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DEVELOPMENT PROSPECTS OF TORE TECHNOLOGIES, ELASTIC MECHANICS AND "WONDERS" WORKED BY THEM IN NATURE

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I was requested to write this report/paper by Professor S.N. Yevstafyev, pro-rector for R&D at the Irkutsk State University who understands the phenomenon of tore technologies and elastic mechanics as the next hierarchical level in the natural science, which necessitates timely education of R&D and teaching staff to master the above phenomenon.

The following material continues and at the same time gives a concise, maybe somewhat fragmentary, summary of my book **"The Technology of Creating the Universe Based on Tore Technologies and Elastic Mechanics. The Foreword"**. The text was written "at a breath", and as such may contain errors though not fundamental, easily correctible and described with respective comments in further works of the author.

In this paper, works dedicated to investigations into, for instance, functional features of galaxies and hurricanes are not considered since they lack the principal thing, namely the toroidal motion mechanics based on which they are brought to live, live and die in infinite and eternal Universe and Time.

Introduction

In the year 2005 important investigation results were obtained in the USA ("Elastoneering, Inc.") exposing **the absolute identity of the mechanics of currently developed tore/elastic machines with naturally occurring processes based on toroidal/vortex motion** [1] (Fig. 1).



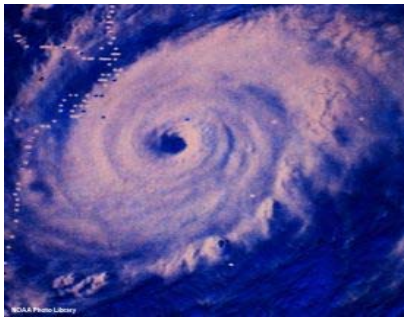


Fig. 1 Visual identity of an engineered 6-branch/roll toroid and natural elastic toroids: 2-branch/roll galaxy toroid and 5-branch/roll hurricane toroid with the central part twisted appropriately. The eversible end – "the corrector funnel"– is everting towards us.

The knowledge of strong and weak points of the toroidal motion mechanics makes it possible to act guided by reason rather than blindly in conducting works to create

- propulsive devices, drives, motors and energy-information systems represented by guided gaseous and/or liquid eversible/enveloping elastic toroids/vortexes with subsequent intake from them of energy and/or information, and/or their target transformation and use;
- systems of timely suppression of such a natural mass destruction weapon (NMDW) as hurricane/tornado spreading headlong over the Earth nowadays, being natural functional specifics of our Galaxy development in the 21st (respective the Earth) century. For instance, the number of hurricanes/tornados in the USA increased twofold in 2005 compared with the year 2004; and this process will continue avalanche-like into the future on the global scale especially in "non-tornado" areas. The reason for the hurricane/tornado NMDW spreading is systematic changing of the climate on the Earth…

Viewed from the above, the Tore Technologies (TORTECH) and Elastic Mechanics (ELASTONEERING) line of activities based on the toroidal (vortex) motion mechanics includes the following segments:

- making propulsive devices, drives, engines, motors and energy-information (smart) systems; and
- making hurricane/tornado NMDW suppression systems.

Tore/Elastic Machines and Mechanisms

The main structural element of ***tore/elastic machines and mechanisms*** is a thin hermetically tight or non-tight (for a pressure pulse) elastic/soft toroidal shell made of real elastic/soft matter and filled with working/fluid medium under excess (gas) or normal (liquid) pressure referred to as an eversible or enveloping elastic toroid. When effected by external or internal forces, the elastic toroid progressively advances through eversion/envelopment (rolling) against an anchoring belt. The central part of the elastic toroid may be twisted before its assembly to a pre-determined (functional) angle equal to $(\alpha + 360^{o} n)$, where 'n' is a number of full twists/turns.
The total number of twists/turns will be $(\alpha / 360^{o} + n)$.

Eversibility

The main functional property of the shell material of an eversible/enveloping elastic toroid as the latter advances to, for instance, its travel length is a permanently moving forward and/or backward circular bend/wave – the boundary of abrupt (by 180^{o}) transformation/conversion of the periphery of the elastic toroid into its central part.

Along with this, its location is constantly changing and is periodically repeated depending on the number of cycles.
Therefore, the material immunity to a permanently changing bend that appears with a certain frequency in a particular location should be taken into consideration.
Moreover, toroid shell materials should maintain working capability within a sufficiently wide temperature range of the ambient air, e.g. of the Earth, from $+45^{o}$ to -60^{o}C.
Therefore, fabrication of a working prototype, e.g. the toroidal drive of a vehicle [2], requires

- use of available materials for rubberized fabric shells;
- use of resilient woven shells impregnated with Indian rubber;
- development of new materials based on cotton, silk, nylon or any other fabric or tubular textile with a rectangular, asymmetrical, triangular grid, having warp threads positioned wedge-like against weft treads of the fabric subsequently coated with Indian rubber;
- development of new intelligent (smart)/"sensitive" materials for toroidal shells [3] with a definite direction of elongation/compression axes in the reinforcing layer, that "reproduce" functional capabilities/properties of "live" materials of natural eversible or enveloping systems.

The most promising thing seems fabrication of multi-layer toroidal shells with extended consumer properties in which each layer imparts its specific properties to the whole fabric or tubular textile. The layers may be linked with a gluing substance and in some cases such linking may be fully or partially absent.

For example, a toroidal shell may be made (depending on its technological purpose) of hermetically tight or non-tight (for a pressure pulse) thin elastic /soft composite material with an empirical *eversibility/envelopment* factor – *Shikhirin's constant*. The material manifests the fundamental multi-nominal integral property of eversible/enveloping elastic toroids, namely *eversibility/enveloping capability* with minimum energy consumption.

The toroidal shell must meet a predetermined relationship between

- *elasticity* - available elastic tensile deformation by 150-200%;
- *flexibility* – available bending deformation up to the value of the radius nearly equal to the material thickness;
- *softness* - ability to form folds when the material works within elasticity limits and the minimum rounding-off radius in its fold does not exceed its 10-fold thickness;
- rheological properties of the working/fluid medium and the value of excess/normal pressure;

- elastic toroid geometries properly proportioned;
- a force value to trigger the process of eversion/envelopment, etc.

Currently, the methodology of experimental measuring empirical eversibility/envelopment factors and the diagnostic test-board for studying thin toroidal elastic/soft shells are under development (*Elastoneering, Inc. USA*).
Existing methodologies, for instance, determining a handle module [4] based on pulling a material under test through a calibrated cone-shaped funnel fail to diagnose the eversibility/envelopment factor – the moving bend/wave of the material.
The shell material of natural eversible/enveloping elastic toroids that are the main "live" micro- and macro-world elements possesses ideal eversibility properties.

Natural Smart Multi-Dimensional Toroidal Solitons

Practically all works related to studies of vortex effects (toroidal motion) and implementation on their basis of energy-information systems authored by Nikola Tesla (1856 – 1943) and Viktor Schauberger (1885 – 1958) are contained in Internet sources [5, 6].
Moreover, authors/owners of these web-sites E.E Aseev (Novosibirsk), E.D. Sorokodum (Moscow) have not only collected and continue to collect and categorize this most valuable information but are directly and successfully involved in creation of such systems and understand these effects from the physical point of view.

Stable eversible/enveloping elastic toroid/vortex.

The main structural component of motors, propulsive devices, drives and energy-information systems based on the toroidal motion mechanics is a virtual thin hermetically non-tight eversible elastic/soft shell being permanently filled/refilled by the enveloping end – a "predictor funnel^{+}" - by way of suction/indraught of the fluid medium under excess (gas) or normal (liquid) pressure from the outer space. The suction (similar to a forevacuum pump action) results from the progressively advancing central part of the elastic toroid rotating with a high angular velocity. The motion follows a multi-turn helical pattern from the "predictor funnel^{+}" to the "corrector funnel^{-}".

The elements of such a power-producing machine are
- the eversible end, or the «corrector funnel^{-}", behind which a low-density area is generated with a current pressure value P^{-} and, respectively, temperature value T^{-};
- the enveloping end, or the "predictor funnel^{+}", in front of which a pressure area is generated with a current pressure value P^{+} and, respectively, temperature value T^{+};

- ($P_t > P^+ > P^-$) relationship should be observed, otherwise the elastic toroid will "sag" and "come undone", i.e. cease to exist;
- the "material" of the generated toroid shell is a virtual smart elastic/soft toroidal (closed) *diffepotential surface of the pressure field* – the specifically structured (formatted, installed) periphery and the central part of the elastic toroid;
- current pressure values P_t , P^+ and P^- and, respectively, T_t , T^+ and T^- temperature values are distributed in areas of "their effect" in compliance with a specific law (Fig.2);
- the direction/track of the elastic toroid movement determines a low pressure area the toroid moves to/is drawn into by eversion;
- In case the elastic toroid exceeds its power-producing ability to move forward to the low pressure area by means, for instance, of its weight, it sags and starts to bite off the Earth surface and everything located on it by the enveloping edge while rotating like, e.g. a hurricane.

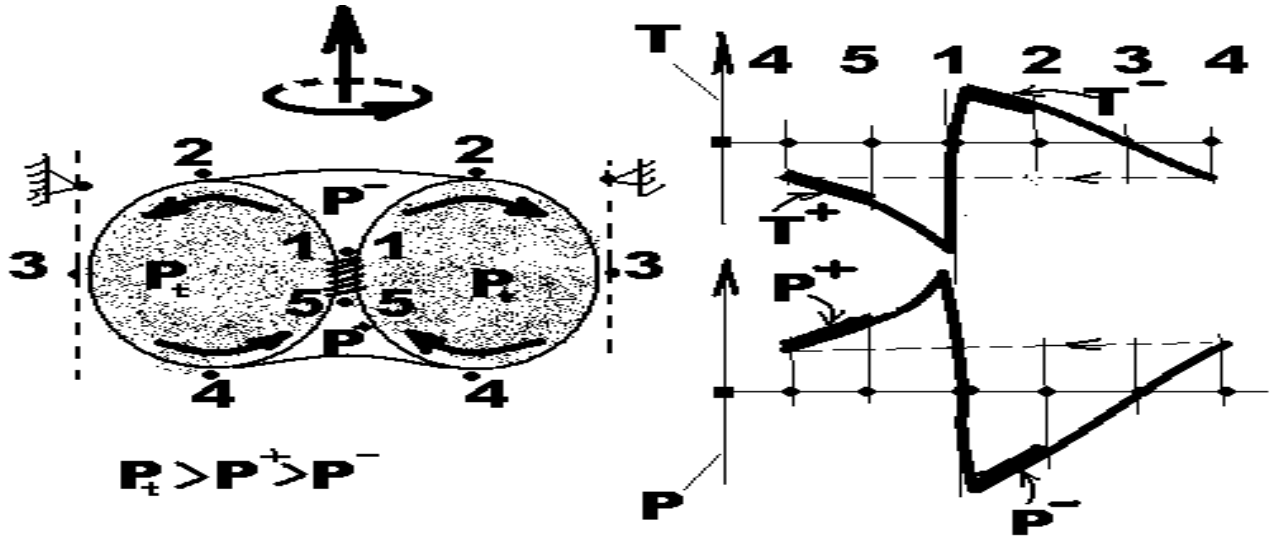


Fig. 2 Pressure and temperature distribution (points 1, 2, 3, 4, 5, 1) on/in the surface of a natural or artificial eversible elastic toroid having a virtual shell. Be in Point 3 is assumed to be an arbitrary '0' corresponding to the point of smooth transition of the "corrector funnel$^-$" to the "predictor funnel$^+$" through the toroid periphery.

Torus knots

The carcass ("body-centered network") of the smart shell material of an eversible/enveloping elastic toroid is a physical system of mutually linked topological [7] torus knots characterized by *p* and *q* parameters [8], where
p is the number of turns around the toroid meridian (poloidal axis); and
q is the number of turns around the toroid length/axis.

Knot lines that cross toroid/torus meridians at a constant angle are also referred to as rump lines/loxodromes [9]. Physically, they support a permanent direction/track, i.e. provide length minimization and hence power minimization during movement along that line including torsion movement [10]. If this angle is equal to 0^o the loxodrome is degenerated into a meridian, and if equal to 90^o, it is degenerated into a parallel.

Baron Kelwin (Thomson William) [11] was the first to express the idea of "vortex atoms" that explains the existence of different type atoms by closed vortex lines with different numbers of knots.

So, the family of torus knots mutually linked (sliding against one another) and interacting in a strict functional natural hierarchy (prioritized by functions) consists of at least three "*static" and one "dynamic"* knot (Fig. 3).

