

The Dialectica Manifesto

Dialectical Ideography

and the Mission of F.E.D.

The Nonlinearity Breakthrough

and

The Fusion Breakthrough

The Nonlinearity Breakthrough and the Fusion Breakthrough.

The prospect of fusion power epitomizes the vast scientific, industrial-technological, and social benefits — potentially *human-social progress re-igniting*, and *human-species-continuation-enabling* — of a *Nonlinearity Breakthrough*.

■ A “closed-form”, global solution of the “highly-nonlinear” Maxwell-Boltzmann-Vlasov plasma equation should enable direct computation of control-parameter-values corresponding to self-sustaining nuclear fusion reaction regimes, while also providing other physical / engineering insights, all leading rapidly to the design and construction of commercially *super*-competitive fusion power reactors, utilizing low-radioactivity or ‘no-radioactivity’, virtually pollution-less fuel cycles [e.g., the *Hydrogen-1/Boron* fuel-regime]. ■

Consider the intensely ‘*auto-kinesic*’, *nonlinear* character of a “plasma” --

“A *plasma* is a gas of charged particles, in which the *potential* energy of a typical particle due to its nearest neighbor is much smaller than its *kinetic* energy.”

“The *plasma state* [also termed *plasma phase* — *F.E.D.*] is the fourth state of matter: heating a solid makes a liquid, heating a liquid makes a gas, heating a gas makes a plasma. (Compare the ancient Greeks’ earth, water, air, and fire).”

“The word plasma comes from the Greek *plásma*, meaning “something formed or molded.”

It was introduced to describe ionized gases by Tonks and Langmuir [in a 1929 paper — *F.E.D.*].

More than 99% of the known universe [M.D.: the *visible* universe, e.g., excluding “Dark Matter”, and “Dark Energy”] is in the plasma state.”

[Dwight R. Nicholson, *Introduction to Plasma Theory*, Wiley (NY: 1983), p. 1].

The motion of the non-neutral, electrically-charged «*plásma*» “particles” just described continually, dynamically generates a *changing magnetic* field — a *magneto-dynamical* field of forces.

The locations and concentrations of the electric charges of these “particles”, changing moment by moment, due to that same motion, also continually change the «*plásma*»’s electric *field* of forces, sustaining an *electro-dynamical* field.

A «plásma» thus generates, by the continual motions of its electrically-charged constituents, an overall or collective electro-magneto-dynamic field of forces.

That field of forces, in addition to acting on anything external to the «*plásma*», to a degree dependent upon the physical-spatial proximity of such an “anything” to the «*plásma*», *also acts* — *self-reflexively* and *self-refluxively* — on the «*plásma*» itself, also because its constituent “particles” are electrically-charged, rather than being mostly electrically neutral[ized], as in typical gas-phase matter.

The «*plásma*»’s field continually changes the motions of its constituent “particles”, and thus changes the electric/magnetic fields that they are generating.

Those “particles” changing positions/*motions* thus change their collective *field*, which changes their collective *motions*, which again changes their *field*, which again changes their *motion*. ...

“*Nonlinear self-consistent motions*” are thereby possible, whereby the «*plásma*»-internal, self-generated *field* also guides the «*plásma*»’s “particles” to *reproduce* their very pattern of *flow* by which they generate that «*plásma*» *field* which, in turn, generates that «*plásma*» *flow* . . . viz. --

“The field. . . is termed ads “self-consistent”.”

“It is determined by the distribution of particles and in turn influences their motion”

[N. N. Kalitkin, D. P. Kostomarov, Mathematical Model of Plasma Physics, <http://www.eolss.net/Sample-Chapters/C02/E6-03A-03-03.pdf>].

-- and --

“This thesis investigates self-consistent electrostatic structures in plasmas and related collective systems. “

“They are coherent structures in which particles become trapped in the wave potential.”

“These phenomena require a kinetic description i.e. a description in which the velocity distribution of the particles is taken into account.”

“Trapping structures extend the areas in configuration space in which a plasma is unstable.”

