Buletinul Ştiinţific al Universităţii "POLITEHNICA" din Timişoara

Seria HIDROTEHNICA

TRANSACTIONS on HYDROTECHNICS

Tom 58 (72), Fascicola 2, 2013

About the IN-YOLOGICAL Interpretation of a Complex Plane

Virgil STANCIU[1] **Cristina PAVEL[1]**

Abstract:This paper presents an expression of Daoist principle ONE is THE ONE, ONE is TWO, TWO makes THREE, and from there all things, which points out that at the things, beings, phenomena and events are two fundamental principles, known in ancient oriental philosophy as Yin and Yang dualism. Although the terms does not designate something concrete, existing in itself, dual aspect is very common in religion, philosophy and science. It is pointed out that, in mathematics, the proper application of this principle is related to the complex plane or complex field. The real part, respective the imaginary part of complex numbers or complex functions, are complementary quantities, such as Yin and Yang. To illustrate this, we present an applications of this dualism in fluid mechanics. By similarity, this model is extended by a model cosmology of the universe as presented in modern physics. However, in this paper, are presented, in the new LIGHT, geometric transformations with practical connotations of the complex field.

Keywords: in-yology, complex plane, coordinates,time

1. INTRODUCTION

IN-YOLOGY is one of the oldest Japanese combination of science and civilization. IN and YO are Chinese abbreviation's for YIN and YANG.
But what are they actually?

There are two contrary concepts or two complementary principles? Are states or events?

In-yology includes all knowledge that allows us to understand the philosophy of Buddhism and the philosophy of the entire Far East, where, all practical sciences of life, medicine, biology, sociology are summarized in harmony.

What distinguishes Oriental philosophy from the Occidental philosophy is that, while the second is based on a simple self-knowledge, practicing analysis, the first extended synthesis, holistic design, knowledge of the system which is possible only through daily practice living.

In the Middle and Far East concept, development of conception of a cyclic Universe, led to primary idea of the existence of unique infinity, which is the origin of all things.

Unique infinite polarized and left the neutral state of transcendence manifested ITSELF in two ways or principles, known in the Chinese wisdom as YIN and YANG.

In Hindu philosophy, these two divine principles are SHIVA and SHANTI, in spiritual science Yoga are called THA and HA, in the wisdom of Western mystics have called Moon and Sun, and Western contemporary science refers them to the negative pole and the positive pole of phenomena.

Howsoever they are known as two cosmic principles, and they form the basis for the existence of world. All phenomena, experiments, beings and so on, are the product of ongoing interaction of these complementary principles.

The idea of complementarity is fundamental in what we wish to demonstrate below.

In the dictionary, the word complementary can mean

- being complements of each other
- two angles whose sum is 90 °;
- two colors of the light spectrum, one primary and one derived, by superposition, give white, the light.

Perhaps the most suggestive meaning of the word complementary, is the geometric nature, can be extended to

- directions (lines) who are 90 º and therefore perpendicular lines;
- coordinate, two axes arranged so as to make each 90 º.

Why cannot talk about orthogonal polynomials, in algebra; orthogonal functions, in trigonometry and analysis; ortho-normal functions, in functional analysis. The examples could go on forever, in every area of our lives.

2. PRINCIPLE OF COMPLEMENTARITY AND DAOIST DOCTRINE

What finally clarify the concept of complementarity, are the great discoveries that physicists discovering, at the beginning of the twentieth century; Max Planck introduces the concept of quanta; Albert Einstein, in 1905 developed the quantum theory of light, based on photon. By this, actuality brings the dual nature of bodies and the light wave; The development of quantum mechanics in two distinct ways: of the wave mechanics and of the matrix mechanics formulation of quantum mechanics approached by Werner Heisenberg.

[1] University POLITEHNICA of Bucharest, Faculty of Aerospace Engineering, Polizu st., no. 1-7, 011061, Bucharest, Romania, e-mail: vvirgilstanciu@yahoo.com, ninapavel@gmail.com

Moreover, Heisenberg, in 1927, discovered one of the fundamental principles of quantum physics, the uncertainty principle, expressed by famous relationships, applied to the conjugated physical quantities; Coordinate - momentum; Energy – time, in a certain state of their own.

It stated unable to determine with precision, while, the position and velocity of a particle.

Based on this principle, Niels Bohr, in 1927, conceived the principle of complementarity.