1. Static knots:

- (***0.0***) - gravitation knot: the gravitation center point is in the center of the toroid/torus "hole", i.e. outside the toroid/torus. It is "responsible" for the gravitation field $\boldsymbol{F_G}$ generation. The (***0.0***) knot is not present in the generally used torus knot system (*a comment of the author*);
- (***1.0***) - "trivial knot" or pressure knot: the circumference (R_t)/oval, located in the XY plane, is the toroid string whose center is crossed by the poloidal axis Z. It is "responsible" for the pressure field $\boldsymbol{F_P}$ epicenter generation.
- (***0.1***) - shape-and-volume knot: the circumference (r_t)/oval, strung onto the (R_t) circumference and moving along guided by the latter, the R_t being the medium line/string of the elastic toroid, i.e. the pressure epicenter. This knot is "responsible" for generation of the diffepotential surface of the pressure field.

2. The dynamic knot $\mathbf{(3n_p; \{}\boldsymbol{n_q + [(n_q - 1)/2]}\mathbf{\})}$ is a smart (energy and information producing) knot referred to as a multi-dimensional helical soliton [12] or a smart multi-dimensional toroidal soliton (*Shikhirin's soliton)* , where

○ p = $\boldsymbol{3n_p}$, i.e. a sequence of 3, 6, 9, 12 and further numbers multiple of 3, where $\boldsymbol{n_p}$ refers to natural scale numbers;

○ q = $\boldsymbol{\{n_q + [(n_q - 1)/2]}$, i.e. a sequence of 1,2, 4, 5, 7, 8, 10, … natural numbers except 3 and multiple of 3 numbers, where $\boldsymbol{n_q}$ are natural scale numbers; the [X] operation is an integer taking operation (integer division).

○ Knot (***1.1***) is a "connected" Euler's soliton that is a purely theoretical knot having no counterparts in Nature. It is a one-dimension toroidal soliton with the energy accumulated as a result of the knot's thread/loxodrome twisted along its longitudinal axis by 360^o and subsequently connected by its ends. "One-dimensional" means having one turn around the toroid meridian (the poloidal axis). This knot "is responsible" only for the shell's power charge – single release, i.e. rotation of the toroid along the poloidal axis and orientation in the space.

Specifics of the ***(3n_p; {n_q + [(n_q – 1)/2]})*** *knot*

- Knot ***3.1*** - a *typical smart three-dimensional toroidal soliton* - has the following features:

- it has energy accumulated as a result of twisting of the thread/loxodrome during the knot formation:
  - along its poloidal axis by 3x360^o - three turns around the toroid meridian (poloidal axis),
  - along its toroidal axis π by 1x360^o,
  - with subsequent connection of its ends, and
  - with the total number of turns equal to 3+1=4.
- **between the turns of the continuous helical curve winding *three times* round the torus there are 7 color areas/rectangles [13-15] transformed to 7 color areas/honeycombs having common boundaries (Fig. 7C).**

Number "seven" is the basic number of structured/formatted/installed areas on the toroidal surface needed and sufficient for their subsequent filling with information; in terms of color this number means seven colors of the rainbow; in terms of sound – seven notes of the music scale (e.g. C-dur, etc);

- edges/threads of the 7 honeycombs combined into a specific toroidal body-centered network are actually gas (if gas is the working/fluid medium) or liquid (if liquid is the working/fluid medium) reinforces (armouring) similar to static rigid wax edges of bee honeycombs or a dynamic "angle" whose edges are formed by flying geese;
- the helix may twist rightwards or leftwards, etc.

This knot is "responsible" for its (the shell) energy (power) charge - "quaternary release' - i.e. rotation of the toroid along the poloidal axis, orientation in the space and structuring/formatting/installation of one set of 7 color areas/honeycombs having common bounds.

- *3p* is a meridian triplet "responsible" for structuring/formatting /installation of a particular number of 7 color areas;
- ***{n_q + [(n_q – 1)/2]}*** "is responsible" for structuring of a particular quantity of branches/rolls of the toroid. The edges/threads of ***{n_q + [(n_q – 1)/2]}*** x 7 honeycombs combined into a specific toroidal body-centered network are actually gas (if gas is the working/fluid medium) or liquid (if liquid is the working/fluid medium) reinforces (armouring);
- ***n_p*** and ***n_q*** are various/specific combination options;
- the total number of turns is equal to ***3n_p*** +***n_q*** + *[(n_q – 1)/2]*, where the [X] operation is an integer taking operation (integer division);
- **3n_p** turns on the surface of any eversible elastic toroid are functionally distributed as follows***: 2.5*** turns are distributed over the periphery while (***3n_p – 2.5***) turns (hundreds, thousands, etc.) are concentrated in/pulled to its central part, near the neck of the "predictor funnel";

- the higher the $\mathbf{n_p}$, the bigger the size of and the more powerful, organized, stable toroidal soliton/charge;
- reduction of the number of branches/rolls, e.g. in a tornado from 5 → 4 → 2 → … leading to "coming undone" and disintegration indicates the beginning of the destruction (power loss) of the toroidal soliton/discharge;
- the $\boldsymbol{3n_p}$ quantity is not decreased with reduction of the $\boldsymbol{\{n_q + [(n_q - 1)/2]\}}$ quantity of branches/rolls and vice versa.

In general, this knot "is responsible" for generation and support of:

- electronic and information systems - formatting (marking, coding) of the surface of the (eversible) elastic toroid for subsequent energy-information filling and/or exchange;
- a fixed system of interrelated typical technology processes of material processing; the main process being super-cold helical rolling of planets, stars, hailstones, etc.;
- an energy/field system – the pressure field F_P (in dynamics), the vortex field F_V, the magnetic field F_M , the electric field F_E, etc.

$[F_G, F_P, F_V \rightarrow FM \rightarrow F_E]$ is the field system indispensable and sufficient for the existence of an eversible elastic toroid with a virtual shell, and vice versa.

I would like to underline that there exists a great variety of torus knots each of which solves a particular functional task. This paper describes torus knots that make the toroidal surface structured with 7 areas/colors and therefore apart from being power accumulators act as *information solitons*. Knots of this type include ($\boldsymbol{3n_p; \{n_q + [(n_q - 1)/2]\}}$). Knot 3.1 is the simplest/ typical knot; between its three turns round the meridian (Z axis) it is possible to form 7 colors/areas/honeycombs on the toroid surface producing an information array to be later filled with information.

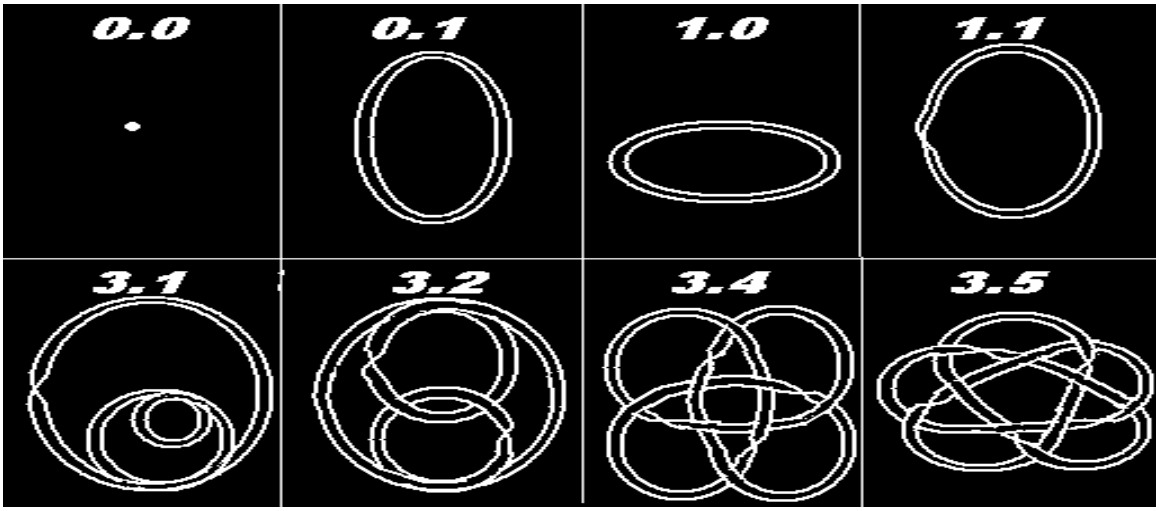


Fig. 3 Examples of natural torus knots "existing" on the toroidal surface

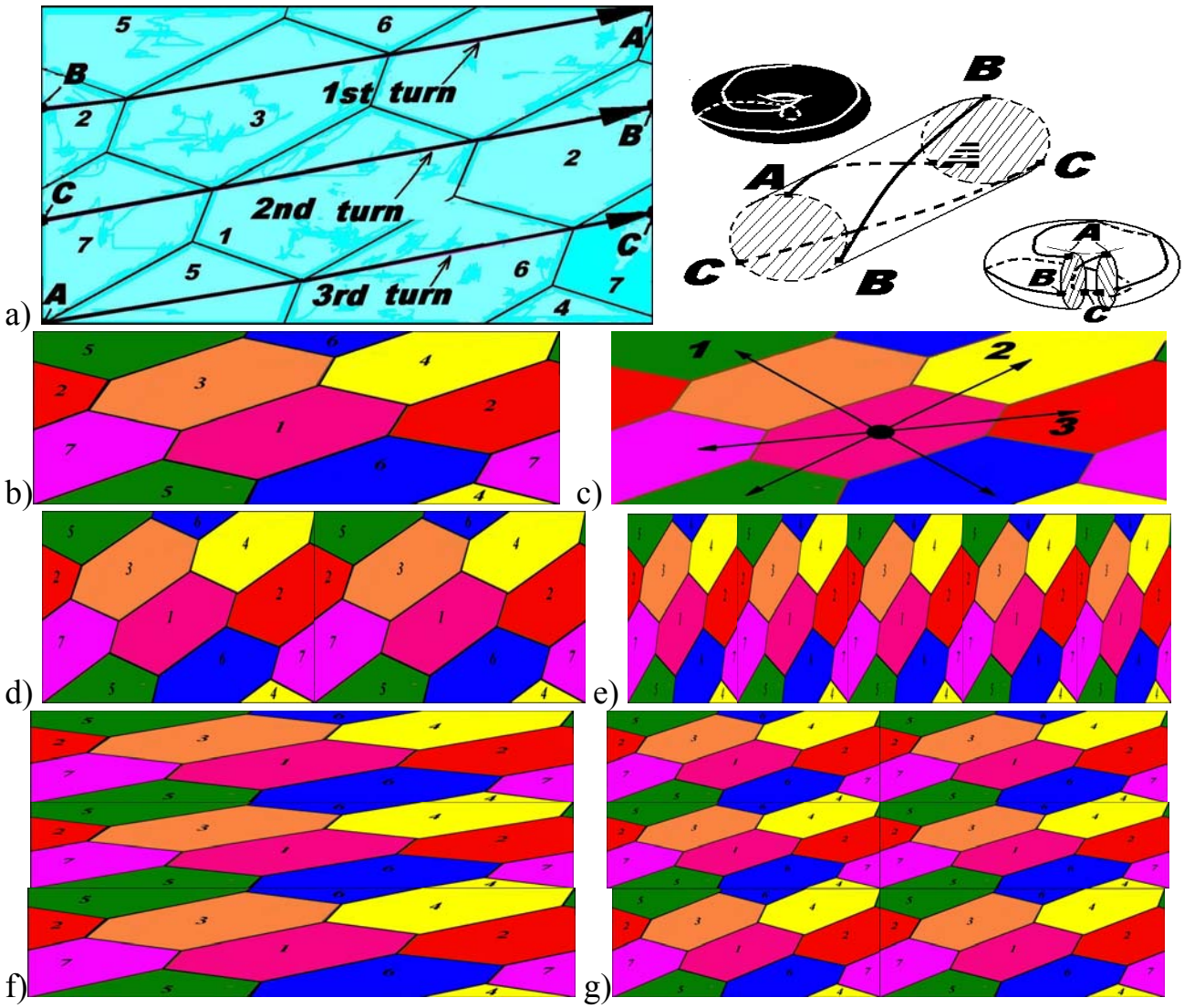


Fig. 4 Unfolded piece/cut pattern (cut, cut piece, billet, cutout) of the toroid/tore surface structured with different types of the ($3n_p$; $\{n_q + [n_q - 1)/2]\}$) knot.
A portion of the unfolded surface delimited by thin vertical and horizontal lines is the unfolded surface of a three-dimensional smart toroidal one-branch/roll soliton (knot ***3.1***).

a) A tore assembly having a surface on which a typical three-dimensional smart toroidal single-branch/roll soliton is formed – knot ***3.1.***
b) Knot ***3.1*** is filled with 7 different color areas/honeycombs having common bounds;
c) Three possible directions for generation of 7 color areas/honeycombs located on the toroidal surface;
d) Knot ***3.2*** – a three-dimensional smart toroidal 2-branch/roll soliton, knot ($3n_p$; 2) is any active galaxy;
e) Knot ***3.5*** is a three-dimensional smart toroidal 5-branch/roll soliton; knot ($3n_p$: 5) is any hurricane/tornado;
f) Knot ***9.1*** – nine-dimensional smart toroidal single-branch/roll toroid;
g) Knot ***9.2*** – nine-dimensional smart toroidal 2-branch/roll toroid.

