

# VERIFIABLE FORECASTS OF ENERGODYNAMICS

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## Abstract

Not trivial consequences of the new fundamental discipline establishing unity of laws of transfer or transformation of any forms of energy are produce.

The essence of the contradiction of these consequences to conclusions of some fundamental disciplines is short described and ways of their elimination are offered.

References to the theoretical and experimental papers confirming conclusions of the theory or specifying ways of their check are given.

## Keywords

*Fundamental disciplines, energodynamics, heat and non-heat processes and engines, forecasts, consequences, contradictions, theoretical and experimental proof, ways of elimination and check.*

## INTRODUCTION

The development of today's science may be characterized by what we call "epistemological inversion". It is now more preferred "to guess equations, not taking into account physical models or physical interpretations of phenomena" (R. Feynman). Scientists do not any more suffer from the fact that their theories do not clear up the reality; they are not any more aimed at discovering cause-effect relations in implementation of various laws. The interpretation of phenomena is not any more a function of science. In such conditions, some striking theories for the "whole shooting match" come to light like mushrooms after rain. They suggest moving backward in time, travelling to parallel worlds, simultaneous presence in different regions of space, producing energy from "emptiness", etc. The scientific world on a large scale looks like a Theatre of the Absurd where space curvatures and zero-length processes become possible; where effect goes before reason, and the Universe can concentrate at a single point of infinite mass; where length of material object can equal zero and energy can be negative; where "dark" matter predominates along with a darker matter; where we calculate energy with accuracy up to the billionth of one percent without knowing what energy really is, etc., etc. Such theories excite and cause sensations, though they never benefit as consist of objects which cannot be studied due to their fancy locations – out of all possible limits. A canonical belief in uniformity and cognoscibility of nature has been replaced by agnosticism and indeterminism. Theory has degenerated into a random search of descriptive formalism for observed phenomena. New empirical facts are now more often pushed into a "Procrustean bed" of existing paradigms by means of various hypotheses and postulates. Hence, there is also an extreme hypersensitivity to any (inc. constructive ones) attempts to change something in our background knowledge. So only those who, as they say, have nothing to lose may decide on making such attempts. And the author of the present article is one of such. In some of his works, such as "Thermodynamics for non-equilibrium processes of energy transfer and transformation" (1991), "Thermokinetics" (1999), "Energodynamics" (2008), "Synthesis of Engineering Disciplines Fundamentals" (2011), "Theoretical Foundations of Fuel-Free Energetics" (2013), the author tries to put things right by making a switch in research methodology and taking a non-hypothetical and non-postulational theory of transfer and transformation of any form of energy as a basis. Deductive method used to build mechanodynamics, thermodynamics, hydroaerodynamics and electrodynamics and systematic approach to the study subjects ("developing from the general to the special") helped to discover plenty of internal and external conflicts in the aforementioned disciplines.

The present article gives a short summary for the very essence of these conflicts and provides links to the author's works suggesting ways of the conflicts solution. Most of non-trivial energodynamic equations have been proved by independent observations and experiments, the rest part could be regarded as to the theory forecasts subject to verification.

## CONTRADICTIONS OF SOME FUNDAMENTAL DISCIPLINES

### 1. *Increase in internal energy of an isolated system during its thermal relaxation.*

Essence of the conflict: According to experimental data,  $U = C_v T$  variable, considered as internal energy in thermodynamics, increases during relaxation in a thermally-inhomogeneous isolated system, which contradicts conservation law (the first law of thermodynamics). Conflict solution: To accept the fact that internal (and any other) form of energy has an ordered (non-equilibrium) and unordered (equilibrium) parts, which allows explaining experiments by transformation of one part into another [1].

### 2. *Usability of environmental heat.*

Essence of the conflict: The second law of thermodynamics prohibits transformation of environmental dissipated heat into work, which contradicts the facts of increase in performance of galvanic and fuel cells by the action of external heat. Conflict solution: To prove that the heat in the cases above performs only in order to make up for decrease of unordered internal thermal energy, but not to transform it into work [1, 3].

### 3. *Possibility of objects motion under action of internal forces.*

Essence of the conflict: Reactionless drives motion in isolated mechanical system contradicts classical mechanics. Conflict solution: To prove that in inhomogeneous system, conservation law refers to the sum of kinetic moments of translation and rotational motion, which does not exclude possibility of their interconversion and change in location of centers of mass of the isolated system [2, 3].

### 4. *Work performed by Coriolis and Lorentz forces.*

Essence of the conflict: According to mechanics, forces normal to motion, including Coriolis forces and a magnetic component of Lorentz force cannot do work, which contradicts the destructive effects of Coriolis forces in nature and electric machines principle. Conflict solution: To prove that any forces can arise by pair and produce torques doing work [3, 4].

