Power from the Quantum Vacuum

by Dennis L Feucht

Is it not somewhat strange that electromagnetic theory as taught in engineering school has not seen any fundamental changes for a century? Classical electromagnetism was developed at a time when fluid flow equations were adapted in the mid-1800s by Maxwell for his theory of electricity and magnetism, a time when everyone thought that the aether was material. About a century ago the Michaelson-Morley experiment and Einstein's Special Relativity dispensed with it. General Relativity (GR) introduced the idea that space-time was warped or twisted where there was mass, and with mass and energy interchangeable, a change in energy is space-time curvature. When quantum theory arose Paul Dirac, and others, conceived of virtual quantum particles in an active vacuum. Energy, in a particle-physics interpretation, is viewed as a change in the virtual particle flux or cross-section in the vacuum. In 1957 symmetry breaking won a Nobel Prize for Lee and Yang, within a year of their discovery. Symmetry-breaking is involved in making virtual phenomena in the vacuum produce something observable.

Despite these major advances in physics over the 20^{th} century, engineering electromagnetic theory has not been updated to accommodate them. Fields theory as taught to EEs is consequently obsolete. It assumes a material vacuum, matter-free force fields, charges without energy input as the energy sources of their fields (thereby violating energy conservation), an inert vacuum, and flat space-time.

In fields' textbooks we are offered "Maxwell's equations" but they are not exactly his. Maxwell originally developed 20 equations expressed in quaternions, not vectors. Quaternions have higher group symmetry than vectors and are more difficult to use mathematically. They consist of both a vector and a scalar. This difficulty led Oliver Heaviside to reformulate Maxwell's theory using vector calculus, and it is Heaviside's four equations that are subsequently taught, though Maxwell also had a part in simplifying his own theory. Even vector calculus is too much for some EE students, and the junior-year fields' course is often considered the hardest of the EE undergraduate curriculum. In producing the vector-based theory simplifications were made, resulting in less than the original theory. What has been left out is where the story becomes interesting.

Additional simplification of Heaviside's formulation was performed by applying the Lorentz gauge. This condition, when applied to the four equations, results in two coupled equations from which wave propagation can be derived. Undesirably, the Lorentz gauge results in EM theory that applies only to the class of EM phenomena of which EEs are familiar: closed current-loop circuits. By imposing symmetric gauging, Lorentz eliminated from further consideration a vast, unexplored realm of possibilities involving extraction of useful energy from the active quantum vacuum.

As old as classical EM theory is the history of experiments that have demonstrated the inadequacy of the theory. This history is as fascinating as it is unknown to most engineers and physicists. The key individuals involved in it are linked in succession below:

Nicola Tesla → Gabriel Kron → Floyd Sweet → Tom Bearden

The first two individuals are well-known in EE history. Mystery still surrounds Tesla's work, and a cult-like following has continued, as it did when Tesla was alive. Tesla was making claims that fit the consequences of an emerging, updated EM theory such as that of present-day Myron Evans http://www.aias.us and others. In accounting for space-time curvature and the active quantum vacuum, the more general EM theory extends beyond classical EM to accommodate gravity and the strong and weak forces. It emerges as a unified-fields theory.

Gabriel Kron is well known for his contribution to motor theory at General Electric in the 1940s. (See, for example, Purdue University Professor Paul C. Krause's Electric Machines book for a brief coverage of motor-theory history.) Less known was his work on negative resistance. He was the chief scientist for General Electric on the US Navy contract for the Network Analyzer project at Stanford University. Kron's paper, "The frustrating search for a geometrical model of electrodynamic networks," circa 1962, contains the following:
"...the missing concept of 'open-paths' (the dual of 'closed-paths') was discovered, in which currents could be made to flow in branches that lie between any set of two nodes." (Previously -- following Maxwell -- engineers tied all of their open-paths to a single datum point, the 'ground'). "That discovery of open-paths established a second rectangular transformation matrix… which created 'lamellar' currents ..." A network with the simultaneous presence of both closed and open paths was the answer to the author's years-long search.