Elements of "Moebius, Spherical and Toroidal Calculus"

I would like to "modernize" some ideas (2nd paragraph) expressed by outstanding present mathematician V.V. Kasatkin [16 – 18] who continued works of Nikolai Ivanovich Lobachevsky, Eugenio Beltrami, Bernhard Riemann et al. The works in question were dedicated to such issues as *"direct" and accurate geometric constructions and calculations on and/or in natural space forms such as a sphere, the Moebius band, the Klein bottle, projective plane, a tore/toroid, an eversible/enveloping tore/toroid, i.e. to making geometric constructions and calculations in their specific natural static and dynamic coordinate system*.
These mathematical technologies should be used only after topological analysis of these natural forms because Topology is the top/principal/backbone hierarchical level of Geometry [19], hence it is the key parameter of the Universe structure, the foundation for its large-scale harmony *moving* through time.
By way of example, every type of a natural eversible elastic toroid such as a galaxy or hurricane has its own dimension-type range whose behavior rules go well with the discovery of the "Large-Scale Harmony of the Universe" [20].
Unfortunately, this discovery does not include topological and dynamic/changing in time specifics of the micro-, macro- and megaworlds.

In Nature (in space and time) there are no indivisible substances and quantities as well as approximations. Only Arithmetic and Geometry "are valid" there.
Algebra does not exist in Nature being foreign and unnatural to it, since this artificially built field of mathematics lacks precision, obviousness and unambiguity. Practical use of Algebra in the present and future intellectually-intensive and transient time, especially in real time is dangerous and unreasonably expensive because any parameters are computed and will be always computed with approximation and with a huge quantity of corrections/iterations (wasted labor).

The only area that does not require use of Arithmetic and Geometry is prediction of the Future. In this case mathematic technologies (artificial intellect) may find application for failure prediction in devices destroyed during storage or use and unfit for analysis of causes of the failure. These technologies [21, 22] make it possible not only to know the "past" and the current "present" but also to see the "future" of products under operating or storage conditions.
The same approach may be applied to prediction of the future for any natural process/product since its parameters no matter how and when they were planned by Nature are always of stochastic nature and implemented with a certain error rather than with absolute accuracy.
Viewed from the above, only one assumption should be made – correct acquisition and processing of information from correctly chosen and ample sources with the purpose,

e.g. to predict how long our Galaxy or a hurricane/tornado with a certain name will exist.

A Sphere and a Tore/Toroid (Fig. 5)

So, it is appropriate to fit two-dimensional objects like a surface and/or one-dimensional objects like a line and/or zero-dimensional objects like a point into a three-dimensional space. On the other hand, three-dimensional or four-dimensional objects cannot fit into or be simulated in the two-dimensional or three-dimensional space, respectively, since they are figures of a higher hierarchical order. In other words, computations on the surface are not identical with calculations in the three-dimensional space.

Any natural (a soap bubble, a water drop) or engineered thin elastic/soft sphere-like shell (sp), filled with working/fluid medium under excess (gas) or normal (liquid) pressure is known to tend to an ideal/natural form, i.e. a ball having

- surface area, $S_{sp} = 4\pi R_{sp}^2$;
- volume, $V_{sp} = 4/3\pi R_{sp}^3$.

Besides, it should be added that any natural (a galaxy or the Bernard cell) or technical thin elastic/soft toroidal shell (t) filled with working/fluid medium under excess (gas) or normal (liquid) pressure tends to acquire an ideal natural form – a closed tore ($Rt = r_t$), having

- surface area, $S_t = 4\pi \boldsymbol{\pi} R_t^2$;
- volume, $V_t = 2\pi\boldsymbol{\pi} R_t^3$.

'$\pi\boldsymbol{\pi}$' as seen from the above expressions is the area. The author differentiated and separated the two '$\boldsymbol{\pi}$' because they solve different physical tasks in the same process.

Let us remember that (2 + 2 = 4) is not equal to (2 x 2 = 4) because the first value of four means the length (one-dimensional value) while the second value of four means the area (two-dimensional value).
That is, the toroid/tore belongs to a four-dimensional space where the 4-th coordinate is a toroidal (circumferential, closed) 'π'- axis that in a physical sense is responsible for eversion (rolling) with parallel twisting/rotation of the tore/toroid round the poloidal Z-axis. Naturally, this continual action occurs in time.

A closed tore unrolls into a rectangle with the sides equal to πR_t and $2\boldsymbol{\pi}R_t$, i.e. their lengths stand in the 1:2 relationship, while its diagonal is equal to $\sqrt{1^2 + \sqrt{2}^2} = \sqrt{5}$, which is an element of the "golden section".

The same analogy may be drawn with respect to the transfer of practical knowledge of the static soft sphere to the research field of the dynamic eversible elastic/soft toroid.

The static soft sphere knowledge transfer is made possible only for the non-eversible soft/elastic tore (a wheel tire).

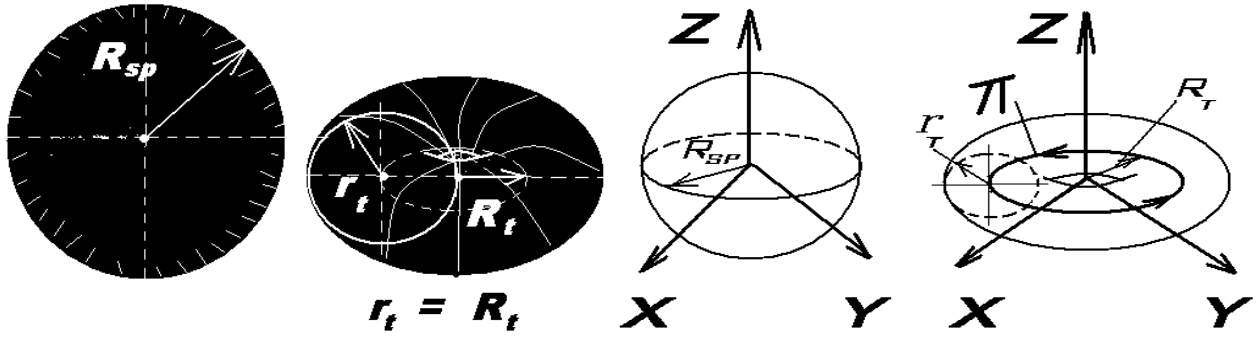


Fig. 5 A "dead" static sphere and a "live" eversible elastic closed tore and, respectively, a three-dimensional (spherical) and a four-dimensional (toroidal) coordinate system, where X,Y are Horizontal and Vertical Axes, Z is a Poloidal axis, π is Toroidal (circumferential, closed) "axis" (Toroidal Axis).

The only "natural" arithmetic-and-geometric method of direct accurate definition of a target distance existing in the world today is based on Kasatkin's "cubic calculus". In practice, for instance, this method is implemented in a navigation unit [23].
These mathematic technologies [24-28] do not have errors in terms of methodology in a three-dimensional space, on a plane, on a line, in a point. The cube of any number is accepted as a unit of volume.
Unfortunately, this method cannot be applied to task solution in a four-dimensional space represented by a tore/toroid (hypercube, hypersphere) The Arithmetical Geometry section of mathematics needs to be developed further and along with Kasatkin's "Cubic Calculus" it should include the "Toroidal Calculus" (being one of the goals of the author), where an EVERSIBLE CLOSED TORE (hypercube, hypersphere) of any size is taken for a unit of volume. A practical implementation of this method will be, for instance, building a computer with parameters including geometries, rate of energy-information exchange, etc., that are abnormally better than the same parameters of contemporary computing.

Obviously, a new section of the topology - the "Engineering Topology" - should be developed (another goal of the author) that will include and describe

- design of technical elastic spheres and eversible elastic toroids, namely cutting 2-dimensional and 3-dimensional patterns to make shells;
- all cutting operations, cartography, "golden section", knotting, braiding;
- building flat and special screens to visualize and control movement of objects in a 3-dimensional or 4-dimensional space;
- transposition to a "physical meaning", and it certainly exists, of all topological puzzles, "amusing drawing, projections, geometry, arithmetic, physics", "selected tasks', etc.

The Devil's Square"

Another no less unique feature of the toroid/tore is the so called *"devil's" (magic) square* of the fourth order (Fig. 6) that has 'n' numbers from 1 to 16 (part of the natural sequence) written into it in a specific order. The partial sum of the divergent series 1+2+3+4+….+16 = n(n+1)/2 = 136.

Different transform operations performed on this series such as rotation, reflection, rearrangement of rows in the top-down or down-top order – totally 384 options – yield the same sum of 34 at adding the four squares located along a meridian, a parallel or a diagonal.

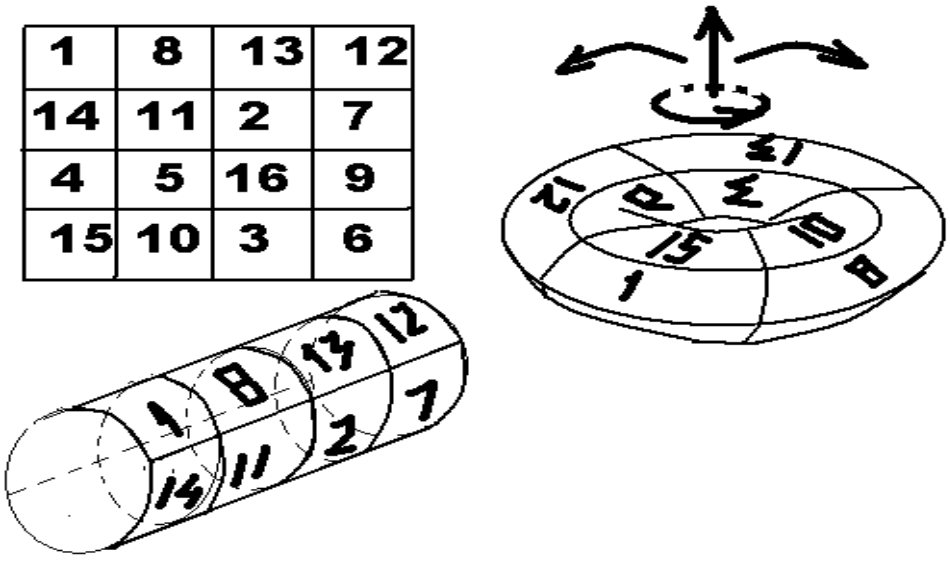


Fig. 6 A cut pattern (cut, cutout), or unfolded tore acting as a natural gyrostabilized eversible platform. The example of number filling is taken from [7].

The *physical meaning*: Digits themselves may express, for instance, hypothetic physical values/coefficients of a closed tore, such as

- *area unit* s_t: The tore surface area consists of 16 different areas (S_{t1}, S_{t2}, … S_{t15}, S_{t16}), i.e.
  $S_t = 4\,\pi\pi\, R_t^2 = [(1+2+3+4\ \ldots..+16)s_t = 136s_t]$, and $s_t = (4\,\pi\pi\, R_t^2/136) = \pi\pi\, R_t^2/34$;
- *"volume/weight' unit* vt: irrespective of specific gravity or density the volume/weight of the tore consists of 16 different volumes/weights (V_{t1}, V_{t2}, …, V_{t15}, V_{t16}), i.e.
  $V_t = 2\,\pi\pi\, R_t^3 = [(1+2+3+4+\ \ldots..\ +16)v_t]$, while $v_t = 2\,\pi\pi\, R_t^3/136 = \pi\pi\, R_t^3/68$.

Based on the foregoing description, when different transform operations are performed on 16 areas or 16 volumes/weights, such as rotation, mirroring, rearrangement of rows in the top-down or down-top order, etc., equivalent sums are obtained at adding four squares (areas, volumes/weights) located along a meridian, a parallel, a diagonal, etc.

It especially important when the tore progressively advances by eversion, with its central part rotating, and in doing that it automatically keeps the balance of areas and volumes/weights at least in 3 directions while twisting at that.
It means *the tore is a natural astatic gyrostabilized eversible platform* [29].

Conclusion: *The three-dimensional space (a static sphere) is a dead space floating in time, while the four-dimensional space (elastic eversible/enveloping tore/toroid) is a live space moving in time according to specific laws*.

Shikhirin's cells
From all great mathematical hypotheses that by now have not been proved though not rejected it is worth while to mention problems of "four, six and seven colors" when each color combines with every other color only once [13].
This principle is known to be used for coloring

- a sphere/globe with four colors;
- the Moebius band, the Klein bottle or one projective plane with six colors;
- a tore/toroid with seven colors.

These type mathematical problems were earlier solved without going deep into the matter only

- to visualize practical tasks, e.g. in cartography;
- as entertaining mathematics [14, 15];
- in an abstract way without referencing to natural effects, etc.