### 5. *Unity of laws of energy transformation in heat and non-heat engines.*

Essence of the conflict: It is stated that in ideal non-heat engines a 100% absolute efficiency may be reached (as opposed to thermal efficiency). Conflict solution: To develop a theory of similarity and efficiency of technical systems establishing singleness of energy transformation laws in heat and non-heat, cyclic and non-cyclic, direct and reverse engines [3, 5].

### 6. *Antisymmetry of reciprocal relations in energy transformation processes.*

Essence of the conflict: Positive definiteness of phenomenological coefficient matrix in irreversible processes theory causes limitation of relative efficiency of energy converters which contradicts the corresponding experiment. Conflict solution: Prove that for energy transformation processes of Casimir's antisymmetric reciprocal relations are valid and can replace Onsager's symmetry conditions [1, 3, 6, 7].

### 7. *Dependence of mixing losses on the character of the mixing gases.*

Essence of the conflict: It is stated that entropy jump does not depend on the character of the mixing gases (Gibbs' paradox), which conflicts with experimental facts that fuel cells lose efficiency depending on affinity of mixing reagents. Conflict solution: To prove that for the mixture of noninteracting gases the entropy jump conflicts with the third law of thermodynamics and is determined not by efficiency losses but by the move of reference point of the mixture entropy [3, 8, 9].

8. *Uniqueness of independent processes dynamics.*

Essence of the conflict: Fundamental for irreversible process theory, L. Onsager's postulate states that each relaxation or transfer process speed depends on all forces acting on a system. That conflicts with the concept of independent process and with laws of mechanics which state their resultant. Conflict solution: To prove that for each independent process there is a single moving force that can terminate the process if equals zero [1, 3, 10, 11, 12].

9. *Unity and opposition of energy transfer and transformation processes.*

Essence of the conflict: Mechanics and thermodynamics do not distinguish work as a quantitative measure of energy transformation process or as a quantitative measure of its transfer into one and the same form; that causes faulty estimation of transformation degree of various forms of energy. Conflict solution: To prove that there is a "water parting line" between these two categories of work and a unity of energy transformation laws in each of these categories [3, 13, 14].

10. *Possible existence of incomplete equilibrium when the heat one is absent.*

Essence of the conflict: The existing theory of irreversible processes declares that it is impossible to terminate any process occurring in the system during its thermal relaxation, which contradicts the experiments on annealing of diffusion couples. Conflict solution: To prove that all types of partial equilibrium based on more common non-entropic equilibrium criteria [3, 2, 15, 16].

11. *Possible degeneration of thermal form of motion.*

Essence of the conflict: The third law of thermodynamics (where absolute zero temperature cannot be reached) is equal to the statement that thermal form of motion is conceptually indestructible and the "heat death of the universe" is inevitable. Conflict solution: To prove that thermal form of movement results from the synthesis of particles kinetic energy and their potential interaction energy, and it degenerates as such if one of those energies disappears. To reason that an absolute zero of any potential may be asymptotically reached [2, 2, 17].

12. *Possibility of conjunction of chemical reactions and metabolic processes within bio-systems.*

Essence of the conflict: Interaction between scalar chemical reactions and vector metabolic processes in bio-systems contradicts Curie's principle by which only phenomena of the same (or even-numbered) tensor rank may conjugate. Conflict solution: To prove the vector character of thermodynamically reversible chemical reactions occurring in cell membranes, fuel and galvanic elements [3, 18, 19].

13. *Possibility of material equilibrium in the process of thermal relaxation.*

Essence of the conflict: While entropy is used as an equilibrium criterion the heat equilibrium plays a special role and none of the processes within objects can be terminated during their thermal relaxation. This conflicts with the fact of achieving material equilibrium in the process of annealing of "diffusion couples". Conflict solution: Developing a theory of partial equilibrium based upon more general energetic equilibrium criteria, and setting "equal status" to all its types [1, 2, 20].

**14. *A force fields absence in case of absence of their sources?***

Essence of the conflict: It is considered that electromagnetic and other fields can exist independently of their sources, which conflicts with Newton's, Coulomb's and Ampere's laws in the absence of masses, charges and currents. Conflict solution: To prove that any force is determined by system energy derivative of one of spatial heterogeneity parameters, so the fields of force are not produced by masses, charges and currents themselves, but by their non-uniform distribution in space [3, 20, 21].

**15. *Solution of the thermodynamic inequalities problem***

Essence of the conflict: The existing methods of calculation of heat transfer, mass transfer and work of change of the system state variables cannot be used in case of irreversible processes, when these variables change spontaneously. Conflict solution: A shift to calculation of energy transfer on the basis of experimental equation of transfer, not of the state one [3, 22, 23].