According to this principle, the nature has two complementary sides that are not visible at once, simultaneously.

Therefore can not be treated unitary, wave and corpuscular properties of an object, since they can only be separated. These properties are complementary, so as, from their entirety, we can know the whole object.

Based on this fact, Niels Bohr gives, the shortest and striking forms, the famous principle of complementarity, which we can be read on the family crest ”CONTRARIA SUNT COMPLEMENTA” with ancient Chinese symbol or T'AI-CHI-T'U or "Diagram of the Supreme Ultimate" obtained by symmetrical arrangement of YIN, dark and YANG, bright, but symmetry is not static, it is one rotary, suggesting continuous motion and cyclical.

„Life," said the Chinese philosopher CHUANG TSE „is a harmonious blending of Yin and Yang, the balance between them, by CHI vital energy circulation”.

The pair of complementary of the YIN and YANG is best expressed in the idea of cyclical motion of DAO.

At first DAO means "PATH" or becoming universe, order of the world. Later philosophers give another name for normal behaviour. In its cosmic meaning, origin, Dao is the ultimate reality undefinable. Father of Daoism (doctrine of DAO) is LAO TSE, and to him is assigned the writing of a book of aphorisms known under the name DAO TE CHING - The Classic of the Path and the Virtue.

The essence of Daoism is found in the first two verses of chapter 42 of the book mentioned, stating „The DAO gives birth to ONE, ONE gives birth to TWO, TWO gives birth to THREE, THREE gives birth to the ten thousand things”….„The ten thousand things have their backs to YIN and embrace stand facing YANG. They achieve harmony by combining these forces”.

What could be more clearly said, which is that, things of nature and man, DAO's creations, are combinations of YIN and YANG. That is why our attention should be focused on the two principles, already well known.

3. TIME, THE VEHICLE OR WAY?

I've always wondered: why when we stay or not doing anything, time is running very slowly?

Perhaps Einstein asked him the same question, as a child, and trying to answer it, came to what is now called the theory of relativity, first in restricted version,1903 and then generalized in 1916.

What is important is that the theory of relativity, created by Einstein, changed completely the conception of the origin, birth, present and the evolution of the Universe.

It is the merit of a belgian Chatolic priest Georges Lemaître, who proposed what became known as the BIG BANG theory of the origin of the Universe, which he called his hypothesis of the „Primeval Atom”.

Also, physicists Stephen Hawking and Roger Penrose, showed that general relativity predicts that BIG BANG is the origin of the Universe, even though Einstein did not take it seriouslythe great explosion.

Einstein, in his theory predicts that the time had a beginning. Even St. Augustine, fifth century, religious philosopher, considered that there was time before the beginning of the world. Interestingly is that by the word „the world”, priests and physicists understood that part of the Universe in motion, so the world is actually moving.

Towards the end of their lives, stars do not generate heat to compensate gravity, the movement is restricted, light can not escape from them, which meens that time ends.

The question is, what means that the time is over, became 0 or infinity?

Sure time has a beginning and an end, as shown by modern physics. It said, today, that the begining and the end of time are events in which the equations of general relativity can not be defined, and they can be considered singular.

After Max Planck, in 1900, discovered that a body heated on red radiates light, and emits it in the package, calling them quanta. Altogether a conclusion can be drawn, namely: Heat is light, light is life, Beginning, and cooling means darkness, End. Therefore the time has this cycle, a beginning and an end, so is variable, addicted to something. Why? What is time?

A continuous flush leads us to SELF or a path with loop, derivatives that can go forward or you can go back, or a line that goes in one direction towards the future? In English, I remember, the expresion used for time is "on time". How much truth in one word.

Maybe time is the distance between cause and effect? It is time something personal? What form has the time? There are several forms of time? To some of these questions we try to answer further, in this article.

4. TIMES’S SHAPE AND SIZE

Through an experiment, Michelson and Morley showed that ether is not a real substance, unnecessary, since it cannot show if something is moving or not, by space. As such, speed of light is independent by the movement of the observers, is the same in all directions, and, therefore, the laws of science are the same, regardless of the reference system who is in uniform movement.

Can be uniform movement a condition God made things to evolve naturally?

But if the movement is not natural, what forces act on bodies? Will forward forces, occurring in deviations from the natural movements to oppose "resistance" to bodies movement?