In these cases the following was not taken into account or was ignored:

A. The existence or absence of the cavity in/volume of colored forms – a working/fluid medium under normal (liquid) or excess (gas) pressure.
   For instance, a sphere and a toroid have a cavity/volume while the Moebius band or the Klein bottle or the projective plane has none;
B. Various forms of movement/relocation of these marvelous natural (not artificial and not invented) elastic figures having or not having an anchoring belt. For instance
   - a sphere, the Moebius band, the Klein bottle or projective plane may progressively advance by rolling or sliding
   - a tore or toroid may progressively advance by eversion/envelopment (rolling) while its central part or periphery may be rotating, etc.
C. The nature of movement of the working/fluid medium together with the moving shell was ignored. For instance, the movement process of the working/fluid medium contained in the sphere-like and toroidal shell may have principal distinctions, etc.

This paper describes "volumizing" of only 4, 6 and 7 colors/areas as possible bases for spatial figures having a physical meaning, with account for the existing (spherical

geometry) and not yet existing ("Moebius, spherical or toroidal calculus") terminology, with description of, e.g. location of various geometric figures on or in closed surfaces like a sphere, the Moebius band and toroid, respectively.

Shikhirin's cell[4] is a spherical tetrahedron whose basis is formed by a regular or irregular spherical triangle (one of 4 colors) (Fig. 7A). The vertex of this figure rests against the center of the sphere.

The spherical tetrahedron has 4 facets (F), 4 vertices (E) and 6 edges (K).
Of the tetrahedron facets,

- one external color facet (of four) is an external spherical triangle located on the spherical surface; and
- three internal facets are internal spherical triangles whose bases are formed by the sides of the external triangle and their common side edges rest against the center of the sphere.

From the Euler's theorem, E+K+F=4-6+4=2.

A sphere is a closed two-sided surface with h=2 ('h' is connectivity (cohesion) [7] that consists of 4 Shikhirin's cells[4] – four spherical tetrahedrons whose bases/facets/"four colors" have common bounds and cover the entire spherical surface. Side facets of the tetrahedrons have common bounds while their vertices rest against/combine into a single geometric/power-producing center O.

Therefore, irrespective of the compressive load, excluding the physical connection (cohesion) of the internal surface of the shell the sphere is always a uniformly strained surface consisting of the bases of 4 tetrahedrons/colors. This surface envelops the pressure force field of the working/fluid medium under excess pressure. For the tension calculation of the deformed sphere-like shell, at least four "bubble" tetrahedrons are needed that rest with their vertices against the center of the shell and determine its tension due to compressed gas.

It should be noted that the gravitation center of a "filled" sphere is located directly or in the vicinity of its geometric center.

Physical meaning: The natural energy stressed condition is achieved by simultaneous attraction/compression and repulsion/inflation away from the center O through internal edges of 4 coupled spherical tetrahedrons that prevent collapse and destruction of the sphere.

2. *Shikhirin's cells*[6] – the Moebius polyhedron; each of six colors located on its surface is a "Moebius" pentagon – Moebius bihedroon (two-facet form) (Fig. 6B) that has two

1/6 color external facets (F) – top and bottom of the flat pentagon having the same color, 5 vertices (E) and 5 edges (K).
From Euler's theorem, E-K+F = 5 – 5 +2 = 2

The Moebius band is one-sided closed surface with h = 2, or it is an infinite band twisted by 180^o made of 6 (three and three identical) "Moebius pentagons having common bounds.

Topologically, it is a one-sided closed surface without volume, i.e. it is impossible to generate excess pressure of the working/fluid medium inside it.
Physical meaning: Moebius band is a ½ (half) one-dimensional Moebius soliton.

3. *Shikhirin's cell*[7] is a "toric" two-vertex upturned pyramid – a toric heptahedron. The toric heptahedron "assembly" is shown in Fig. 6C.
The toric heptahedron consists of 7 facets (F), 8 vertices (E) and 13 edges (K):
Facets:
- two identical side facets (1st and 2nd) are "toric" triangles;
- four side facets (3-rd, 4-th, 5-th, and 6-th) are tetrahedrons. The tetragons (a pair) located opposite each other are identical;
- one external "1/7 color facet (7-th) is the pyramid basis and a "toric" hexagon/honeycomb located on the toroidal surface. Every edge of any honeycomb is an edge of six similar hexagons/honeycombs, etc.

Edges and Vertices:
  - 6 edges (1-st to 6-th) - *the base*, form the carcass of a cell base – a honeycomb/one-color area;
  - 6 edges (7-th to 12-th) – the *meridian tie*, form the elements of the internal power carcass;
  - 1 edge (13-th) - *longitudinal tie*, carcasses and centers the cell. Moreover,

- this edge forms 1/7 length of the medium line (oval) – the tore string (or rests against the medium tore line);
- all 7 (from 7 cells) consecutively coupled edges/ties form the medium line – the toroid/tore string ;
- each vertex of the base/honeycomb is at the same time the vertex of two other honeycombs. I.e. there are 14 points on the toroidal surface that unite three of seven different color areas;
- each 1/7 toroid string length is, in its turn, divided by 3, i.e. on the medium line – the tore string there are 21 points each of which consecutively overlaps (splices) 1/3, 2/3 and 1 lengths of three edges/ties from seven.

From Euler's theorem, E-K+F = 8 – 13 + 7 = 2
The tore/toroid is a closed two-sided surface with h =3 consisting of $7\mathbf{n_p}$ toric heptahedrons.

Physical meaning: The natural energy stressed state is attraction/compression towards the toroid string with simultaneous repulsion/ballooning (bulging) away from it towards the toroid surface (the periphery and central part) of 7coupled toric heptahedrons through their internal/meridian facets that keep it from collapse and destruction.

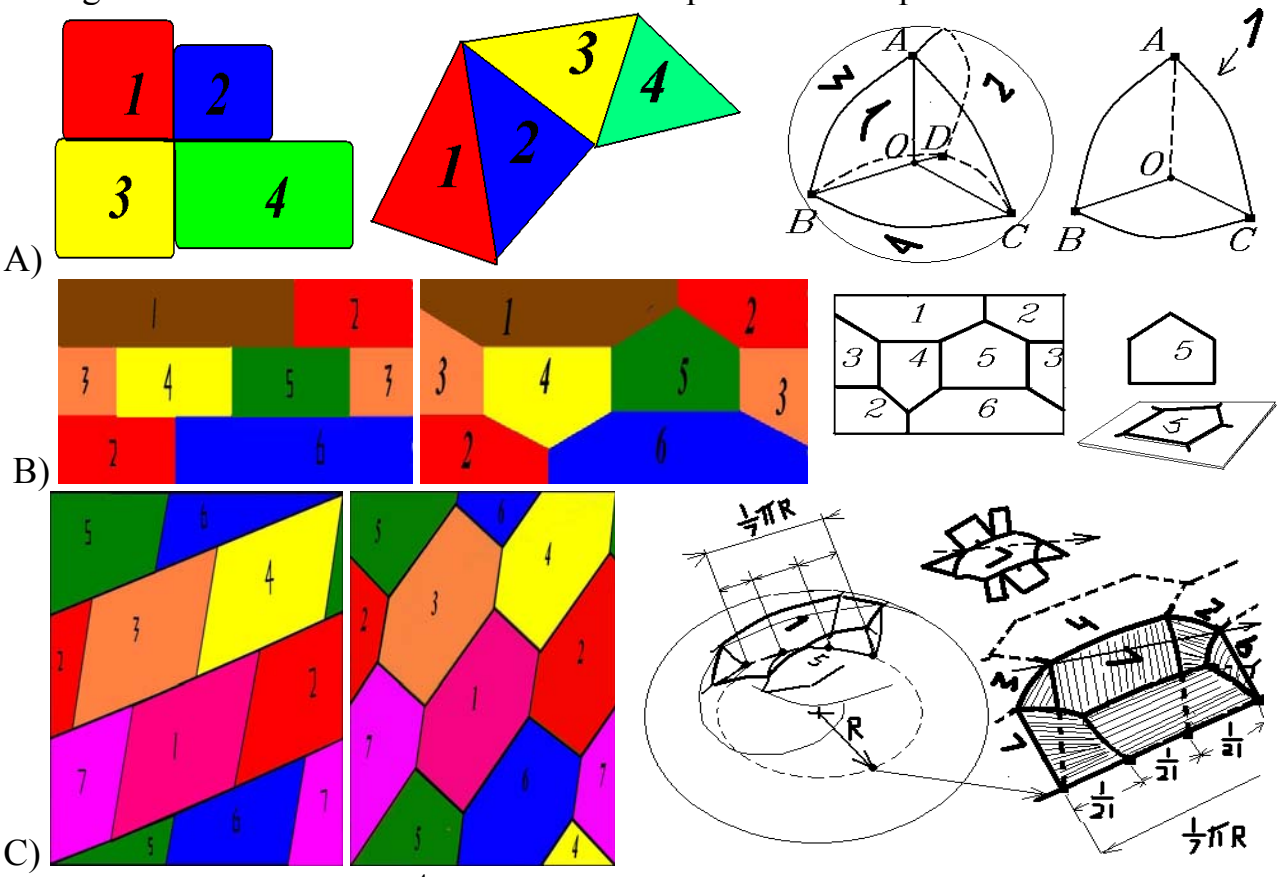


Fig. 7 A) right – Shikhirin's cell[4] ; left – a sphere-like surface "covered" with 4 different colors/areas having common bounds, and transformation of 4 "n-angular" color areas into four triangular color areas.

B) right – Shikhirin's cell[6], "a Moebius band" surface covered with 6 different colors/ areas having common bounds, and transformation of 6 tetragonal color areas into 6 pentagonal color areas.

C) right – Shikhirin's cell[7] and its cut pattern/unfolded view; left – a toroidal surface "covered" with 7 different color areas having common bounds; and transformation of 7 tetragonal color areas into 7 hexagonal color areas/honeycombs.

Shikhirin's cells[4,6,7] *are real natural forms (figures) each solving a specific physical task. A minimum number of cells is used to generate a sphere, the Moebius band (the Klein bottle, projective plane) and a tore/toroid, respectively*.

The next generation/components/derivatives of Shikhirin's cells[4,6,7] is/are formed according to certain laws.

Functional features of natural eversible elastic toroids

Galaxy. This knot ($3_p\mathbf{n}_p$, 2) is a smart multidimensional toroidal 2-branch/roll soliton, where $\mathbf{n}_p$ is counted in hundreds/thousands.

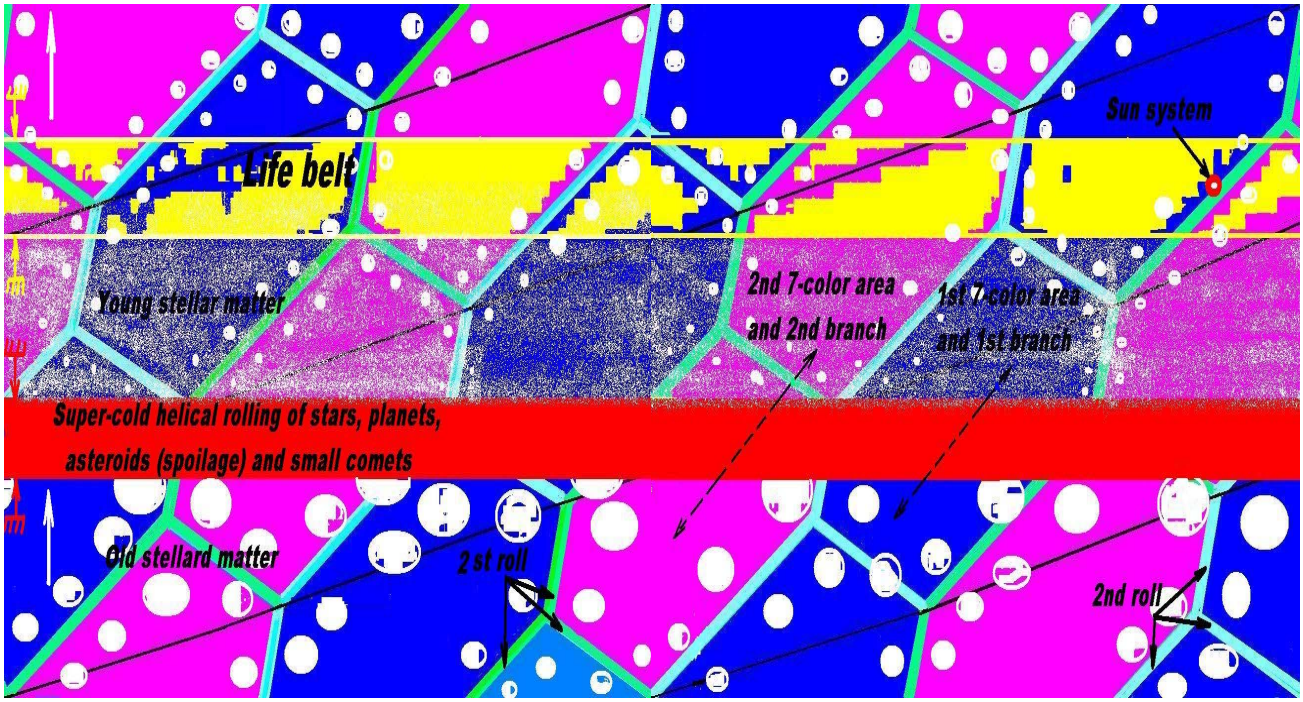


Fig. 8 A cut pattern of our or any other Galaxy. The figure shows clustering of stellar matter along honeycomb edges as it occurs in reality.