The open-path discovery involved negative resistance. Anyone familiar with impedance transformations caused by active devices operating above their bandwidths (such as BJTs operating above f_β), input resistances of constant-power converter circuits, or gyrator circuits found in negative-impedance-converter filters, might not be terribly impressed by the discovery of "negative resistance" by Kron. What Kron meant was not negative incremental resistance but negative static resistance, a resistance that sourced power. According to nuclear engineer Tom Bearden, "Kron was never permitted to release how he made his negative resistor, but did state that, when placed in the Network Analyzer, the generator could be disconnected because the negative resistor would power the circuit."

It might be understandable how a development of this magnitude in military research might be closely guarded. Kron however gave hints about it in the published scientific literature when he wrote: "Although negative resistances are available for use with a network analyzer…" [Gabriel Kron, "Electric circuit models of the Schrödinger equation," Phys Rev 67(1-2), Jan 1 and 15, 1945, p 39]. He also hinted about "only a few" such resistances when he wrote:

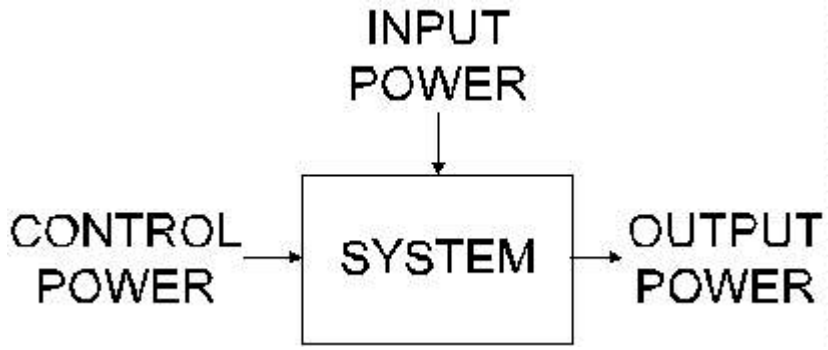
> "When only positive and negative real numbers exist, it is customary to replace a positive resistance by an inductance and a negative resistance by a capacitor (since none or only a few negative resistances exist on practical network analyzers)." [Gabriel Kron, "Numerical solution of ordinary and partial differential equations by means of equivalent circuits," Journal of Applied Physics, Vol 16, Mar 1945a, p 173.]

(The above quotes from Kron were excerpted from On Extracting Electromagnetic Energy from the Vacuum IC-2000, by Tom Bearden.) Kron was onto something interesting that has never emerged from military research.

Floyd Sweet, an experimenter who was also good at math, also worked at GE, where Kron was his mentor, but not on the Network Analyzer project. Electrogravitic effects arise in Sweet's story, and indeed, claims have been made of unusual electrical devices exhibiting antigravitic effects on the bench: Floyd Sweet's bench. Sweet worked with Kron and continued his line of research into negative-entropy EM.

By the way, dear reader, does this sound near the lunatic fringe to you by now? It did to me at first. But let's press on, and cover this strange development to the present. Truth can be stranger than pseudo-science and the full truth has yet to be made plain to all of us in this ongoing saga.

Sweet developed a device he called a vacuum triode amplifier (VTA). It was not the familiar thermionic triode. It was, for the most part, a nonlinear magnetic device, claimed to output more power than was input to get it started -- far more power. Sweet retained knowledge of the details of its construction. What seemed critical was the proper conditioning of the permanent magnets. Other researchers who have built similar devices have been unable to cause their magnets to retain (for as long as Sweet did) the characteristic required for the desired "power gain" or coefficient of performance (COP). COP is a thermodynamics quantity that is the ratio of output power to control power, as shown below.



Then:

$$COP = \frac{\text{Output Power}}{\text{Control Power}}$$

whereas efficiency is defined as:

$$\eta = \frac{\text{Output Power}}{\text{Input Power} + \text{Control Power}}$$

A system will not have an efficiency exceeding one, but COP can be over unity. Well-designed heat pumps nowadays have COP ratings of over 10. (They are seasonally adjusted and commercially given as SEER ratings.) The VTA showed a COP >> 1.

