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Subject: *Preludes Series – Prelude II.: "Nonlinearity & Self-Changingness"*

Dear **www.dialectics.org Webmaster,**

Greetings to you from **Foundation *Encyclopedia Dialectica*!**

Background. This letter contains **Prelude II.** of a series of Preludes to a forthcoming major manifesto by **Foundation *Encyclopedia Dialectica***. The series title is – ***Portents & 'Pre-Vestiges' of an Immanent Critique of Modern, 'Mathematico-Science'***. The series is based upon a sequence of commentaries already posted elsewhere on the World Wide Web. The title of this **2**nd **Prelude** of the series is – "**Nonlinearity & Self-Changingness**".

Prelude II.: "Nonlinearity & Self-Changingness". What is *Nonlinearity*, and what, if anything, does it have to do with "*Self-Changingness*" [«*Auto-Kinesis*»], and with «*Dialektikê*»?

Here's a partial answer --

"...That is the way I explained *non-linearity* to my son. But, why was this so important that it had to be explained at all? The complete answer to this question cannot be given at present, but some people feel that **the answer, if known, would shake the very foundations of mathematics and science**... practically all of classical mathematical physics has evolved from the hypothesis of linearity. If it should be necessary to reject this hypothesis because of the refinements of modern experience, then **our linear equations are at best a first and inadequate approximation**. It was Einstein himself who suggested that the basic equations of physics must be *non-linear*, and that **mathematical physics will have to be done over again**. Should this be the case, **the outcome may well be a mathematics totally different from any now known**. The mathematical techniques that might be used to formulate *a unified and general non-linear theory* have not been recognized... we are now at the threshold of *the nonlinear barrier*."

[Ladis D. Kovach; "*Life Can Be So Nonlinear*" in American Scientist (48:2; June 1960); pages 220-222, **emphasis** added].

The equations in which humanity's present best formulations of the "laws" of nature are typically formulated are called "partial [integro-]differential equations". Almost all of these "natural-law equations" are *nonlinear* equations.

Modern science is embroiled in a gigantic scandal that is seldom mentioned to the public: most of these "law of nature" equations have **never been solved**, because of the difficulties which *nonlinearity* presents, for solving equations, to present-day mathematics.

It helps to think of domain of "integro-differential equations" as that of an algebra, but an algebra expanded to be able to explicitly talk about change, the speed of change, the acceleration and deceleration of change, etc.

Nonlinear change equations, at their core, have the following structure, in "narrative translation" --

"**The Next-Instant Rate of Change of the State of the System is proportional to the *Self-Multiplication* of its present State**", or

-- "The Speed of Evolution of the State of the System = a control-parameter times the ***Self-Action*** of its present State."

Sounds rather "*karmic*", doesn't it? Nonlinear Dynamical Equations seem, thus, to be about '***Self-Changingness***' – about the trajectory of change generated by the '***self***-operation' of each **_state_** of a dynamical system, the operation of each such dynamical **_state_** upon **_itself_**, in producing its "next". But what has this to do with «***Dialektikê***»?

If we could solve the -- *highly nonlinear* -- Navier-Stokes Equations, which describe the dynamics of gases and fluids, could we locate the "Achilles heels" of hurricanes and tornados, where the application of a small/affordable amount of energy would have the disproportionately-large effect of abruptly ending the storm?

If we could solve the -- *highly nonlinear* -- Klimontovich equation, and/or the Maxwell-Boltzmann-Vlasov equation, could we find the location, in the vast "control-parameter-spaces" of those equations, the control-parameter-values-lists -- representing the physical the conditions -- which would create a self-sustaining Hydrogen-Boron fusion reaction, thus yielding essentially only electrons, no ionizing radiation, giving us abundant, inexpensive, pollution-free power?

WHY ARE _NONLINEAR_ DYNAMICAL EQUATIONS SO HARD FOR OUR PRESENT MATHEMATICS TO SOLVE?

Dialogically yours,

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