On Fig. 1 (the middle) two spiral branches/strands – Siamese twins – are clearly seen. Moreover,

- the branches are located 180° relative to each other and twisted in one direction;
- evert together with the "material" of the virtual tore-like shell of the natural elastic toroid;
- the "body-centered network" formed with respect to the two branches is represented by two parallel-coupled honeycombs as if converting to each other ***($3_{pn}p$, 1) + (3_pn_p, 1);***
- edges/threads (strands) of 2 x 7 honeycombs = 14 honeycombs combined into a specific toroidal body network are real gas reinforces (firming elements) (Fig. 8);
- strands/rolls are two flexible threads/loxodromes twisted 3_pn_p times round the Z poloidal axis in one direction;
- the cross-sections represent the form-forming profile of 2 rolls of a faceted shape, etc.

Shikhirin's Classification of Galaxies (Fig. 9)

The older classification of galaxies – Hubble tuning fork – was based only on visual information, namely the outward appearance of galaxies obtained by means of a

telescope and, naturally, ignored the principal back-bone feature – the toroidal motion mechanics.

A) *The active galaxy generally designated* ***($3_p n_p$, 2)*** *- a smart multidimensional toroidal two-branch/roll soliton*.

Left) Top view: "corrector funnel$^-$" – "galaxy disk", former S- and/or E galaxies; the "bulge" - natural light emission observed in the deformation area/center as a result of forming operations of the process of super-cold helical rolling of stars and planets as well as compressed gas emissions – small comets (eversible elastic gas toroids – *toroidal plasmoids*).

Middle) Bottom view: "predictor funnel$^+$" - "black hole", *former SB galaxies*, "Barr" - natural light emission observed as a result of starting process operations of helical rolling of stars and planets – generation of a two-roll (auger, screw) system and delivery of original stellar matter to the deformation area/center. The process rolls are two stretched like strings "luminous" branches/strands. While revolving in one direction respective their longitudinal axes, the branches/strands are progressively drawn into simultaneously capturing and transferring the original stellar matter into the deformation center. The original raw material/preform/stellar matter is revolving in the opposite direction.

Right) Side view: former E galaxies or "galaxy disk" observed at different tilt angles; the halo is a working/fluid medium invisible for modern visualization means, held under excess pressure and enclosed into a shell of an eversible elastic toroid (outlined by white color) that is permanently in the toroidal motion state together with the shell – "reproduces" its toroidal motion. Together they represent a giant gravitation container.

B) *Interacting galaxies* N***($3_p n_p$, 2)***, where N is number of interacting galaxies. The figure shows two interacting galaxies ***2($3_p n_p$, 2)*** – two interacting *smart multidimensional toroidal two-branch/bar solitons* that move in opposite directions/courses (the right one toward us, the left one away from us) rolling each other smooth by their peripheries. When galaxies are connected to each other with one of the two branches/rolls (umbilical cord), power-energy exchange is implemented between them resulting in eating up or bringing up a newly-born/young galaxy - bound vortex. There may be various combinations of opposite directions/courses of galaxy movement for subsequent energy-information exchange.

C) *Dead galaxies* – former ***Irr*** galaxies + "nebulae", ***E*** galaxies (shrapnel) – stellar matter ejected or ejectable as a result of disruption of the toroidal shell of an elastic toroid – death of the galaxy, and

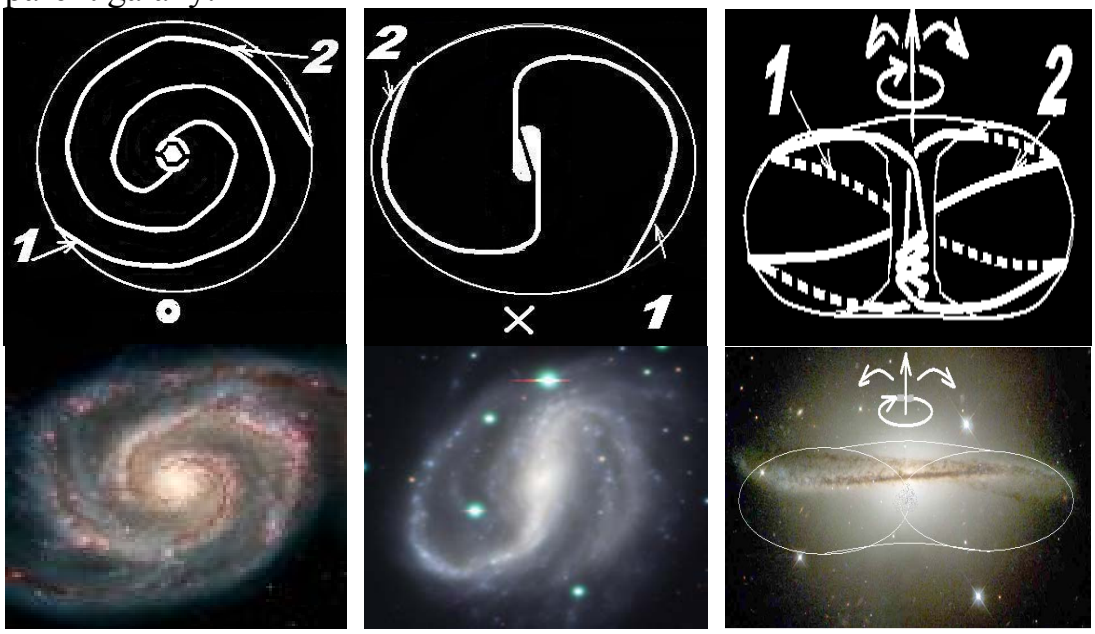
Parent and Child Galaxies

1st version. Working/fluid medium ejected/shot off from an old parent galaxy (nebula) together with a genetic "remnant/fragment"(turns/twists of the central part) from the "torn" shell (***Irr*** galaxy) of an elastic toroid (Fig. 9-C1). This "remnant" keeps everting

by inertia (Fig. 9-C2) creating the periphery of a new elastic toroid. Through the periphery, the flared end of the "corrector funnel^{-}" is coupled with the "predictor funnel^{+}" (Fig. 9-C3).
Similarity: The above is similar to a pricked balloon moving forward in the air space with high acceleration (due to the working/fluid medium running out of its shell under pressure). Its motion is stopped when the working/fluid medium pressure and the environment pressure reach equilibrium since it is not a toroidal (recoverable, self-organizing) motion.

2nd version Interacting galaxies ***N($3_p n_p$, 2)***, where N is a number of interacting galaxies (Fig. 9-B), represent a process of birth/generation (separation from the mother galaxy) of a bound vortex – a child galaxy. In the course of active energy-information exchange through the "umbilical cord", or coupled branches/rolls, using one branch/roll of the mother galaxy couple and one branch/roll of the child galaxy couple, respectively, the child galaxy reaches a certain size and separates from the mother galaxy starting a new independent life.

3rd version Interacting galaxies ***N($3_p n_p$, 2***), where N is a number of interacting galaxies (Fig. 9B), represent a process of copulation of two galaxies resulting in appearance of the 3-rd or 3-rd and 4-th, etc. bound vortex (vortexes), or child galaxy(-ies) . In the course of active energy-information exchange through the "umbilical cord", or coupled branches/rollers, using one branch/roller of the child galaxy couple and one branch/roller of every parent galaxy couple, respectively, the child galaxy (-ies) reaches (reach) certain sizes and separates (separate) from the parent galaxies starting a new life of a parent galaxy.

A) 

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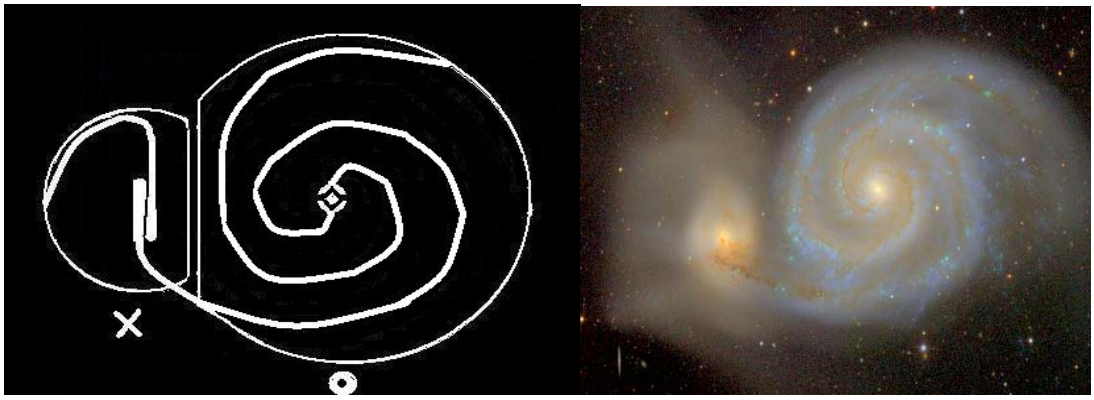

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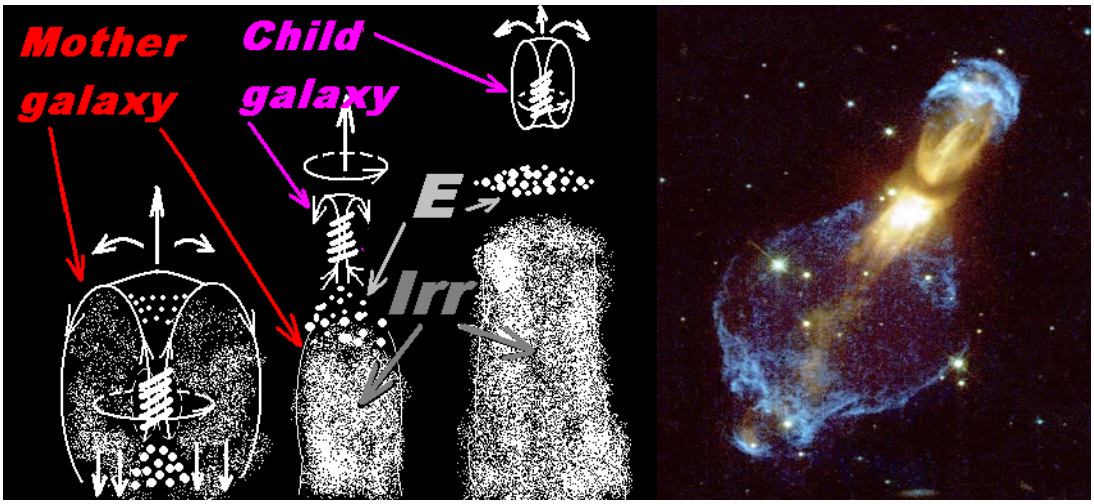

Fig. 9 Shikhirin's classification of galaxies and elements
Forward movement of a galaxy by envelopment in the **X** direction – away from us; by eversion in the ● direction – towards us

Hurricane /Tornado

It is associated with knot (***3$_p$n$_p$, 5***) referred to as *a "multidimensional helical soliton" or "smart multidimensional toroidal five-branch/roll soliton*, where $\mathbf{n_p}$ corresponds to tens/hundreds.

There is no such a notion as hurricane classification (similar to the older classification of Hubble galaxies). Hurricane-like phenomena can be observed from all sides and even from inside. Galaxies may be observed only through a telescope/tomograph that allows to obtain only a flat image showing a galaxy in a single perspective: side view, top view, bottom view, angle view. Due to shortage of visual information, we try to use many techniques to color, "volumize" and turn this "volumized" flat picture round different axes extracting even intravolume information at that. As a matter of fact, information scarcity along with absence of diagnostic methods such as those "sensing" the pressure field inside the toroidal shell of a galaxy ('halo' is working/fluid medium under excess pressure) brought forward the Hubble classification and its derivatives – a set of different perspectives of live and dead galaxies identical by their structures.

The classification of galaxies and galaxy elements presented by the author is a classification of any natural elastic toroids including that of hurricanes and hurricane elements.

