The Edge of the World

I. The 3-Sphere of the Poincarè conjecture

The great epistemological importance of mathematical conjecture lies in its ability to show the researcher the promising direction based purely on strict logical consequence – and this long before the time is ripe for it.

A vision of this category is the "Poincaré conjecture" of 1904 about the 3-sphere of topological space. By systematically predicting for a higher dimension what he had previously mathematically proven, Poincarè analogically implied the existence of four-dimensional space being bordered by (so-called) 3-sphere.

Only a few years after publishing the conjecture, the first of his predictions was to be confirmed by Albert Einstein's discovery of a four-dimensional "space-time-continuum" - this consequently surely decisively contributed to the exceptionally great fascination of generations of the best mathemeticians for more than 100 years to come.

Now it finally seems that the Russian, Grigori Perelman has indeed succeeded in proving the Poincarè conjecture – whereby this proof naturally also verifies the existence of 3-sphere which borders the space-time-continuum.

Because until now, the mathematical entity of a 3-sphere was only imaginable in a totally abstract way and seemed impossible to attain through an empirical method of research in the space-time-continuum, this was the first time that a rational bridge to a mysterious world was built, a world which until now, could only be described in pictures and words in a purely speculative manner.

The significance of Perelman's achievement is much more than a highly specialized mammoth feat. Because the 3-sphere of Poincarè's conjecture is defined as homeomorphic i.e. identical in form or rather analog in form to our experienced four-dimensional world, it may be considered mathematically proven that it is possible in principal to accept a 3-spherical *Meta-World* beyond our experienced world which, like an infinite "black hole", allows no information to reach us.

How then is the 3-sphere designed? How does it relate in principal to our laws of nature, which the topological principal promises?

If in the following I now will try to approach to 3-sphere with the help of macro-physical analogies, I indeed trust in concrete provable physics. By this I will reach self-evident to a fundamentally enlarged definition of space, which so to say will project into the "meta-physical 3-sphere border" - and from which I seriously expect that it will help to complete what Newton and Einstein exemplarily came off: **The abstract comprehending of the infinite complexity of the world into most simple mathematical formulas**.

The fact that Poincaré conjecture itself by analogy bases on a systematically wonderful simple conclusion (namely that 2-sphere of topological space conducts to 3-sphere like 1-sphere to 2-sphere) makes this hope realistic. In this context further let me remind to the deep conviction of Albert Einstein that „nature is the realization of the mathematically most thinkable simplicity".

So what in this sense is 3-sphere? I say: 3-sphere is nothing else than a sphere, which is defined by space dimension, namely a spherical hollow body resulting from “3-dimensional closed” elastic deformation.

The space dimension of a hollow body naturally is identical with the route between lower and upper surface.

However, this route– as in the following will be shown – really is a dimension of a special kind.

II. The Space-Force-Continuum

A. Definitions:

1. The abstract empty space, how is defined in Euclidian geometry, principally is neutral in effect. A “natural” route that is an origin route that means a neutral, that means a Euclidian route in empty space therefore here is defined as being principally not-curved, that means totally straight, that is anisotropic.
Therefore the “natural” area in the empty space also is not-cambered, that means totally straight, that is anisotropic.
Furthermore the “natural” body in 3-dimensional space is not-rounded that is cubic, that is anisotropic.

2. The topological space, that in this context means, the open - until to spherical-bordered space, in contrary to Euclidian space never is neutral in effect. A route in topological space therefore is always curved that is (,) in all counts a principal modification of the original state, namely the empty Euclidian Space being neutral in effect.

3. This modification is the result of a force effect. So the curved route principally stands for a state of force in space. This state of force here principally is defined as “elastically deformed”. Analog to the state of elastic deformation of our world of experience the curved route is to understand in the sense of dual nature, namely as “polaristic unity” consisting of tensile and compression stress. Thereby compressed state is the result of force and the stat of elongation the result of counterforce.

> **a.** The circle that is the 1-sphere in topological space is the limiting case of “in-itself-closed” that is of a “**hermetically”** centered-curved route of force. I define the circle as border of a not-in-itself-closed that is a **“not-hermetical”** 2-dimen-sional manifold.

4. According to this area in topological space principally is cambered that is modification of the 2-dimensional original state. This modification is the result of a force effect. The cambered area therefore is a state of force.