Perhaps second law of dynamics

$$\vec{F} = m \cdot \vec{a} \qquad (1)$$

is the divine force that prevents us from living exaggerate, of our desire to overcome the natural? Is this the way of living and being natural, is the way of God, our path in life, without inertia and divine power is zero?

Theory of relativity combines a single dimension of time with three ordinary dimensions of space (Minkovski space), creating a four dimensional space-time.

Adding the effect of gravity, Einstein suggests that the distribution of matter and energy, in the universe, bends and distorts space-time.

Objects in this space-time tend to move in straight lines, but due to the curvature of space-time, their trajectories are bent.

Therefore, time and space are connected, space cannot be curved by matter and energy without time t not to be involved.

So the time has form, and as space is finite, time may be finite, it has a beginning and an end.

The link between space and time, in statement of restrained relativity can be established based on the Einstein's relations, demonstrating

- lenght contraction

$$l = l_0 \sqrt{1 - \frac{v^2}{c^2}} \qquad (2)$$

where l is the length measured by the "other" observer, l_0 is the the length measured by the observers on reference frame, v is the relative velocity and c is the sped of life;

- time dilation

$$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad (3)$$

where t is the time observed in the other reference frame, t_0 is the time in observers own frame of reference.

It is understood that, from the very beginning, God gives a number of units of length and number of time units, for length of each object and every being, respective their "life".

If you want to live longer we will need to grow second, to dilate second, to fill it with life, intellectual activities, work and spirit.

Multiplying these two relations, we obtain

$$l \cdot t = l_0 \cdot t_0 = k \qquad (4)$$

ie space time product is constant.

This means that space and time are two inverse sizes respectively

$$t = \frac{k}{l}. \qquad (5)$$

So to determine the form of time, reversal transformation is applied to the space. Inevitably, time shape depends on the shape of space.

In this case of the Universe of the space time relation

$$l \cdot t = \sqrt{k}^2 \qquad (6)$$

so the radius of the circle, which is compared with circular symmetry, is

$$r = \sqrt{k} \ . \qquad (7)$$

If we represent in a system of perpendicular axis space time, prior relationship would get a hyperbole, as in Fig . 1. One point M would have coordinates (s, t).

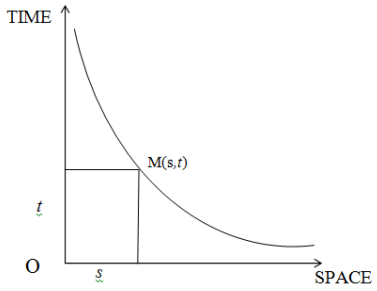

Fig. 1. Space-time space

Relative to the concept of coordinate system, is an indication that, in general, sizes, measured on the horizontal axis and vertical, are complementary, axes have between them an angle of 90 °, and from there, the notion of co-ordinates system, ie orthogonal sizes on coordinate axes.

However, each axis corresponds to the idea of this dimension, perhaps the prefix "di" refers to the two ways of getting over the line, and can be

- Up - down;
- Left - right;
- Forward - backward.

5. FROM THE CARTESIAN COORDINATES OF THE MATERIAL PLAN, ON POLAR COORDINATES OF THE DIVINE PLAN

The great physicist and astronomer Johannes Kepler stated that „Geometry has two great treasures; one is the Theorem of Pythagoras; the other, the division of a line into extreme and mean ratio."

Both treasure have, in their essence, the extraordinary idea of perpendicularity, therefore, on a different scale, complementarity. They refer to HARMONY and LIKENESS, which is the basis of our conception of BEAUTY, GOOD and TRUTH, in a word, PERFECTION.

As it says in the Holy Scriptures, God created the Cosmos, that is, Macrocosmos represented by the Universe and Microcosmos, the MAN after His IMAGE and LIKENESS .

However, modern science has shown that following the "Big Bang" 15 billion years ago, apperead SPACE and TIME. Thus, the Creator has given us the NATURE and the WORLD, STATE and MOVEMENT, Geometry and Mechanics.

We can speak of two real geometries, one created by God, natural geometry, unconventional or fractal geometry, and another discovered by man, Euclidean geometry, which were added non Euclidean geometries, as an attempt to get us closer to the true geometry.