One of the principal distinctive features of active existence/activity of natural elastic toroids is (are) the environment (-s) of a hurricane or galaxy. For instance, if a galaxy is put upright onto the surface of a giant "Earth" it will also behave like the "Ivan" tornado and vice-versa. In case a hurricane overshoots its power-producing capability to move forward to a lower pressure area, for example, by its weight it collapses and starts "to drill" the Earth surface by the enveloping end. Such "dirty" hurricanes make only a small percentage of a number of "clean" hurricanes acting in the atmosphere.
Summary: The basis for any "genetic" code of any natural process whose mechanics is based on the toroidal motion (a natural eversible elastic toroid) is a topological torus knot (**3np**; $\{[\mathbf{n_q} + [(\mathbf{n_q} - 1)/2]\}$) – a multidimensional toroidal soliton with definite combinations of n_p and n_q values.

Folding and a "Smart" Network

Nature has no ideal elastic toroids but there are elastic toroids having a physical tendency to form a closed tore as an optimal shape in terms of energy-information equilibrium.
A tore/toroid should not be looked upon as a static hollow "doughnut" incapable of eversion/envelopment but rather as an eversible "doughnut", or a (barrel-shaped) eversible elastic toroid that everts if the external and internal perimeters of the longitudinal cross-section of the tore/toroid are identical in any place (!).
That is, a natural as well as an engineered eversible elastic toroid should be made of a barrel-shaped sleeve of a single diameter! Otherwise, it will be "blocked" (jammed) at an attempt to evert.
The only difference between a natural toroid and an engineered toroid concerns their twisted or untwisted central parts, where
- for a natural toroid, the super-elastic material of its shell is compressed and folds are not seen: they are distributed over (hide/contract in) the shell material structure.
- for an engineered elastic toroid, the "surplus (redundant) material" of the sleeve is folded in a specific way respective the weft and warp.
However in any case energy is spent on compression/folding and releasing/smoothing of the shell material both of the natural and engineered toroids.

In Nature, well-known phenomena such as a hurricane, tornado, comet, ball lightning, etc. have a similar "design" where the anchoring belt of an eversible elastic toroid is placed at its periphery – an external peripheral body (Fig.10).

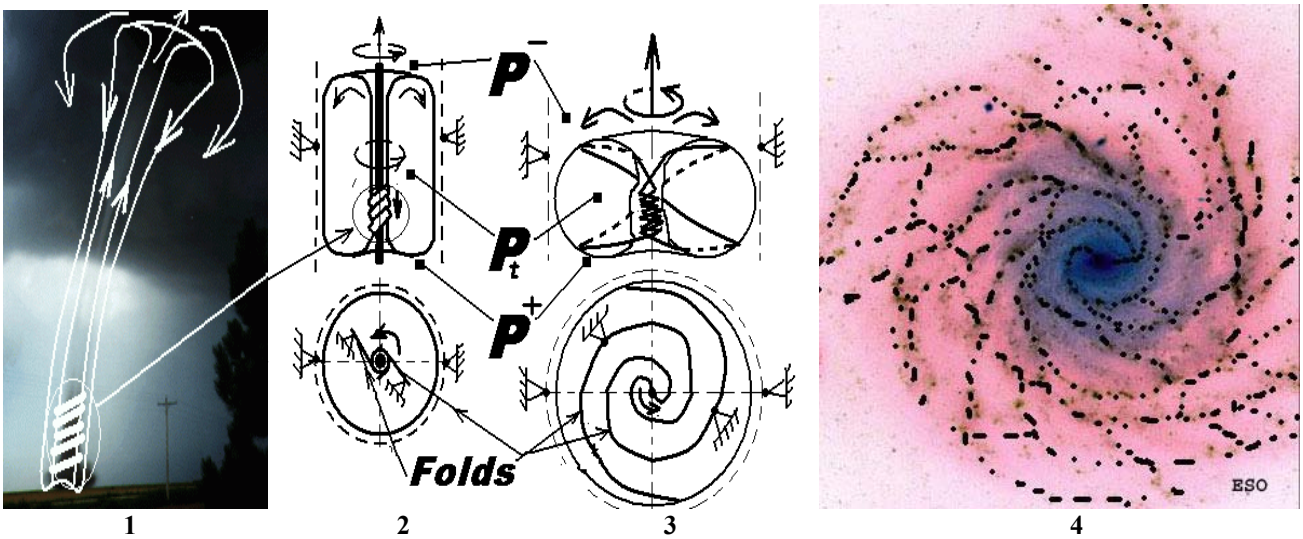

Fig. 10 "Behavior" of twists/turns in the central part and of folds at the everting end – in the "corrector funnel"of an elastic toroid with the anchoring belt fastened at its periphery: 1 and 2 - slightly retouched picture of a galactic vortex and of an engineered toroid, respectively; 3 – a galaxy; 4 – formation of stellar substance in "folds"/honeycomb edges of the galaxy.

In other words, when the elastic toroid moves forward by eversion respective the Z poloidal axis folds on its everting end – " the corrector funnel$^-$" change their locations, however they do not rotate together with the Z axis against the static periphery but rather "remain static". This phenomenon is referred to as the "*toroidal" stroboscopic effect*".
This effect is probably of the same nature as the effect that visualizes one of perspective images of standing waves having different parameters on the display screen, something that is studied by Cymatics [30].
"Twists/turns" in this case are simultaneously twisting (coiling) around the central body and are sliding away from it and do not move forward anywhere.
The central body is pushed out of the central part of the elastic toroid with a twofold speed with respect to the latter.

When an engineered elastic toroid having the central part twisted with a preset number of twists moves forward, all knots/twists are grouped and move/slide away from the "corrector funnel$^-$" to the "predictor funnel$^+$" and cannot physically "jump"/wriggle out of the central part to the periphery.
The same process occurs in a natural elastic toroid wherein only about **2.5** turns are distributed over the periphery while the majority (hundreds, thousands, dozens of thousands) – $(\mathbf{3n_p - 2.5})$ turns/twists are focused in its central part. In this place a *forced active folding* occurs. That is, the main load is carried by the *leading enveloping end of the toroid*, or the "predictor funnel$^+$", with the "twists/turns" formed in its neck.

For any galaxy, the "predictor –funnel^{+}" is a "black hole" that captures old stellar matter by in-drawing (as though sucking it in) and then forms in the center of deformation different figures from it such as stars, planets, small comets and "asteroid waste".

In the driven everting end – the "corrector-funnel $^{-}$"– a *free folding* process occurs; folds are straightened and smoothed as they are released from the contracted and twisted central part of the elastic toroid.
Besides,

1. All folds are formed only in the shell material (in the interface layer) of elastic toroids;
2. Folds in engineered elastic toroids are less "spirally" than in natural elastic toroids. This feature may be explained by a limited elasticity/softness of the shell material of an engineered elastic toroid, namely by the structure of its reinforcing layer – the warp and the weft. Therefore, folds at the ends of the engineered elastic toroid are formed in the direction of the weft or the warp or the diagonal between them.
3. The reinforcing layer of natural elastic toroids has a more complex volume structure and possesses absolute elasticity/softness.
4. Elastic toroids with the twisted central part have all folds formed and located at a tangent to the longitudinal axis of elastic toroids and cockled.
5. Engineered elastic toroids with the untwisted central part have a strictly radial arrangement of folds from the longitudinal axis to the periphery of the elastic toroid.

Folds in engineered eversible toroids manifest the shell material properties, its geometries and excess pressure values, while in natural eversible toroids folds correspond to edges of color areas/honeycombs, or threads/loxodromes of the knot $(3n_p; \{n_q + [(n_q - 1)/2]\}$, along which all stellar matter is concentrated. This is clearly seen in all pictures of the everting end – the "predictor funnel^{-}"including the one retouched by the author (Fig. 10-4).
The dynamic process of contraction (pulling in) and distribution of stellar matter respective the edges of color areas/honeycombs can be compared to a continually correcting acute (no more than 30 deg.) angle of a flying flock of geese. If the flock increases and exceeds a certain "critical mass" leading to the "angle" balance shift, then an edge of the second angle equal to the first angle will start to generate from the upper edge of the "angle"(at a certain distance downwards. The author watched this process not once during geese flights over the Lake Michigan in 2000-2005 (Chicago, Illinois).
In my opinion, the intelligent portion of the toroid represented by an energy information electronic smart network is formed in the shell material of any natural elastic toroid – a toroidal $3n^p$-dimensional $\{n_q + [(n_q - 1)/2]\}$-branch/roll soliton, namely along treads/loxodromes of its branches – edges/reinforces (consolidations) of areas/honeycombs.

For instance, the smart network of natural eversible elastic toroids is

- the habitat for the majority of vegetoanimal world and the environment for spreading audio waves of different characteristics in interface layers of oceanic and sea "non-intermingling" currents;
- a concentration place for all stars, planets, meteorites, asteroids, comets in interface galaxy layers. (Fig. 8), etc.

Supercold helical rolling of stars, planets and …hailstones.

Cold helical rolling is a high-speed metal forming process with a flange fully separating a finished part from a perform [31].

A bar stock moves between profile rolls rotating in one direction that are placed at a fixed angle against each other in a vertical plane. These causes axial movement of the bar stock rotating in opposite direction relative to the rollers, towards the processing zone – the center of deformation. The metal utilization factor reaches 98% -99%. For example, the process capacity is 3000 – 600 pieces per minute for balls of 1-3 to 10 mm diameter. Nominal dimensions variation is 0.05 mm.

Stars and hailstones formation is the form creation of regular polyhedrons – Platon's bodies and their derivatives [32], for example, dodecahedrons (stars, planets) or their stellations (hailstones) [33] - by means of supercold helical rolling of solids, regardless of their material (Fig.11). This is also an effective technological process with a high degree of workpiece processing and a high utilization factor of "star" material or ice, that is one of the main functional features of natural multidimensional toroidal solitons ($3n_p$; $\{n_q + [(n_q - 1)/2]\}$).

Star formation

Foe galaxies: cross-sections of two rolls- a forming profile has a specific faceted shape. Each roll rolls a definite quantity of facets.

Direct and indirect confirmations of the dodecahedron, icosahedron and combinations thereof forms are:

Indirect confirmation: the icosahedron- dodecahedron structure of the Earth (IDSE, The Earth as the Geocrystal) [34], proposed in the USSR in 1971 by N.F. Goncharov, V.A.Makarov and V.S.Morozov, researchers from the Moscow State University, and developed in the USA since 1975 [35], explains the interrelation between many anomalous processes on the Earth and in Nature.

These papers do not contain information on how icosahedron- dodecahedron shape of the Earth was formed.

Direct confirmation: Investigations of Saturn and particularly Iapetus, one of its satellites carried out by NACA in 2005 showed that the satellite has a shape of a dodehedron [36] (Fig.11).

Why do all stars and planets have a spheroid shape rather than shapes of a dodecahedron, icosahedron and their combinations? Let us see!

1. All “solid” planets such as Earth, Mars, Moon and etc. have an atmosphere and also fine elements and dust. For a long time atmospheric effects “drove” them to and fro across the surface and naturally they deposited on the polyhedron facets in a form of caps- spherical segments transforming the planet into a spheroid. Available water or another liquid helped polish the spheroid surface carrying away “silt” and leaving it in low places.
2. All “liquid” stars and planets such as Sun, Jupiter, Saturn, etc. developed into regular polyhedrons in a supercold center of deformation of a galaxy star rolling mill in a frozen state. As a natural elastic toroid-galaxy moved forward by eversion into the warm zone1-2 (Fig.2) these stars and planets melted, in other words became liquid at least on the surface and flooded the polyhedron facets together with their edges.

3. Iapetus, the satellite of Saturn, devoid of atmosphere did not melt as the temperature needed for its thawing was insufficient (due to its chemistry). So now it has a solid glaze-like bald surface, its dust if it ever was there was just blown off into outer space and Iapetus remained as naked as it was born, that is, a regular polyhedron-dodecahedron. Moreover, one can clearly see the so-called “Maginot Line” http://photojournal.jpl.nasa.gov/catalog/PIA06166 on the Iapetus surface (Fig.11), a mountain ridge girding the planet exactly along its equator as if dividing it into two equal parts. It is nothing else but a burr (fin, rib, bay, lug) – excess material extruded in helical rolling through a gap between roller flanges.

The density of a star/planet material decreases radially by concentric/coaxial layers in the direction from the surface to the center. That is, the surface layer of the star/planet is denser/more solid/thicker than its soft center/kernel.

In terms of technology it is explained as follows:
The star-and-planet rolling process in “twists”/turns/rolls of the galaxy central part takes a very short time(with respect to the galaxy complete eversion time) with a simultaneous sharp temperature drop in that zone. An old star substance drawn by the enveloping end, or the “predictor funnel[+]”, into the center of deformation freezes in a very short time changing into an oval body. In doing this, it does not have time to freeze through to its longitudinal axle/center. Then its concentric layers pull up to its surface due to expansion at freezing, thereby the center/kernel become less dense and correspondingly the temperature in the area of its longitudinal axis/center rises.
This results in a low-density/loose/porous medium similar to tufa with a higher temperature than that of peripheral layers.
Probably this circumstance keeps the bodies of stars and planets from destruction, namely the low pressure in their centers restrains/radially pulls together Shikhirin’s cells[4] derivatives that shape their bodies.
At the same time future stars/planets are knobbed by the rolls and calibrated.