> a. The surface of a sphere that means the 2-sphere, in topological space is the limiting case of the hermetically centered cambered area. I define the 2-sphere as border of a not-hermetical 3-dimensional manifold.

5. The body in the closed topological space accordingly is rounded that is a modification of the 3-dimensional original state. This modification is the result of a force effect. The rounded body therefore is a state of force.

a. The spherical body that is the 3-sphere in topological space is the limiting case of the in-itself-closed "hermetical body". I define the spherical body "metaphysically" as the border of a not-hermetical 4-dimensional manifold.

A. The Poincaré Conjecture

First of all the wording:

„**Every simply connected, closed 3-manifold is homeomorphic to the 3-sphere."**

The basic situation topologically can simplified be described like this:

1. The **1-sphere** is a 1-manifold, which is defined as in-itself-closed that is **"centered hermetical"**, because there is no beginning and no ending. 1-sphere is the border (namely the circumference) of a 2-dimensional circular area, which because having a separable border (namely the 1-sphere) and therefore has beginning and ending, is to understand as not-in-itself-closed that is **"not-hermetical"** 2-manifold.

2. The **2-sphere** is a 2-manifold, which can be defined as "centered-hermetical", because there is no beginning and no ending. 2-sphere is the border, namely the surface of a 3-dimensional ball, which - because having a separable border (namely the 2-sphere) and therefore has beginning and ending - is to understand as a **"not-hermetical"** 3-manifold.

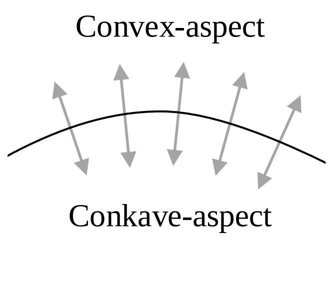
Both sentences are particularly striking the systematic, which has brought Poincaré to the citied logical conclusion, which according to the systematic of sentence 1 and 2 (thus) can be formulated:

3. The **3-sphere** is a 3-manifold, which can be defined as "centered hermetical", because there is no beginning and no ending. 3-sphere thereby is the border, namely the **"Metabody"** of a 4-dimensional ball, which - because having a border (namely the 3-sphere) and therefore has a beginning and an ending - is to understand as a **"not-hermetical"** 4-manifold

B. Dual nature of Aspect

I here understand every force-route in elastic space as a symmetry axis. From this in elastic space necessarily results a dual aspect. In case of the straight line both aspects are completely mirror-symmetrical that is identical but laterally reversed. In case of a curved line symmetry is "distorted". One aspect is convex-distorted the other concave-distorted. The distortion at the inside of the curved symmetry axis (that is the "concave-aspect") consists - same as known from optical lenses - in compression, the distortion at the outside (that is the "convex-aspect") in elongation.

Fig. 1



C. Symmetry as Homeomorphism

Definitions:

1. The dual nature of aspect is a homeomorphism. The symmetry-axis between 2-dimensional parts I here call ***1-symmetry-break***. Accordingly I call the symmetry-area between 3-dimensional parts ***2-symmetry-break*** and the symmetry-axis between 4-dimensional parts ***3-symmetry-break.***

2. If dimensions of *1*-, *2*- and *3-symmetry-break* are located in the abstract Euclidian space, they are straight, plane or cubical.
Dual-effect in this case is ***"mirror-symmetrical"***. If they are located in the curved resp. cambered topological space dual-effect is ***"convex-concave-symmetrical"***.

3. If symmetry-break is spherical resp. a 1-, a 2- or a 3-sphere, I call the homeomorphism of dual-aspects ***"inside-outside-symmetrical"***.
Homeomorphism of a sphere in the sense of inside and outside is an interrelation between ***"inclosed"*** (that is inside) and ***"outclosed"*** (that is outside).

D. 2-dimensional Lines, 3-dimensional Areas, 4-dimensional Bodies

Definitions:

1. The ***„2-dimensional line"*** here is understood as a linear, strung-out area (strip) that is an area, whose width dimension is so minimal that it relatively can be neglected.

2. The ***"2-dimensional 1-sphere"*** is the limiting case of the in-itself-closed that is *hermetical* 2-line resp. a circle, whose line-width is minimal that it relatively can be neglected.

3. The ***"3-dimensional area"*** is a flat-body, whose height dimension is so minimal that it relatively can be neglected.