In mechanics, we can speak about the foundations of Newtonian mechanics, in 1687, relativistic mechanics, the theory created by Albert Einstein, initially restricted in 1905, and then generalized in 1916 and quantum mechanics after 1900. History of complex numbers and their relationship to geometry, algebra, analysis, physics, Eastern philosophy and religion is interesting and very exciting.

In fact, the story of complex numbers have the following characters

- Coordinate system of René Descartes;
- Number *i* and imaginary sizes;
- Harmonic functions.

And, more than likely that, people, nature, Universe, the Cosmos, the world and everyone and everything have a role in this plan, called "complex" by mathematicians.

The beauty of Descartes's theory consist in establishing a linking between fields which seemed disjoint, so unexpected connections.

Basically, it establishes a general relation, showing that, any geometry problem can be solved by algebraic calculation.

Thus, given two orthogonal axes O_x and O_v, any point M, from their plane, corresponds a pair of two numbers, point coordinates and vice versa, to a pair of points by two numbers corresponds a well defined point in plan, Fig. 2.

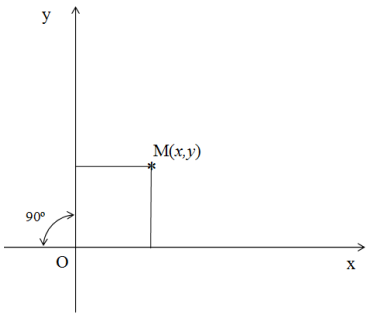

Fig. 2.

If the two coordinates, *x, y*, of the point M varies, each of one can take any real value, not independently of each other, so M is a curve.

It has been shown that there are various ways of representing planar curves

- by Cartesian equation

$$F(x,y)=0 \tag{8}$$

- cartographic

$$y=f(x) \tag{9}$$

or

$$x=g(y) \tag{10}$$

- parametric

$$x=x(t) \tag{11}$$

$$y=y(t) \tag{12}$$

with $t\in[a,b]$;

- coordinated polar, ρ, θ, Fig. 3.
-

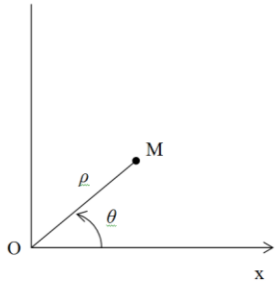

Fig. 3. Coordinated polar

These modes of representation are locally equivalent, so they were extended to curved in Euclidean and Banach spaces.

Later, in 1890, Giuseppe Peano discovered a flat curve that fills the all space and passes through all points of a square. This curve was seen, for nearly 100 years, a "pathological" mathematical object, and today is used in pattern recognition.

The study of these curves led to draw the following "funny" curves, given in polar coordinates

- 8 petals;
- 3 large petals and 3 small petals;
- propeller;
- butterfly,

and "cute" curves, used to signature recognition, as Bézier cubic approximation, of curves expressed matrix.

D'Alambert proved that any algebraic expression consisting of imaginary quantities, can be reduced to the form $A+iB$, where *A* and *B* are real quantities.

Notation i, imaginary half for $\sqrt{-1}$, appears for the first time in 1794, in a paper published by L. Euler.

Danish engineer K. Wessel, was the first who discovered the method for geometric representation of complex numbers in the plan, method assigned to Gauss. However Gauss built the geometric representation in his thesis in 1799.

In the paper entitled "Theory of biquadratic residue " in 1828, Gauss

- Introduced the term of complex number, $a+ib$;
- Called the term a^2+b^2 as complex number "norm" , $a+ib$;
- Demonstrate the legitimacy of all operations performed by complex number.

Since 1821, Caucy named $\sqrt{a^2+b^2}$ with the term "module". To i are due the name "conjugate" given to complex numbers $a+ib$ and $a-ib$.

In principle, a complex number α can be represented as

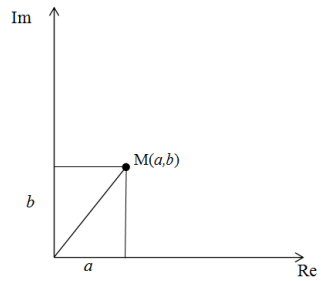

Fig. 4. Complex number α

- Algebraic form in Cartesian coordinates

$$\alpha = a + ib \tag{13}$$

where

- The number a is called the real part of α, $a = \mathrm{Re}(\alpha)$;
- The number b is called the imaginary part of α, $b = \mathrm{Im}(\alpha)$;

Obviously M is the image of α, and α is affix M.