Conclusion:
The star formation is a supercold helical rolling of stars, planets and gas emissions accompanying this process known as comets. A feedstock for the helical rolling is a mass fractured by the first twists/turns and frozen at the ultralow temperature - the old star substance.

Formation of stars (hailstones, etc.) through a supercold helical rolling is proved by the studies referred to in [37](Fig.11 , the right-hand picture): '… *the velocities of hundreds of gas knots streaming at hundreds of thousands of miles per hour from the nucleus of NGC 4151, thought to house a supermassive block hole"(?!).*
As a matter of fact, the "knots" are mentioned here for allegory rather than as topological knots, and surely not as stars and planets rolled in the deformation area/center between two galaxy branches/rolls located in the central part of a natural everting elastic toroid.

The cross-section or the forming profile of the two rolls has a certain faceted shape of honeycomb edge elements to obtain regular polyhedrons, e.g. a dodecahedron.
The right-hand figure shows the real dodecahedron planet Iapetus with the Maginot line and its burr profile resulting from interaction of two roll flanges.

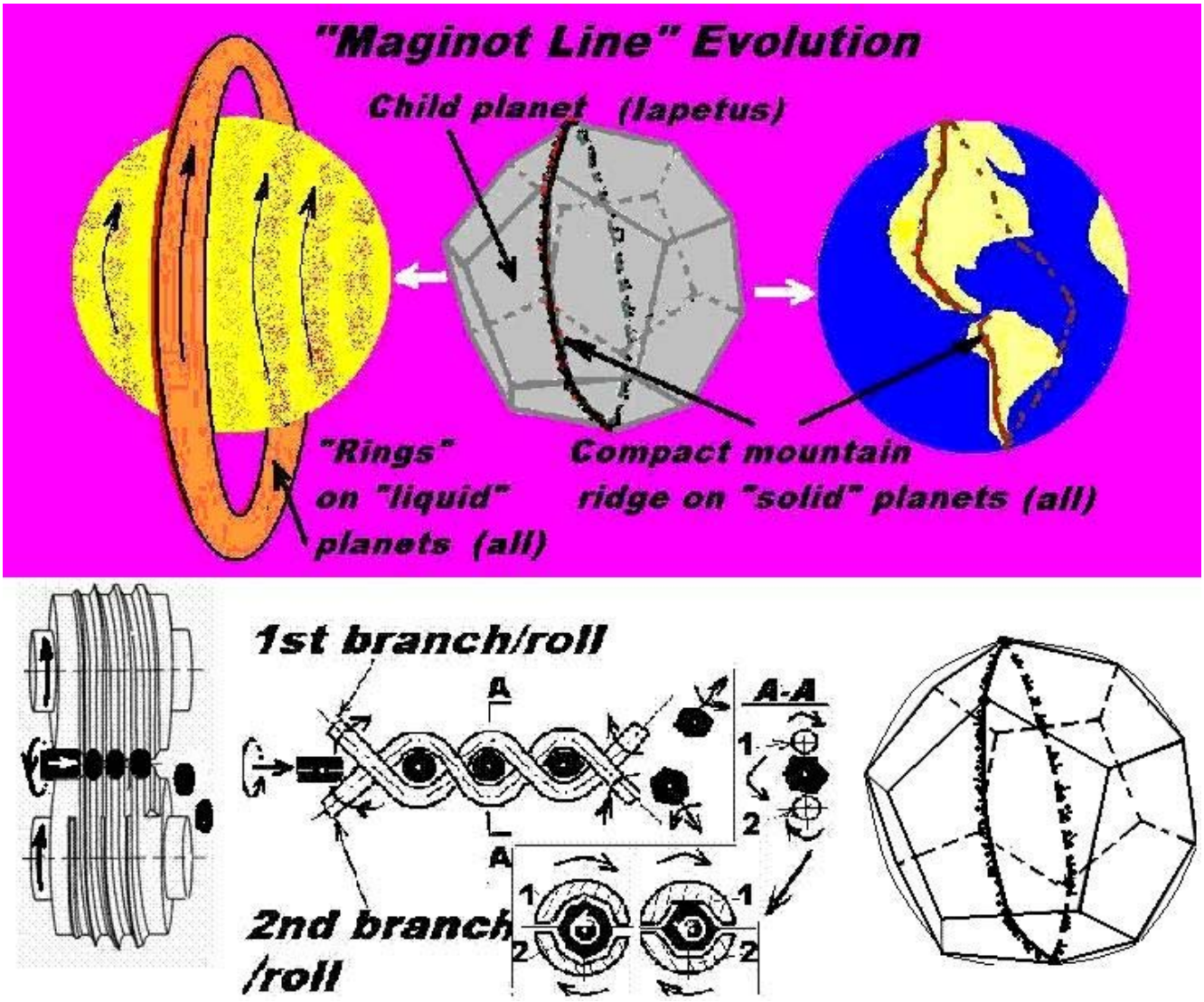

Fig. 11 Operating schemes of a ball-rolling mill (left) and a star-rolling mill (middle) with two versions of forming profiles of the rolls. Real process looks at http://hubblesite.org/newscenter/archive/releases/1997/18

At the bottom of the right-hand picture http://hubblesite.org/newscenter/archive/releases/1997/18 one can clearly see a process of star/planet formation by way of supercold helical rolling. The "cross-sectional view" shows part of the deformation area/center located in the central part of a galaxy - a natural eversible elastic toroid being a source of generation of several (about 7-10) stars/planets and gas bubbles, or small comets, that are also natural eversible elastic toroids – toroidal plasmoids.

The torque is imparted to stars, planets, their satellites, and solar systems by rolls/branches rotating in one direction and by their profile peculiarities, e.g. sizes of honeycomb edge angles. As for their physicochemical composition, it is predetermined just by geometries of honeycomb edges – giant multi-tire/multi-store carrousels.

Comet Formation

This knot (***$3_p n_p$, 2***) is a multidimensional helical soliton, or a *smart multidimensional toroidal 5-branch/roll soliton*, where n_p = several hundreds/thousands.

In the process of supercold helical rolling of stars and planets gas and dust are emitted that accompany the rolled raw material of future stars and planets repeating their complicated motion tracks, namely move forward along a helical curve in space between the rolls rotating in one direction and everting respective their longitudinal axes and the raw material of future stars and planets rotating in the opposite direction.
The number of gas and dust amounts is no less than the number of generated stars, planets and their unfortunate siblings that failed to be born/scattered to pieces (asteroid belts).

Gas and dust amounts everting together with stars and planets from the central part of the galaxy to its periphery reproduce/repeat parameters of its toroidal motion, therefore, after escaping from the central part they continue forward movement by eversion creating an eversible elastic gas toroid, namely a comet – mini-galaxy. It is obvious that the comet being a natural eversible elastic gas toroid has all its functional properties. Knowing that any eversible elastic toroid moves forward to a low pressure area one may say the velocity of the "active" forward movement of the comet exceeds the velocity of the "passive" forward movement of stars and planets as they evert together from the central part of the galaxy to its periphery.
The above explains extended forms of comet orbits remaining in or escaping from the gravitation field of some "solar system".
The tail of the comet is nothing else but the result of operation of its own helical rolling mill producing its own particles – regular polyhedrons. These particles are everting together with the comet shell material in the direction from the "corrector funnel$^-$"to "the predictor funnel$^+$" while some portion of them is "peeled off" from the comet by its environment – the anchoring belt, and drifts after the comet in the form of its tail (Fig.12, left)
If the comet looses power and starts disintegration its speed gets lower and all particles that are still produced by the comet's rolling mill do not keep normal motion everting together with the comet's shell material but behave like the central body of an everting elastic toroid, i.e. move forward at a double velocity with respect to forward motion velocity of the toroid itself. This process results in formation of the comet's front tail constantly extending in length (Fig. 12, right).

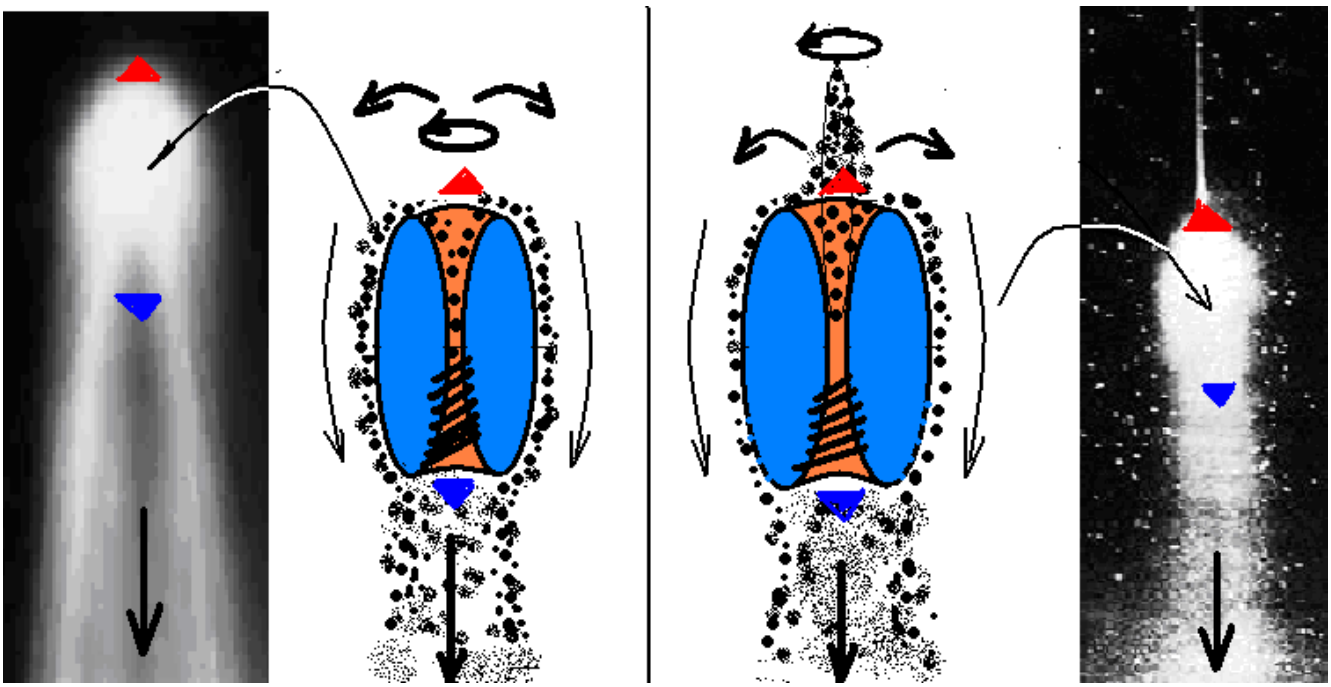

Fig. 12 “Healthy” (left) and “sick” (right) comets

Hailstone formation (Fig.13)

This process means a supercold helical rolling of hailstones, or water “pieces”, followed by gas emissions in the form of steam and fog. A source raw material/”preform for the helical rolling are water, debris, various objects, live beings, etc., drawn into through the enveloping end of the elastic toroid and getting into the central part of the toroid cooled up to sub-zero temperatures (as a result of rotation). The water freezes together with in-drawn elements producing an ice rod of an oval cross-section. Just this is a preform for a hailstone rolling mill. Everything that was left lying on the ground after the storm – heaps of rubbish, deformed trees, upturned cars, dead and wounded animals – are nothing else but rejected (irregular polyhedrons) “parts” resulting from the helical rolling.

Fig. 13, left: top view of the hailstone formation process run on a 5-roll "supercold helical rolling mill" – the central part of a natural eversible hurricane/tornado toroid.
Real process looks at http://www.mesoscale.ws/pic2004/040612-10.jpg

The Fig. 13 shows the hailfall process (without debris and other bodies), with the hail everting together with the periphery of the hurricane from its central part – the hailstone rolling mill.
Picture http://www.mesoscale.ws/pictures/hail/ shows "strangely" shaped hailstones.

Direct evidence of the 5-roll scheme of hurricanes/tornados is provided by pictures of "Ivan" and "Isabel" hurricanes used in [38] that are shown elsewhere ©.
The density/specific gravity of the material of a hailstone is decreased radially by concentric layers in the direction from its surface towards its kernel (core)/center, i.e. the surface ice layer of a hailstone is denser/harder than its snow center.

In terms of technology it can be explained as follows:

The process of hailstone rolling in "twists"/turns/rolls of the central part of a hurricane take a very short time – several seconds followed by a sharp temperature fall in that area. Water drawn by the enveloping end - the "predictor funnel+" into the deformation area/center freezes in fractions of a second getting transformed into an oval shape body. However, the body fails to freeze through up to its longitudinal axis/center since as the ice volume increases its concentric layers are drawn to its surface thereby discharging the area/core that surrounds its longitudinal axis. As a result, less dense/spongy/porous ice similar to snow is produced being in a space discharged with respect to the external environment.. Simultaneously, future hailstones go through roll knobbing and calibration.
If the number of the hurricane's branches/rolls changes ($5 \rightarrow 4 \rightarrow 2 \rightarrow \ldots$), e.g. at a power drop, the profile of forming rolls also changes as well as the shape of hailstones – from regular polyhedrons to flattened or elongated faceted ovaloids.