“The main argument and result of this work is that there exist certain kinds of perturbations of an equilibrium that can destabilize the plasma, even if linear theory predicts stability.”

“The usual procedure in plasma theory of analyzing the stability of a plasma by means of a linearization of the equations is therefore questioned.”

[Alejandro Luque Estepa, Ph.D. Thesis, Notes, “Electrostatic Trapping as a Self-Consistent Phenomenon in Plasmas and other Collective Systems”, <http://trove.nla.gov.au/work/5306782?q=subject%3A%22plasma+instability%22&c=book&versionId=6172546>].

This *dialectical process* thus foments a sustained *self-re-iteration*; a *self-consistent “state”* [or ‘*dynate*’] *of motion*; a ‘*consistent-with-self*’ [‘*consistent-with-continuation-of-self*’] /- ‘*consisting-of-self*’, ‘*self-reproducing*’ *motion* of the «*plásma*».

Indeed, the “asymptotically stable” solutions of the «*plásma*» equations, corresponding to actual long-*maintainable flows* [to ‘*spatio-temporal attractors*’, as contrasted with fleeting, “measure zero”, virtually unobservable “*transients*”], must typically have this *dynamically “self-consistent”, “self-reproducing”* character.

Along with any additional influences, acting upon it from its outside, from its ‘*externity*’, the «*plásma*»’s ‘*internity*’ thus *interacts with itself*, *self-reflexively* and *self-refluxively* driving its own *internal motion*, hence, its ‘*auto-morpho-genesis*’, and its ‘*auto-meta-morphosis*’, as a ‘*subject-verb-object-identical eventity*’.

The «*plásma*» phase of atomic / pre-atomic matter-energy, thus, at least in part, exemplifies a ‘*self-forming content*’ — a partially ‘self-shaping’, ‘self-molding’ phase of matter-energy, characterized by ‘self-[induced-]plasticity’ as well as by ‘other-[induced-]plasticity’.

The text *Dialectical Ideography*, in its Section 1. b., entitled *Why Dialectical?*, glosses a hypothetical fusion reactor design, which F.E.D. has dubbed the ‘*Cyclonotron*’ *design* [link: http://www.dialectics.org/dialectics/Dialectic_Ideography_files/5_Dialectics-Part1b-WhyDI_OCR.pdf].

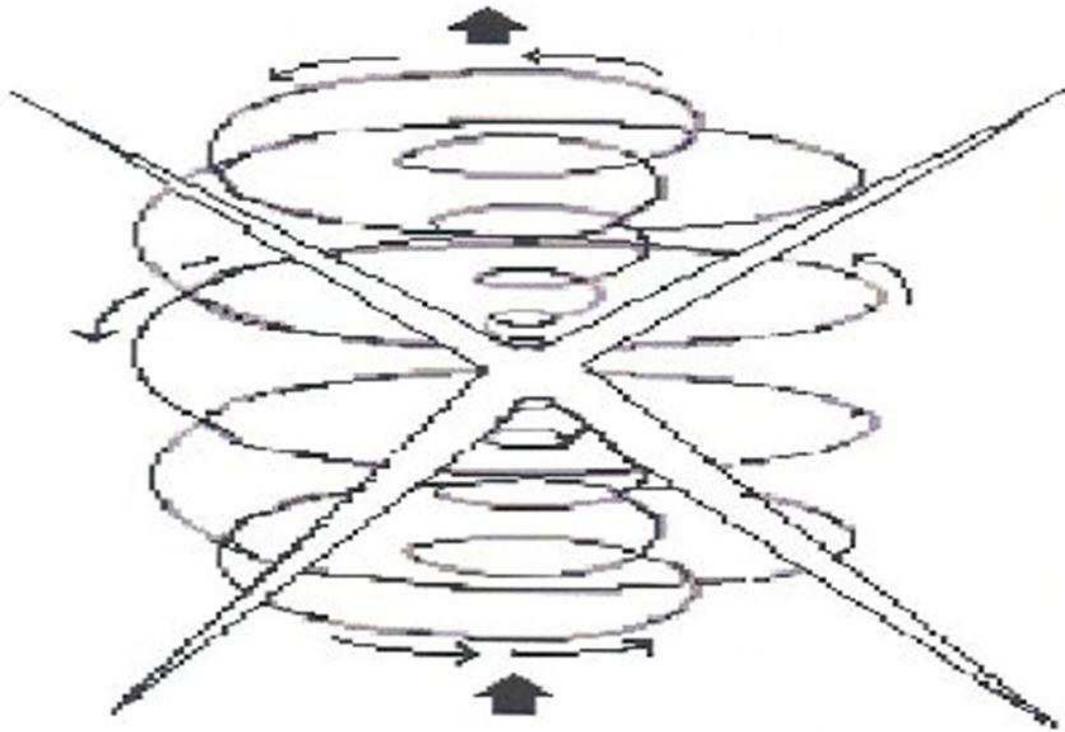
This design hypothesis is based upon the propensity or proneness of “‘*flowing media*’”, or “‘*rheids*’” — whether they be the ≈ electro-neutral liquid or gaseous “*rheids*” described by the [*nonlinear*] Navier-Stokes system of equations, or the electrically-charged, ‘electro-magneto-*active*’ and ‘electro-magneto-*self-active*’ «*plásma*» “*rheids*” described by the [*nonlinear*] Maxwell-Boltzmann-Vlasov [vector-]equation(s), by the Klimontovich equation, and by the Liouville equation — to “spontaneously” generate, i.e., to ‘*self-generate*’, “‘*cyclonic*’” [and “‘*anti-cyclonic*’”], or “‘self-re-entering’”, *vortices*: “‘*toroidal vortices*’”.

