Force Fields - Evolution or Creation

In the early 1800's inventors Barlow and Jacobi independently developed rotating electric motors utilizing the newly discovered electromagnetic phenomenon, i.e.; the ability to create magnetic attraction by conducting current thru a coil of wire surrounding an iron core. Consider the fact that a readily available and inexpensive metal, namely iron, was long past being well known but at that moment "just happened" to have an atomic structure that has a number of unpaired electrons to make iron what we call magnetic. The individual atoms produce a magnetic field and, being unpaired within the iron molecule so as to not cancel a neighboring magnetic field, the iron is magnetizable to create a net magnetic field. This is unlike the other well known metals and alloys such as aluminum, copper, bronze, brass, lead, tin, gold or silver which are not magnetizable. In the modern world following that period of discovery, the most useful home and industrial power sources are a benefactor of magnetism. In the air gap of an electric actuator (between stationary stator and movable rotor) the magnetic field there provides a potential energy within the gap. Then as the gap closes in response to the force, that force produced times the distance of gap closure is the mechanical energy (work) done at the expenditure of the magnetic energy. If not for iron, other metals such as nickel or cobalt are not as cost efficient and thus more expensive for large scale world wide needs. Along with many other resources, iron seems to be a fortuitous gift awaiting discovery for modern needs. Experimenters and inventors alike took it up as a challenge to understand and make these forces predictable and useful.

Part of this challenge materialized in finding that the iron's degree of magnetization had a non-linear relationship to the flux density within the iron's flux path.. These qualities are seen on a BH curve of the iron. Careful testing is required to produce such a graph and then the engineer/designer uses the BH data of the graph to compute the magnetic force or torque as it relates to the size of the actuator and electric current supplied to the coil. Early on, from the early 1800's and until after computers became available in the mid 1900's, this was a tedious, repetitious, time consuming task; largely a trial and error effort to find the flux value whereby the iron circuit's magnetomotive force would converge with that of the electrical coil (amps x no. turns) for a given geometry and current level. A predictable force then was derived from the flux level that produced the convergence.

It is interesting to note that Herbert C. Roters recognizes on page 84 of his 1941 text book, Electromagnetic Devices, that a critical impediment to calculating iron cored solenoids is the lack of an equation relating the B and H values of the iron. Such an equation would remove the tedious guess work for obtaining the flux in the circuit or the mmf dropped across the various iron elements that make up the circuit. To quote; "In the magnetic circuit containing iron, however, the relationship between flux and magnetomotive force is by no means linear, nor can it be expressed by any reasonably simple mathematical equation." This was in 1941. Then, as late as 1964 Richard Feynman in The Feynman Lectures on Physics, Vol. II, pp. 36-37 states "Now all we need is an equation which relates H to B. But there isn't any such equation." When did equations begin to emerge? Testing for magnetic characteristics is one hurdle and another is to fit the data to an equation. Apparently this latter effort awaited the computer. In my case, having acquired one of the early Commodore VIC-20 computers in 1982, I finally, after a number of hours spread over several days, developed two equations. One was to find values of H, with B as the input, from zero to about maximum permeability (B/H) and the second was from that level to saturation. Merging the two solved the dilemma of having to examine and pick values from a graph and allowed the computer to crunch along at directed flux levels until a convergence was obtained for the values of coil mmf versus the total mmf drops in the iron and airgap circuit. This flux value at the point of convergence identified the correct flux in the magnetic circuit according to its unique

geometry and coil current from which the force was computed.. Otherwise a lengthy table (a lookup table of B vs. H data points) would be required in computer memory, of which my computer did not begin to have adequate capacity, as well as an additional loop for interpolation between table values. The interpolation method, interestingly, was and perhaps **is** the current process in magnetics fea software even though perhaps not as precise as an equation.

This discussion regarding iron as a fortunate element in our world is only an example of the 'free' things we take for granted; namely the laws of physics that we did not and could not invent. Here is only one of an infinite number of "natural conditions" that long ago predated our need for them.[1] So does it make sense that our world, our existence, our self awareness, our cognitive abilities, our cosmos is anything less than an engineered, planned, coordinated continuum from God's creation? But wait, you might say. The overwhelming conclusions in academia world wide are that evolution is a fact; that a big bang is responsible for all that we encounter. Science also says that the summation of energy and matter cannot be created or destroyed. Yet, here they are. The matter of the universe along with its inestimable energy of heat and motion cannot have just evolved. From what does a force field evolve? Or energy? Where does a first hydrogen atom (fully formed and active) evolve from? Did the nucleus and its constituent particles and fields form separate from the electron? If the argument is that the atomic particles naturally formed out of the big bang, then the laws of physics had to predate that event. And consider the serious efforts of scientists to search the cosmos for a superior intelligence (as long as it isn't God).