**16. *Existence of new types of interaction.***

Essence of the conflict: Classical and quantum mechanics are not aware of forces or fields initiated by spatial non-uniform distribution of angular momentum, which contradicts experiments with gyroscopes and rotating bodies. Conflict solution: Proof of the force field existence determined by spatial non-uniform distribution of angular momentum [3, 24, 25].

**17. *Possibility of rotational motion transfer in vacuum.***

Essence of the conflict: Mechanics is not aware of the ways of rotational motion transfer in vacuum or in stationary medium, which contradicts astronomic observations and experiments with rotating objects. Conflict solution: Proof of existence of an unknown type of rotating objects interaction (in addition to existing four types) and possibility of ether "vorticity" transfer. Supplementation of mechanical equations with members responsible for that interaction [3, 24, 25].

**18. *Existence of orientation interaction contributing to bodies or their part orientation ordering.***

Essence of the conflict: Science is not aware of interaction causing unified orientation of rotating objects, which contradicts astronomical observations and experiments with spin systems of some materials. Conflict solution: Proof of existence of one more type of rotating objects interaction causing disappearance of precession and ordering of orientation of their rotational axis [3, 24, 25].

**19. *Possibility of creation of gravitational energy converters.***

Essence of the conflict: Gravitation theory based upon Newton's law excludes possibility of gravitation energy transformation in cyclic processes, which contradicts with operation of tidal power stations. Conflict solution: To use a more general form of gravitation law in cases of random distribution of masses which does not exclude possibility of gravitational field source configuration change in a cyclic process of the trial body [3, 26].

**20. *Feasibility of fuel-free "heat generators".***

Essence of the conflict: Classical and non-equilibrium thermodynamics do not accept possibility of development of heat pumps working on ether energy, which conflicts with experience in development of series of fuel-free "excess heat generators" which do not use chemical, atomic or nuclear transformation energy in material matter. Conflict solution: Experimental proof that classical characteristics of heat pumps confirming the use of ether energy are valid for heat generators [3, 26].

**21. *Feasibility of «overunity» devices working on ether energy.***

Essence of the conflict: Contemporary physics does not accept possibility of development of electro-technical devices with output power exceeding calculable input power, which conflicts with experience of development of series of “excess power generators”. Conflict solution: Proof that disequilibrium between ether and material matter may be reached by action of electrical impulses of near resonant frequency [3, 26].

**22. *Elimination of divergences in Newton's and Coulomb's laws.***

Essence of the conflict: Newton's and Coulomb's laws operate with point mass and point charges and do not consider possibility of their interpenetration. This causes infinite value of potentials and forces in case of point masses and charges maximum approximation. Conflict solution: Derivation of Newton's and Coulomb's laws with final values of masses and charges taken into account, and without their infinite approximation allowed [3, 27].

**23. *Incompleteness of Maxwell's equations.***

Essence of the conflict: Maxwell's equations are focused on electromagnetic field and, hence, do not include displacement fluxes of bound charges in dielectrics and magnetics; this complicates explanation of Rowland-Eichenwald's, Roentgen-Eichenwald's, and Wilson-Barnette's effects. Conflict solution: To reject postulating Maxwell's equations and establishing them for an agent in external electromagnetic field from ergodynamics primary principles with aforementioned fluxes taken into account [3, 27].

**24. *Existence of electromagnetic longitudinal waves within substance.***

Essence of the conflict: Maxwell's equations of electromagnetic fields do not include solutions for longitudinal waves, which conflicts with experimental data on successful transfer of significant power via one-wire line of a small section. Conflict solution: To prove that, within Maxwell's equations, there is a need to replace partial time derivatives of electric and magnetic induction vectors by total ones, which explains longitudinal EMW within substance and assumes energy transfer via one-wire line in it [3, 27].

**25. *Unfoundedness of substitution of ether for electromagnetic field.***

Essence of the conflict: Maxwell's postulate of electrical and magnetic energy interconversion processes occurring in electromagnetic field leads to violation of conservation law. Conflict solution: To return ether as material medium interacting with substance and transferring any form of its energy by means of corresponding vibration frequencies of its density [3, 27].

**26. *Existence of radiation of non-electromagnetic nature.***

Essence of the conflict: Electromagnetic theory considers optical and any other phenomena belonging to electromagnetic type, which conflicts with radiations of non-magnetic nature. Conflict solution: To deny a fact that substance energy is transferred in the same form. To prove that the mechanism of transfer is conducted by transformation into ether energy, with subsequent inverse transformation in the previous (or another) form of radiation receiver energy [3, 27].

**27. *Existence of radiation potential different from temperature.***

Essence of the conflict: Astrophysics attributes to cosmic (“relic”) radiation a definite temperature, which conflicts with temperature concept as a measure of random motion intensity. Conflict solution: To prove that a wave form of energy exists and is different from potential temperature [3, 27].