4. The ***"3-dimensional 3-sphere"*** is the limiting case of the in-itself-closed that is *hermetical* flat-body resp. *3-spherical surface*, whose height dimension is so minimal that it relatively can be neglected.

5. The ***"4-dimensional body"*** is a *space-time-body*, whose time dimension is so minimal that it relatively can be neglected.

6. The ***"4-dimensional 3-sphere"*** is the limiting case of the in-itself-closed that is *"hermetical space-time-ball"*, whose time dimension is so minimal that it relatively can be neglected, which therefore can be treated like timeless.

If 2-lines, 3-areas, 4-bodies are deformed, they define states of force, which are characterized by an elongation stress at the *"convex border"* and a compression stress at the *"concave border"*. Following the principle that the product out of elongation and compressing stress always is constant ($e_s * c_s$ = const.), elongation stress and compression stress flow into one another from the convex border, where only works elongation stress (elongation pole) to concave border, where only works compression stress (compression pole). The transition from elongation affecting to compression affecting is defined by a quasi-abstract line, area, time-area, which in fig. 2, 3 and 4 is outlined in red.

The neutral line, area and the area being neutral with respect to time I here understand as *“1-, 2-* and *3-symmetry-breaks of state”*, the borders of the *“flat-line”, “flat-body”* and *“time-body”* (that is the dipoles of elastic deformation) as *1-, 2-* and *3-symmetry-breaks* of *“in-out-effecting”*. Both aspects will become states by the *“in-itself-closing”* of *flat-line, flat-body* and *“time-body”*. This means that the borders of *“hermetical flat-line”*, *“hermetical flat-body”* und *“hermetical time-body”* from the *convex-side* includes “out-closing” and from the *concave-side* “in-closing”. The distorted symmetry of the diametrical aspects so has transformed to an ***“inside-outside-symmetry”***

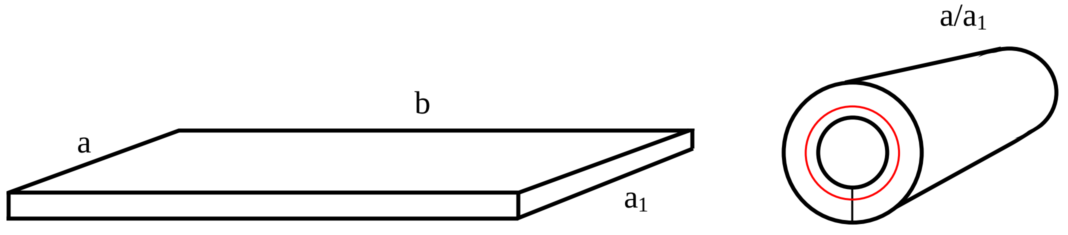
III. The inhomogeneous deformed elastic Space

The route, which is crossing a curved flat-line from convex- to concave-aspect, I here call *Dimension of force.* Because *Dimension of force* describes the overlaying state of force, it is advisable to analyze physical analogies that are arias being characterized by physical force properties.

Thought experiment 1

For that purpose I here employ an ideally elastic flat-board, which is “neutral in effect” and which I here define as a flat-body (3-area), with the height (h). I now deform the flat-body along the longitudinal axis (b) and close it by welding the edge surfaces (a) and (a_1). Thus arisen is a cylindrical body, which can be defined as “1-dimensional in-itself-closed”. This procedure includes a manifestation of inhomogeneous elastic deformation, which now can be analyzed.

Abb. 2



(= *K-dimension*)

The welding of the edge surfaces let arise a cylinder (abstract to define as 2-dimensional 1-sphere), in which the energy of deformation is stored as an elastic potential. According to the laws of “inhomogeneous elastic deformation” the stored potential can be defined as a polaristic area of tension stretching from a maximum of elongation (upper surface resp. convex-area) to a maximum of compression (lower surface resp. concave-area).

With increase of elongation stress that means towards the upper surface (convex-area) of the cylindrical body, the metrical distances between molecules automatically will increase. With increase of compressing stress that is towards the lower surface (concave-area) on the other hand the metrical distances between molecules in an adequate way will decrease. From this follows that elongation in contrary to compression seems to be dominant. This effect the more is visible the higher the plate thickness.

Despite this appearance there is an absolute balance between compression- and elongation-stress and it is valid the equation:

Elongation-force ≡ Compression-force

Optical asymmetry is the result of the deformation of the originally Euclidian object, because the (related to the state of force) homogeneous space of the object has transformed in a systematic way to an "inhomogeneous" space.