The plot thickens considerably with Tom Bearden http://www.cheniere.org a nuclear engineer who is a retired Lieutenant Colonel with an intelligence background. Bearden has worked with Floyd Sweet; as he recounts:

> "At least I did realize the implications with the Sweet VTA, and convinced him to do that crazy antigravity experiment -- which worked beautifully. I had had that notion about Dirac Sea holes producing negative energy fields -- and thus possibly antigravity -- ever since finishing my MS at Georgia Tech in 1971. So at least the Sweet VTA antigravity experiment did work. But then the sniper took a shot at him, just barely missing his head because he stumbled and fell very fortuitously. It scared the living daylights out of him, and he would allow nothing else to be done with that experiment or effect. He also would not show it to anyone else, as far as I'm aware. He apparently knew a bit about Kron's involvement in certain "experiments that never happened," and of course Kron was his mentor. The Sweet VTA, I believe, was a take-off or adaptation from Kron's negative resistor. For that reason I also think Sweet was afraid to try to get that device out on the market. He fervently believed that, if he did, he would certainly be killed." [Correspondence posted at Bearden's website, dated Friday, 7 May, 2004]

If this sounds more like a plot from a spy movie than a history of modern technology development, consider why Bearden, a retired army officer with connections to Russian military technological intelligence and also himself an assassin's unsuccessful target, would not find this incredible. Bearden is convinced that the Russian KGB (now FSB) is considerably advanced over the West in the development of what he calls "scalar

EM" and what the Russians call energetics. He recounts the geopolitics of weapons development after World War II after Stalin discovered, to his dismay at the Potsdam conference, that the US had developed the atomic bomb. Stalin was determined to leapfrog the bomb with a super weapon. As Bearden explains:

> "Ironically, Stalin's 'great technical breakthrough' was to come from Germany's radar scientific team, taken to the Soviet Union after the war. This team had drastically advanced the theory of radar cross-section and radar absorbing material (RAM). They were on the verge of discovering phase conjugate time reversed radar waves -- which would enable the great new super weapons Stalin sought…
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> "…the Soviet Academicians did not dare to debate or protest against his ultimatum to search every field of knowledge, no matter what. Instead, Academy scientists vigorously turned to a massive search for the new breakthrough area. Scientific literature from the West was hauled to Russia by the shipload. Thousands of Soviet PhDs and engineers were put to work in huge analysis institutes, sifting through the literature and digesting it -- and carefully noting anomalies and areas which should be followed up. Nothing even remotely approaching such a technical digestion and analysis effort has ever been attempted in the West." (From this search it seems clear that the Soviet discovered Whittaker's 1903 and 1904 papers also prescribing the engineering method.)
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> "…At the time German and Soviet radar scientists probably began to discover -- and puzzle over and work out the theory and hardware for -- time-reversed EM waves and phase conjugate mirrors."

It is the expanded EM theory which, according to Bearden, has mind-boggling breakthrough consequences once it is refined and applied. According to him (see his book, Fer de Lance: Briefing on Soviet Scalar Electromagnetic Weapons), the FSB has retained tight control of longitudinal-wave interferometric weapons of amazing capabilities, including the ability to cause significant meteorological and geological effects.

Evidence Bearden cites for KGB/FSB development of scalar EM weapons includes:

1. The Kyshtym accident in 1957 - 58 in the Ural mountains, a major nuclear event that Bearden believes was caused by an EM weapon development failure that triggered the nuclear explosion of nuclear materials in the area.
2. Anomalous microwave radiation of the US embassy in Moscow, which began during the late 1950s and has repeatedly occurred to this day. Bearden writes, "Twin beams have been noted in the radiation, suggesting interferometry. Scalar EM components on the carriers would not be detected by normal microwave instruments, although the weak carrier signals would. Further, the strength of the scalar EM wave's infolded components can be essentially independent of the strength of the carrier. Apparently a wide variety of physical effects were experienced by personnel in the Embassy, including several US Ambassadors… The response of the US Government and the counteractions taken (or not taken) at the US Embassy in Moscow reveal whether or not the US is aware of scalar electromagnetics and scalar interferometry, with very high confidence. Since apparently no US scalar EM countermeasures have been taken at the Embassy, the Soviets have long been assured that the US knows nothing of scalar EM, has not developed scalar EM weapons secretly, and possesses no defenses against the surprise use of scalar EM weapons against US forces and installations."
3. "In January 1960, Khrushchev announced the development of a new, fantastic weapon -- one so powerful it could wipe out all life on earth if unrestrainedly used. The New York Times printed part of the story. Khrushchev, of course, was referring to the newly emerging scalar EM weapons. So in early 1960 the Soviets were in at least what we call the engineering development stage for large scalar EM beam weapons, which would be deployed when finished." Bearden continues, "Since 1963, the Russians have had the equivalent of more than seven additional Manhattan Projects (using the Russian 5-year program instead of the 4-year Manhattan Project), back-to-back, in development of energetics weaponry. Western scientists refuse to accept it, and cannot understand it, as scalar EM theory is not in their textbooks."