This “‘genericity’”, by “‘*rheids*’”, with respect to “‘*toroidal-vortical flow-forms*’”, may be *related* to the ubiquitous, “‘*particle-like*’”, “‘*solitary wave*’”, or “‘*soliton*’”, *solutions* that have been derived, *in closed-form*, for a very large and diverse variety of *one-dimensional*, *nonlinear*, partial-differential *wave*-equations.

‘Neo-closed-form’ “‘*toroidal vortex*’” *solutions*, or “‘*cyclonic vortex*’” *solutions*, may be the true *three-dimensional* generalization of those *closed-form*, *one-dimensional*, “‘*solitonic*’”, “‘*nonlinear wave*’” *solutions*.

We conjecture that *non*-pulsed, continuously-“burning” fusion reaction may be maintainable at the “‘heart’” of the “‘eye’” of a «*plásma*» *toroidal vortex*, or «*plásma*» ‘*micro-hurricane*’, induced into “‘self-precipitation’” in a «*plásma*» control-chamber whose parameter-vector of control-parameter-value set-points is appropriately tuned, e.g., via engineering guidance received from the ‘neo-closed-form’ solution of the «*plásma*» equations.

This conjecture is depicted below.



In the above-depicted hypothesized *nonlinear self-consistent motion* of the «*plásma*», fresh fusion fuel is injected at the base of the ‘«*plásma*» cyclone’, then ‘vortically’ conveyed up the ‘eye chimney’ of that ‘cyclonic «*plásma*» vortex’, and concentrated maximally at the “‘heart’” of that ‘eye chimney’ -- approximately half-way up that ‘eye chimney’ -- by «*plásma*»-borne ‘electro-magneto-dynamic’ fields, stronger than any solid-state -- e.g., metal -- magnetic field coils and/or electrodes, could source, without themselves being converted to a molten liquid phase, to a vaporized gaseous phase, or even to an ionized «*plásma*» phase, thus with sufficient field-strength to overcome the Coulomb mutual repulsion of the fusion fuel nuclei, thereby bringing these nuclei into a proximity sufficient to ignite, and to continuously sustain the ignition of, the fusion reaction, thence continually, ‘vortically’ conveying the fusion reaction products up and out of the top of the ‘eye chimney’ for removal, in a continuous toroidal motion, the motion of a «*plásma*»-constituted torus ‘rolling upon itself’.