The dimension of space has being transformed into a "dimension of quality".

So I can say: The 3-dimension of the inhomogeneous elastic deformed board is a dimension of force.

Fig. 3

(← →) elongation stress (-)

(→ ←) compression stress (+)

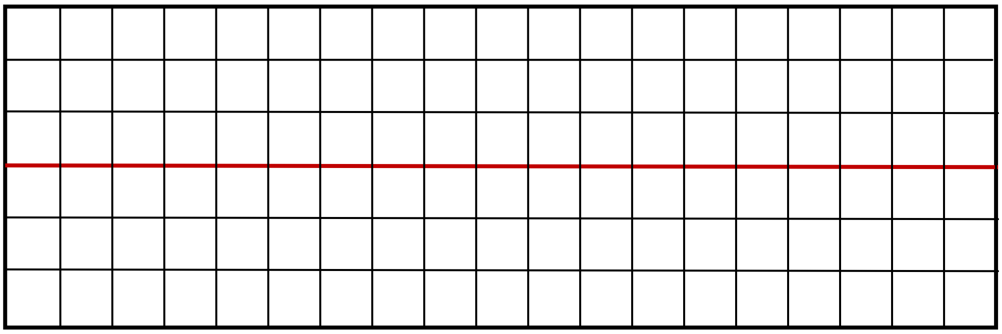


Fig.3 shows a section of the board in the Euclidian original state that means the cross-section of the board with equidistant molecules characterizing the non-deformed original state.

Fig. 4

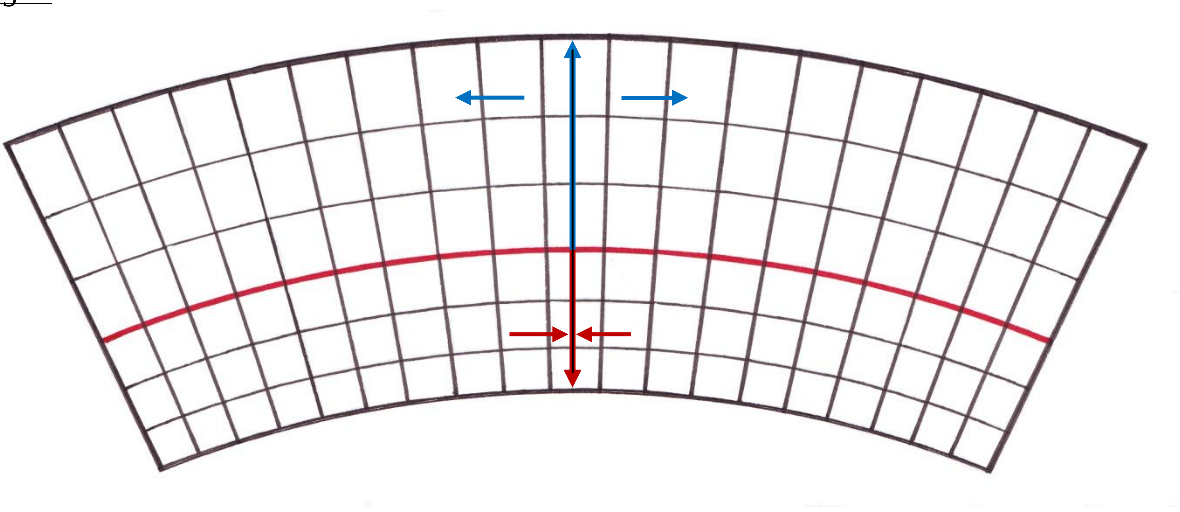


Fig. 4 symbolizes the same section after the inhomogeneous elastic deformation.

If compromising an elastically volume it becomes smaller, if dilating bigger. Both cases are the result of investment of energy, which when prevented to reset (as for example by welding of the surfaces of the edge) in the elastic volume will remain as an elastic potential. (The route from upper to lower surface of arched body here was defined as dimension of force of the inhomogeneous elastic deformed state.) While in the non-deformed state distances between molecules were metrically absolute equal, in the deformed state from upper to lower surface – because of the inverse proportionality of density and extend - they were continuously decreasing.