Why do so many objective persons reject this view and at the same time search the cosmos with the best technology that we can muster for that elusive super-intelligence that will solve all our problems. Is it because God is not doing it our way? Is it because He requires personal responsibility? Math is only one of the discoveries along with all of physics, that we have not invented but has been designed for our use and handed to us. All of these things are based in perfection and require our diligent inquiry so as to result in well being, and personal satisfaction. Like it or not, these same mysterious gifts to us give praise to the Creator by all who either dabble in it or specialize in it. The scientist is not the originator, grantor, or master over these things but a discoverer only as well as a philosopher attempting to explain his discoveries. The fundamental attributes of things are the secret things that belong to God[2] that our best physicists have spent their lives to understand and quantize, yet without completion. In the realm of human debate over the fundamentals, who is right? If any one man could understand all of the associated mysteries it is doubtful that he could explain them for anyone else's understanding and agreement. It makes one wonder if we have arrived at an impasse in scientific theory; is further (publicly funded) effort profitable? Does it matter if we are made of fields or particles or both? Have we made good use of the existing discoveries we have made thus far? The early paragraphs of this writing show that we have; and, other inventions of usefulness agree. But, is there a limit? Are we so far up on the asymptote of human discovery where further effort becomes a net loss? Where is the unreachable line that divides knowledge and secret?

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1 "The more I examine the universe and the details of its architecture, the more evidence I find that the universe in some sense must have known we were coming." ― Freeman John Dyson , physicist, 1923-2020.

[2] Deuteronomy 29:29

It is understandable that even Albert Einstein found mystery in the force fields; magnetic, gravitational, electrostatic, nuclear...those 'forces at a distance'. My favorite and most illustrative demonstration is a pair of rare earth magnets; each about 1" diameter and 0.4" thick with a hole thru the middle and inserted about a long wooden dowel rod with like poles opposing. Therefore, one magnet is suspended above a lower one and it takes many pounds of force to push them to within about 1/4 inch apart. Otherwise, the upper magnet levitates about 4 inches above the lower.[3] The effect is impressive having nothing between them yet forced apart and if the upper magnet is raised and dropped it bounces by means of the opposing fields and behaves as if a spring is responsible. But nothing is to be found in between. Yes, a detector that responds to magnetism's forces will detect the field. But otherwise, it is invisible. Now my high school science teacher's lecture stating that nothing touches any other thing makes sense. A solid piece of wood for instance is not solid but maintains its shape due to fields of force. A spring is not really a solid device causing compressive or stretching resistances; it is the force fields in the atomic structure of its molecules and atoms that provide its stationary shape and its restoring forces. Pull on the ends of the spring and the forces pull back; push the ends together and the forces push back The force fields have this in common; that a suitable detector can measure that they are there. Light, radio frequency waves, gravitational forces, the theoretical nuclear attractions and repulsions (which are considered as proven by the results at Los Alamos and Hiroshima) are real, but, at the same time, are secretly created. How would any human genius create any one of them?

As an engineer for nearly 55 years it is obvious that any attempt to relegate the created universe or any of its smaller constituents to some form of natural evolution is a deception that is inexcusable to defend or condone as legitimate. Here we are, on a spinning ball, endlessly orbiting a star, circulating about in a galaxy among billions of galaxies, and we are more intelligent than the One who created them? It is both humorously ludicrous and at the same time soberly futile. Ultimately and certainly it is promised: "He that sitteth in the heavens shall laugh: the LORD shall have them in derision. Then shall he speak unto them in his wrath, and vex them in his sore displeasure." We mortals go on theorizing and speculating on "scientific" things and ignore the ongoing plan for us that was set in motion at the same time as were the secret things of God.

God, in His instruction book for man, said "By faith we understand that the worlds were prepared by the word of God, so that what is seen was not made out of things which are visible." (Hebrews 11:3) and "For since the creation of the world His invisible *attributes* are clearly seen, being understood by the things that are made, *even* His eternal power and Godhead, so that they are without excuse." (Romans 1:20).

3 If these particular magnets were allowed to fully attract they could not be separated again without fracturing them.