**28. *Radiation “reddening” during its transfer in absorbing medium.***

Essence of the conflict: The redshift is explained only by “recession” of galaxies which conflicts with dissipation typical for all forms of ordered energy. Conflict solution: Proof of singleness of energy transfer law in material substance and ether, and inevitable wave potential decrease [3, 27].

**29. *Force character of interaction between ether and substance.***

Essence of the conflict: Physics do not accept ether-supported forces; that causes violation of Newton’s third law in series of experimentally observed cases. Conflict solution: Proof of ether wave similarity to electrical or magnetic dipole whose interaction with the substance has a force character and is defined by the same analytic expression [3, 27].

**30. *Existence of faster-than-light speeds.***

Essence of the conflict: Special theory of relativity postulate about inaccessibility of superluminal speeds conflicts with series of experimental fact. Conflict solution: To accept existence in ether of longitudinal waves along with the shear ones with distribution speed exceeding the speed of light [3, 27].

**31. *Possibility of ether-substance equilibrium disturbance.***

Essence of the conflict: Rejection of ether as a material medium possessing own energy conflicts with experimental data indicative of series of “overunity” devices receiving external energy. Conflict solution: To find out conditions of ether-substance equilibrium disturbance and in-feeding of substance with the energy of ether [3, 27].

**32. *Possibility of self-sustaining rotation.***

Essence of the conflict: Mechanics does not have interactions responsible for implosion phenomenon, tornados and typhoons formation and development, etc., hence it is impossible to explain the phenomenon of rotation “self-acceleration” of series of magnetically ordered objects after initial push (Searle’s effect). Conflict solution: To uncover vector potential nature as an angular velocity of electric current circular motion, and its relation to eddy magnetic field [3, 27].

**33. *Existence of spontaneous processes of equilibrium deviation.***

Essence of the conflict: Entropy increment principle prescribes system degradation and excludes possibility of any processes of “self-organization”, which conflicts with evolutionary processes observed in wildlife. Conflict solution: Proof of “processes “antidirectivity” principle by which approximation to equilibrium of any parts or degrees of freedom of non-uniform system is necessarily supported by other parts or degrees of freedom withdrawal [3, 28].

**34. *Elimination of thermodynamics and evolution contradiction.***

Essence of the conflict: Entropy increment principle prescribing processes one-way orientation to the system degradation is in “egregious” (I. Prigozhin) contradiction with biological systems evolution character. Conflict solution: Proof that, along with relaxation processes, biosystem includes antidirectivity processes, and that adds to the system’s time of relaxation (lifetime), which is implied by Darwin’s “struggle for survival” principle [3, 28].

**35. *Impossibility of “order” out of “chaos” phenomenon.***

Essence of the conflict: “Order out of chaos” concept conflicts with the second law of thermodynamics (entropy increment principle). Conflict solution: To prove that, according to antidirectivity principle, ordering process regards not to the whole system but to its separate areas or freedom degrees and is supported by decrease in the system ordered energy as a whole, in full accordance with the second law of thermodynamics [3, 29].

**36. Possibility of the Universe internal development without equilibrium state.**

Essence of the conflict: The theory of the heat death of the universe conflicts with the fact that, after 10 billion years of existence, it has not reached heat equilibrium. Conflict solution: Proof of inapplicability of entropy increment principle for the Universe as a whole and its replacement by energetic criteria tolerating its further development without equilibrium state [3, 29].

**37. Velocity independence of mass.**

Essence of the conflict: Understanding of Newton's mass as a measure of the object inertia contradicts with mass conservation law for isolated system. Conflict solution: To prove that, along with mass, another coefficient should be included in the second Newton's law, which will consider nonlinearity of accelerating force dependence on the object impulse. To discover the coefficient's dependence of accelerator velocity and efficiency [3, 30].

**38. Inequality of mass and energy.**

Essence of the conflict: Postulate of mass and energy equality causes contradiction with internal energy conservation law. Conflict solution: To prove that closed system energy can change with constant rest mass by means of various forms of energy exchange with environment [3, 31].

**39. Non-conformance of energy quantum to photon energy.**

Essence of the conflict: Unlimited increase of photon energy with frequency increase  $\nu$  conflicts with series of experiments and leads to "ultraviolet catastrophe". Conflict solution: To prove that a true radiation quantum is soliton – a solitary wave arising in ether by means of substance structural elements oscillations and achieving there a structural sustainability [3, 32].

**40. Nonapplicability of relative theory applied to absolute values.**

Essence of the conflict: Galileo's relative principle extrapolation to every single natural phenomena leads to violation of internal energy conservation independent of any reference system. Conflict solution: To prove that any internal variables of the system should be measured in absolute scale similar to temperature and pressure scale and independent of motion or disposition of the system as a whole [3, 33].

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