Regarding this from the neutral area in the qualitative middle of the cylindrical body (fig. 3 and 4 / red line) one can say: The tension of the *dimension of force* in Euclidian sense (that is abstract idealized) towards upper surface systematically will increase and to the lower surface systematically will decrease. The unit of measurement in this case is not defined by the constancy of metrical expansion (yard or meter) or the constancy of the flow velocity of time (minutes or hours) but more complicated by the constancy of an inverse proportionality, namely of the inverse proportionality of density and extend.

IV. The 3-sphere as a 3-dimensional space-force-continuum

Ex ante a citation from "Ad Vitellionem Paralipomena" by Johannes Kepler:

"In this way, the whole form of quantities came into existence and with it, the differences between the straight und the crooked and also the most wonderful form of all: the spherical surface. While making these namely, the Wise Creator playfully created the image of his Adorable Trinity. According to this, the central point is the original source of the spherical body, the surface the image of the innermost point and the way to find the same and furthermore that which tangibly occurs by the point infinitely egressing up to a certain uniformity of all individual actions of egression, whereupon the point conveys to itself in such an expansion that ***point und surface should be equal in inverse proportionality to the density****. Thus absolute equality exists on all sides between point and surface, the closest Oneness, the most wonderful harmony, connection, relationship, proportion and equality of mass;* ***and although obviously they are three: center, surface and interspace, they are really one, so that not one could be missing, not even in thought, without destroying the whole."*** *(Frankfurt 1604, pp. 6-7, quoted after the translation in W. Pauli,* Der Einfluss archetypischer Vorstellungen auf die Bildung naturwissenschaftlicher Theorien bei Kepler, *in C.G. Jung and W. Pauli,* Naturerklärung und Psyche, *Rascher 1952, p. 125) (highlighting by Ignatius)*

This *"Kepler ball"* for me is a wonderful visionary mathematical description of the 3-sphere, as being predicted by the Poincaré conjecture. In this context *"Kepler ball"* seems especially important for me, because it also makes recognizable a phenomenon we know from our world of experience.

When Kepler says, there would be *"the central point thus as it were is the original source of spherical body, the surface the image of innermost point"*, and when he speaks from "*by the points infinitely stepping out of himself"* and when especially he declares the equality of point and surface *"by inverse proportionality of density"*, then he exactly describes the "geometrical appearance" of a spherical sound wave, which is emitted by an *"isotopic radiator of zero order"*, namely the frequency pulsing of an in-itself-vibrating hollow body.

The part of space, which is effected by the so defined sound wave, is exactly adequate to the “3-sphere space”, which here is called, “Kepler ball”.
The route from the “central surface” - in this case the upper surface of the hollow body (that is the sound source) - to the “peripheral surface” - in this case the final scope of the wave - is exactly identical with the here so called “dimension of force”. (On looking closely it becomes quite clear that there is a second spherical wave effecting in the hollow space of the frequency pulsing hollow body, which is directed from the inner surface of the hollow body to the central point of the hollow space, I here define this wave a negative spherical wave)

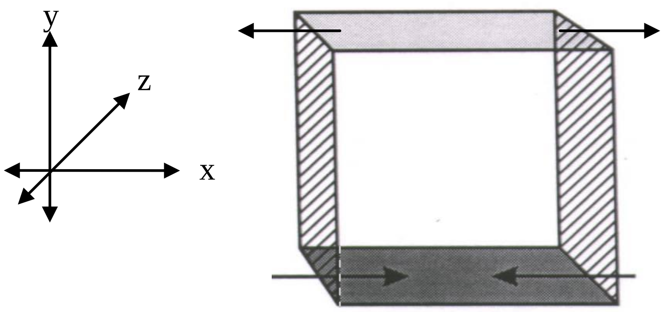
<u>Thought experiment 2</u>

First I intellectually let the *dimension of force* of an elastic deformed closed spherical flat body (for example a soap bubble) get down to Zero. It is clearly noticeable that the *dimension of force* converges to an abstract 2-dimensi-onality in Euclidian sense.

In a next step now I will act out the opposite process and let the *dimension of force* get up to infinite.

To this I intellectually design an ideal elastic cube, which I elastically deform →∞ along its three Euclidian dimensions.

