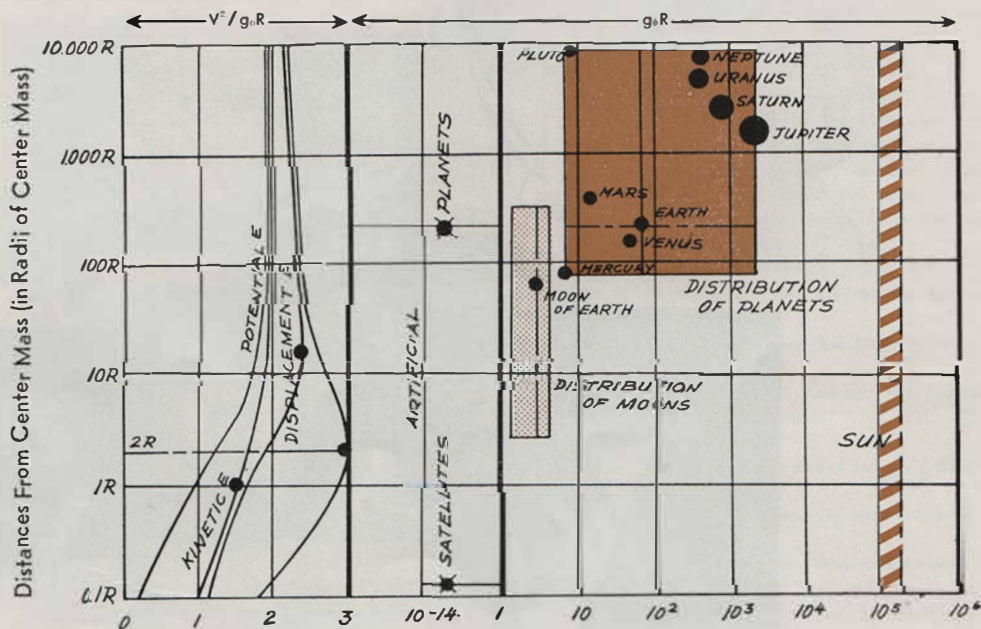


FIGURE 4

ENERGY DISTRIBUTION OF OUR SOLAR SYSTEM