Unproved truths

1. Thunder clouds formed near point 1 (Fig. 2) at a high temperature and always accompanying an hurricane are just a disguise hiding its graceful, thin, cobra-like dancing shape.
2. Thunder clouds are formed and electrified only by hurricanes generated in the Earth's atmosphere.
3. Hailstones are produced **only** by a hurricane/tornado. There is no other source of hailstone formation in Nature (on the Earth).

4. Dirty hailstones with a porous kernel (core) result from the activity of a hurricane interacting with the Earth's surface: before the contact with the earth the hurricane is white, clear and "clean", and after the contact it is dark and "dirty".
5. Clean hailstones with a white porous snow kernel is a result of activities of hurricanes that did not contact the earth and hence did not interact with its surface. In other words, they stay in the atmosphere and are invisible since they are "clean" and "hide" in disguising clouds they created themselves.
6. The lightning is a result of **only** hurricane activities; the hurricane short-circuits the Earth surface and a thunder cloud created and electrified by the hurricane itself. After self-discharge and hence weakening, the hurricane dies – ceases its activity.
7. Various "side" effects like a rainbow, ozone and remarkably clear sky after a thunderstorm also result **only** from activities of the hurricane and follow its death.
8. Cross sections of the forming profile of any of the 5 rolls also have an appropriate faceted shape – of honeycomb edge elements, and allow to obtain, for instance, regular polyhedrons, flattened or extended faceted ovaloids.

Miscellaneous

The "bubbling", or formation of sphere-shaped gas-bubbles (dodecahedrons, icosahedrons and combinations thereof) irrespective of the gas composition of this bubble is another indispensable quality of natural liquid eversible elastic toroids – multidimensional toroidal solitons $(3n_p; \{n_q + [(n_q - 1)/2]\})$ that generate the above-mentioned bodies. For instance, the cavitation process inherent in a liquid medium owes its origin to liquid eversible elastic toroids appearing as a result of propeller screw rotation.

Role of the Mankind and Its Action Plan for the Future, or "The Bitter True is Better Than a Beautiful Lie" *(very briefly and needs to be elaborated)*

I hope that if I understand our Galaxy concept correctly, all thinking and unbiased people will share my point of view on reading this paper.

So, our Galaxy and hence all other galaxies are natural elastic toroids that while moving forward in space live a certain lifetime: from their birth to their natural death.
All "solar systems" move by eversion together with the galaxy shell material in the direction from the central part of the elastic toroid through the "corrector funnel-$^{-}$", the periphery to the "predictor funnel^{+}", the "black hole", for reworking and generation of new "solar" systems. And this process will go on until the Galaxy itself ceases to exist.

The lifetime of any galaxy includes (based on the Earth cycle example):
- its birth – new stars and planets are generated;

- childhood – on “selected” planets, with the anthropogenic factor involved, conditions for life are originated – “life belt”;
- maturity - all periods associated with floral and fauna life on “selected” planets;
- old age – the “life belt” fades, stiffens and ceases to exist;
- death – natural disruption of the shell integrity, running out of the working/fluid medium.

Being quite aware of these processes (and so are we now) our ancestors (and we are also destined to it if we grow wiser) were very active in

- looking for “solar” systems on whose planets suitable life conditions (“life belt”) might appear;
- conducting investigations and monitoring of planets capable of producing “life”;
- transferring (!) to them floral (for creation of the atmosphere) and animal world, including the whole gene pool;
- immigrating to those planets from a solar system or another galaxy that was dying in natural way.

And the above cycle is sure to continue and will be going on forever.

Life is just as eternal as are eternal and infinite the Universe and Time that have no beginning and no end.
Absolutely all processes of birth, life and death in the Universe including those involved in all aspects of people’s life are typical (mastered) technology processes.
Any galaxy contained, contains and will contain a planet like our Earth.
Life on any planet originates when the latter has been relocated by eversion together with the shell material of the Galaxy from its central part, or the “corrector funnel-$^{+}$”, to its periphery, namely when the planet along with the Galaxy shell material has overcome the bending curve on the everting end.
Our planet Earth has already covered the more 2/3 distance from this curve.
On stepping over this threshold, the surrounding space and hence stars and planets cool down, mature, increase in volume/weight and advance to their natural death – the black hole/”predictor funnel^{+}”.
No climate warming will hardly ever happen since our Earth like any other planet or galaxy is programmed for a natural death of “super-cold” and is already approaching this domain.
All “glacial” and other elapsed periods of this kind were only the result of movement by eversion of the galaxy - a natural elastic toroid, with simultaneous rotation in its sleeve.

Any life ceases even if a planet possesses huge stocks of mineral resources and untouched Nature, like in the Alaska area that have been preserved by human efforts.
One cannot help thinking that all these treasures protected by law and not used by Man are senseless and will perish in an excellent state.

For instance, the author sees obvious symptoms of the starting super-frosty (below 40^{o}C/F) life phase of the Solar system that is continually moving by eversion along with the Galaxy shell into its supercold area, which means approaching death for everything alive on the Earth. The fuel resources to warm up and cook food will last for several years, and in a while time will not even suffice to cut wood quickly…. No one will help ….

However this short and at the same time giant time span is sufficient for the "clever" Mankind to find near the bending curve in this or another branch of the Galaxy or in a branch of another galaxy another planet to which by efforts of many generations the best people of the Earth will emigrate from the planet dying a natural death. For me it is quite obvious that our planet was found and populated just in the same way by our distant ancestors who came from our or another Galaxy.
Collisions with other galaxies are physically impossible since galaxies as natural elastic toroids move by tracks through energy information nodes that make an intelligent and reinforcing part of the outer space - a gas fluid medium with definite rheological properties.
There are only two scenarios according to which super-resilient and super-elastic eversible toroidal "ball" galaxies may "collide" on parallel or opposite courses:

1. Galaxies mutually roll each other by their peripheries and in the meantime interact with each other by way of power and energy interchange.
2. The first galaxy being the central body is rolled through the central part of the other galaxy. In this case the periphery of the first galaxy and the central part of the second galaxy are knob-rolled, which is followed by energy and information interchange.

The mankind life period on any planet like Earth does not continue for more than 10 thousand years, with the total period of "life belt" existence being hundreds of thousands years. The reason is quite commonplace: the scientific and technological process will ultimately reach its limit on the Earth in its main life-ensuring aspect – power and energy production, resulting in irreversible stagnation and depression in all spheres of human activity on the Earth and hence in overall system anarchy with the total loss of control over the entire situation.

Recent events involving natural calamities and anthropogenic catastrophes triggered, for instance, by nuclear power engineering are a perfect confirmation of the approaching limit in science and technology.
The Man is given very little time to

- become aware of its mission in the Universe;
- understand the composition of the Universe, galaxies and the Solar system in details and on the global scale;

- realize that the Galaxy cannot last for ever, it has is own dates of birth and death;
- understand that the "life belt" wherein our Solar system resides will invariably go beyond the Galaxy "horizon" and the life will freeze though the Galaxy will remain active;
- define the limit of the Mankind's existence on the Earth;
- detect a new resident planet where the starting period for the Man to populate it will correspond to the end period of the Man's existence on the old planet;
- prepare for a long travel scientifically and technologically in order to save its future generations (its genetic code);
- be aware that on arrival at any planet all knowledge, experience and skills naturally accumulated on the old plane will be lost after a number of generations (no infrastructure created over ages) or technical means for their deciphering will not be available. Imagine, you have found a CD-ROM 10 year ago and wonder what it is for. It will never occur to you "to read" it somehow. What I mean is, our successors will start the cognition process anew and are sure from time to time to come across traces of "ancient" civilizations much more advanced, God knows why;
- the probability for mankinds existing concurrently in the Universe to get aware of their future is very small, and even if there is one, they may be "several years short of time".

For instance, there may be (and exist now) false goals:

- "the petrol pipe" - neglect and intentional hampering of creation of power systems based on new principles, e.g. tore technologies and elastic mechanics, leading to being fatally late for life-saving galactic emigration;
- global fight for peace - worthless use of practically all financial and human resources, etc.

I would like to say it again it is worthless to keep CH energy resources (oil and gas) in/under one's property/control since descendants – successors in property – will undoubtedly freeze to death just as the rest animal and floral world on the Earth that is moving within the solar system towards the "Life Belt" boundary.

Moreover, the global Apocalypse may come much earlier. Petrol and gas producers and their numerous teams will not be able to retain their property title to CH resources since revision and redistribution of the CH property, and hence the World will go automatically in the near future irrespective of their wish.
The cause: CH fuel production and transportation tends to become more expensive which finally makes hydrocarbons purchasing senseless. The prices will rise through

- development of new deposits in hard-to-reach and seismically dangerous Earth areas;

- "thinning" of giant amounts of oil (over 50%) still remaining in oil fields due to their high viscosity, which prevents their natural or economically feasible "squeezing out" onto the Earth's surface;
- development and/or control of new or old deposits on other "problem" areas;
- laying new gas pipelines, e.g. over the bottom of oceans and seas;
- safeguarding new and old deposits and transportation roads as well as power stations producing power by hydrocarbon combustion, and power lines;
- restoration of infrastructure and/or its elements after constant and systematic distraction (terrorist acts) by "old" owners and/or competitors, claimants, etc;
- fight with new claimants for revision of this property.

Atomic power producers will encounter similar problems including "the clockwork" syndrome. To put it in a nutshell, owners of this property are actually losing control over it, and the final loss will not take long – not more than 10 years.

As a result of losing CH energy resources or control over them, **countries living "on or in the vicinity of an oil or gas pipe" will be converted to dead zones controlled by marauders.**

In my opinion, one of the two scenarios of a "smooth" but very short period of transition from using hydrocarbon power sources to making use of toroidal motion-based vortex power systems will be realized:

- Appearance of new owners of vortex energy carriers and their teams. Old owners of CH energy carriers will go bankrupt failing in this short-lived competition. The example of Bill Gates who performed a revolution in the field of information technologies and left "old" cock-sure owners far behind may appear much less dramatic than the near future events of rash revision of the property in energy resources. In the latter case, down and out will be monopolies supplying electrical power and gas. Moreover, vortex energy production and supply principles drastically differ from conventional technologies making their infrastructure superfluous (pipes and power-lines not needed).
- If old owners, i.e. CH energy proprietors, do not ignore the Bill Gates example they will grow with time into new type owners, or to be more exact, into co-owners of vortex energy sources. In such a situation old owners acting as co-founders of new companies, will provide financial resources needed to continue works targeting new energy sources, appropriate infrastructure and development thereof

Moreover, at present, the work on vortex energy problems is carried on uncontrollably by hundreds of teams and individual researchers all over the world who continue works by Tesla, Clem, Schauberger, etc. as well as develop absolutely new designs making use of state-of-the-art science and technology advances. Buying patents, know-how and specialists with their subsequent "freezing" or any other suppression of their activities, something that was going on through the 20-th

century, will not bring success since during the current very short (threshold) period Mankind is passing to a new hierarchical level of its development as a result of a natural system crisis programmed by Nature in all fields of its activity. ”The Genie has already been let out of the bottle”.

There is one thing not to be overlooked: the operation of vortex energy systems is followed by generation of vortex fields poorly explored by now that may have a positive or negative effect onto the biosphere of the Earth as well as on living and plant organisms under space conditions. The vortex fields should be studied on a system base for which purpose special sensors and systems should be built that “feel” the vortex field and, if needed, neutralize its negative effect.

Viewed from the above, all financial and human resources should be directed towards

- creation of toroidal motion-based technical means to provide protection from Almighty Nature, primarily from hurricanes;
- building toroidal motion-based energy systems and taking off their energy for future use;
- making preparations for future emigration onto another planet prepared by us.

Obviously, the best intellectual resources of the Mankind should be allocated for this purpose.

It may happen that only one Mankind of thousands will become aware of its lofty calling/destiny and be able to spend dozens of years preparing for a long journey to continue its population rather than be as thick-headed as simply freeze to death.
The ”chicken and egg” were, are now and will always be simultaneously/concurrently both the first and the last.
“In the beginning was the Word …” - ALL including “the Word” was, is and will always be simultaneously/concurrently the first and the last.

P.S.
1. A month ago (August, 2005) I was contacted by Dr. A.I. Kachan, PhD, a professor from Kharkov specializing in creation of tore-based medical and pump-and-compressor (peristaltic) systems as, e.g. in [39]. At present he lives in Israel.
2. The English version of [1] (beginning) and this paper (continuation) will be placed on Website: *www.elastoneering.com/publications/htm*

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