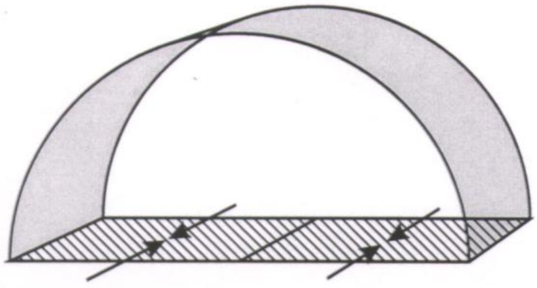
Fig. 5



<u>Partial step a)</u>

T he floor area (dark grey) will be compressed along the x-axis till to a mass-line and in countermove the light grey area to a jacket surface of a half-cylinder extended.

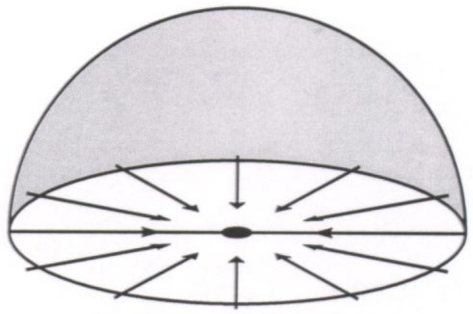
Fig. 6



Partial step b)

The hatched area along the z-axis will be compressed till to a mass-line and in countermove the light grey jacket area of the half-cylinder to a hemispherical surface extended

Fig. 7



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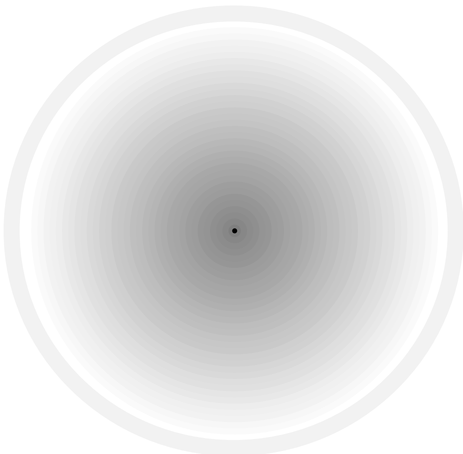
Partial step c)

The white area along the y-axis will be radial directed compressed till to mass-point and in a countermove the light grey hemispherical surface till to 3-sphere extended. Every area of the origin cube → ∞ compressed will disappear in the central point of the 3-spherical ball.

Fig. 8



V. The Polarism of the 3-Spere

Now first I take a look at the spherical surface as such. Hereby I recognize (like shown in II / D /3) that the spherical surface can be regarded from two opposite places, namely from inside of the spherical surface and from outside. First I call "internal view" and second "external view".

As in the former shown, from both places I will each get an opposite result. The *internal view* shows a concave and the *external view* a convex curved surface.

I really expect that this dual nature of spherical surface encloses the key to solving the here treated problem.

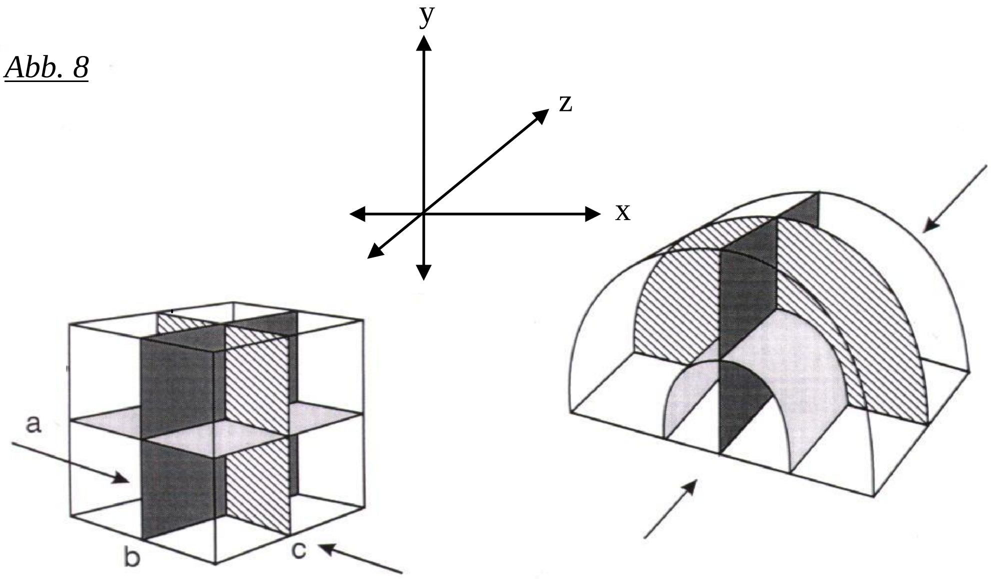
Because the 3-sphere according to the laws of inhomogeneous elastic deformation in a polaristic sense has to be understand as parted into two opposite zones of tension, I define (analogical to the bipolarity of a magnet) in the qualitative middle of the force area of 3-sphere the existence of an immanent 1-sphere, which is completely neutral in tension.