4. 49 other events, through 1986, that have the characteristics of scalar EM weapons development.
5. A statement by Secretary of Defense William Cohen at an April 1997 counter-terrorism conference sponsored by former Senator Sam Nunn. Quoted from the DoD News Briefing Q&A at the Conference on Terrorism, Weapons of Mass Destruction, and U.S. Strategy, University of Georgia, Athens, Apr 28, 1997, Cohen said: “Others are engaging even in an eco-type of terrorism whereby they can alter the climate, set off earthquakes, volcanoes remotely through the use of electromagnetic waves… So there are plenty of ingenious minds out there that are at work finding ways in which they can wreak terror upon other nations… It's real, and that's the reason why we have to intensify our [counterterrorism] efforts.”

New York Times, January 15th, 1960

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FIVE CENTS

KHRUSHCHEV SAYS SOVIET WILL CUT FORCES A THIRD; SEES 'FANTASTIC' WEAPON

STRENGTH CITED

Premier Pins Military Might on Stockpile of Nuclear Arms

By MAX FRANKEL

have now are formidable weapons indeed, the weapon we have today in the hatching stage is even more perfect and even more formidable.

The weapon, which is being developed and is, as they say, in the portfolio of our scientists and designers, is a fantastic weapon.

Bearden has put considerable effort into development of a theoretical basis for the unexplained phenomena that a number of researchers besides Tesla, Kron, Sweet, and himself have observed. His basic approach has been to do what every engineer already knows to do: check your assumptions. He and his group in Huntsville historically traced the development of EM theory, looking for the assumptions. The fact that eminent physicists such as Feynman and Wheeler have admitted that physics lacks definitions for force or energy drove his search in the direction of looking behind observables to hidden variables, such as longitudinal-wave and time-reversed photons of quantum theory.

The Bottom Line, For Now

Bearden, like Tesla, is viewed either as a crank (as in a recent Editorial in Scientific American, referring to his patent) or as well ahead of his time. My efforts to get to the bottom of the claims about vacuum-sourced energy, or "free energy," or "zero-point energy," as it is usually called, included a personal visit to Bearden's home in October 2004 in Huntsville and a 90 minute discussion with him about the topic. His book, "Energy from the Vacuum," contains the theory as it is presently worked out by him. While intriguing and containing much insightful material, it lacks the rigor I was seeking. That might be found in the work of associated theoretical physicists, such as Myron Evans, or others in a company involved with Bearden.

Previously, while in Belize, a friend and particle physicist, Mark Ludwig, copied me three chapters from an "Advances in Optics" book edited by Myron Evans. Mark, who spent two years in undergraduate physics at MIT before going on to CalTech for graduate work, could not see anything either fatally erroneous or theoretically conclusive in the papers and thought that the next step was to build one and find out. That is what Bearden's company is doing. The Motionless Electromagnetic Generator (MEG) device is patented, though the patent is not complete enough to allow duplication of the device by anyone skilled in the art. What art that would be exactly, I am not entirely sure -- an EE with a particle physics background, perhaps.

As an experienced power-electronics engineer without a theoretical physics background, I would think that I could reliably assess whether a MEG in operation is outputting more energy than taken from its electrical input. I inquired in Huntsville about a demonstration but, alas, the machine was torn down for changes during my day in the region. That is reasonable enough in ordinary product development, and at this time, the CEO does not want his company to be prematurely attracting the attention of the press (which can also be very reasonable before the device is ready to be unveiled). My prospective meeting with him was spoiled when I mentioned off-handedly that I write a monthly column for a major electronics trade e-journal. They want no press at this time.

My advice to readers is to let time take its course, leave them alone for now, and examine what theory is available, starting with Bearden's website and the publications associated with (or by) Myron Evans. My engineering instincts tell me that this is not a charlatan effort of major proportions but that something is going on here that might be of breakthrough proportions. But only time will tell.

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