As the following thought experiment will show (compare Fig. 8, 9, 9, 10) a inner spherical surface will result being characterized by force value zero ($K = 0$), which from the zone of elongation stress only external can be observed that means only convex-curved appears and which from the zone of compression stress only internal can be observed that means only concave-curved appears.

Thought experiment 3

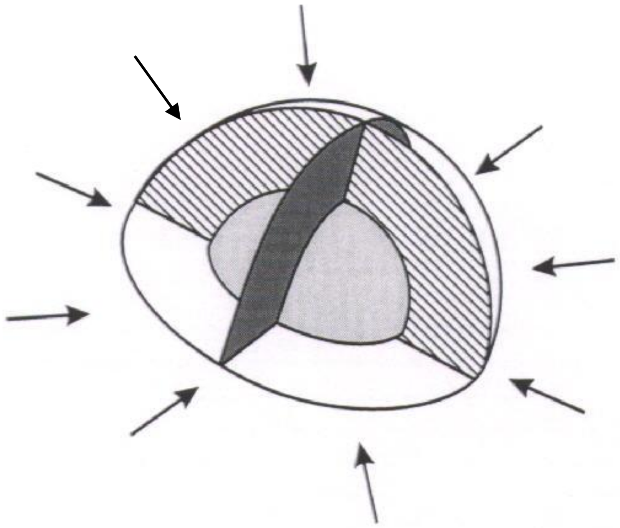
In a first step the floor area (x * z) will be compressed along the x-axis till to a mass-line and in countermove the cover area to a jacket surface of a half-cylinder extended. Herewith the symmetry-area of the “height” (y / light grey) transforms to a semi-cylindrical area, the symmetry-area of the “width” (b / dark grey) and the symmetry-area of the length (x / hatched) transform to semicircular “qualitative” that means compressed → enlarged areas, which are right angled to each other.

Abb. 8



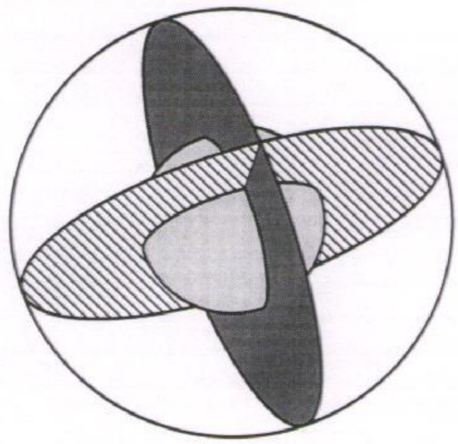
In a second step the floor area of this semi-cylindrical body will be deformed by pressure along the z-axis till to a mass-line. Herewith the semi-cylindrical body transforms into a hemispherical body. The symmetry-areas of width (dark grey) and of length (hatched) transform to semicircular qualitative areas, which are right-angled to each other.

Fig. 9



In a third step the circular floor area of this hemisphere by a radial effecting pressure will be deformed till to mass-point. In interaction with the elastic counterforce of the body the symmetry-area of the height (light grey) will transform to an interne homogeneous (Euclidian) 2-sphere and the symmetry-areas of length (hatched) and width (dark grey) to qualitative circular areas, which are right-angled to each other.

Fig. 10



The geometrical representation of this procedure as same as geometrical representation of thought experiment 2 (Fig. 5, 6, 7, 8) incidentally only are symbolic. In such an extreme case realistically the values of elongation would tend to infinite ($\rightarrow\infty$).

Because the dimension of force, as here has been described, same as the spherical ball of Johannes Kepler in a sense of quality stands for the internal balance of energetic status, I understand the route between central point and spherical surface of the 3-dimensional inhomogeneous elastic deformed cube as dimension of 3-sphere space.

I propose to name this route after its discoverer *Kepler-dimension* (in short *K-dimension).* The unit of *K-dimension* that is the distance dividing the dimension into equal parts, in this case consequentially could be called *"Kepler".*