- Trigonometric form in polar coordinates

$$\alpha = r\left(\cos\varphi + i\sin\varphi\right) \tag{14}$$

where

- r is α module

$$r = |\alpha| = \sqrt{a^2 + b^2} \tag{15}$$

- φ is α argument

$$\cos\varphi = \frac{a}{r}\ ,\ \sin\varphi = \frac{b}{r}$$

- Exponential form

$$\alpha = re^{i\varphi} \tag{16}$$

where $$e^{i\varphi} = \cos\varphi + i\sin\varphi \tag{17}$$

according to Euler's formula.

In polar coordinates, complex number α in trigonometric and exponential forms, can be represented as in Fig. 5.

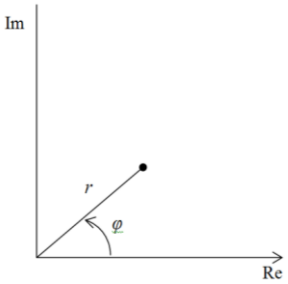

Fig. 5. Polar coordinates

Regarding operations with complex numbers, following comments can be made, for $\alpha = a + ib$ and $\alpha_1 = a_1 + ib_1$

- operations in algebraic form, the sum

$$\alpha + \alpha_1 = \left(a + a_1\right) + \left(b + b_1\right) \tag{18}$$

- operations in trigonometry form, where

$$\alpha = \gamma\left(\cos\varphi + i\sin\varphi\right) \tag{19}$$

and $$\alpha_1 = \gamma_1\left(\cos\varphi_1 + i\sin\varphi_1\right) \tag{20}$$

- multiplication

$$\alpha\alpha_1 = \gamma\gamma_1\left[\cos\left(\varphi + \varphi_1\right) + i\sin\left(\varphi + \varphi_1\right)\right]. \tag{21}$$

It is helpful to make some considerations about the most common geometric transformations in applications, which, fact, can be expressed by operations.

Be α_0 a fixed complex number and α another complex number belonging to the set of complex numbers.

Then, we define

- Translation $\tau(\alpha)$,

$$\tau(\alpha) = \alpha + \alpha_0 \tag{22}$$

- Homothety $\varpi(\alpha)$, center O and ratio k,

$$\varpi(\alpha) = k \cdot \alpha \tag{23}$$

- Rotation $\rho(\alpha)$, center O and angle α

$$\rho(\alpha) = e^{i\varphi} \cdot \alpha \tag{24}$$

- Symmetry $S(\alpha)$ with respect to the real axis,

$$S(\alpha) = \overline{\alpha} \tag{25}$$

- Inversion $I(\alpha)$ with pole O and involve k or inversion with respect to the circle that has center O and radius equal with $\sqrt{k}$,

$$I(\alpha) = \frac{k}{\overline{\alpha}} \tag{26}$$

- Inversion $u(\alpha)$

$$u(\alpha) = \frac{1}{\alpha}\cdot \tag{27}$$

With these specifications, we can move to the complex plan, which essentially, is a connection between real plan, geomteric and co-plan a co-geometry, where the two axes of co-ordinates are real axis Real and imaginary axis, *i*Real≡*i*-maginary.

A picture of the plan, according to the authors, is presented in Fig. 6, the axes are obtained successively, by multiplying by *i* or rotating with 90º. In this plan, a point has coordinates (Real, *i*Real) and is the image of the complex number π =Real+*i*Real.

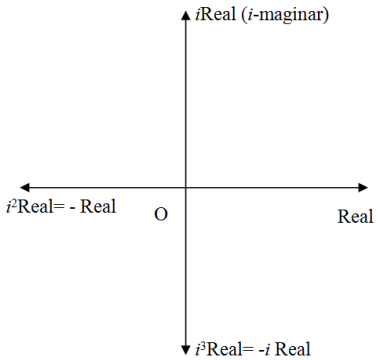

Fig. 6. Complex plane

6. HOLISTIC GEOMETRY ONE METAGEOMETRY

What we have presented so far, simply enter in a domain, which is beyond the geometry, with special significance, in which, each object, creature or thing, phenomenon or process is well located and fully

represented.

The idea of holistic involves a global treatment of the entity, knowing that all is not a summary of her components, rather their relationship. And these components, as we have seen, were created by God, they are complementary and there may exist in the two real principles of YIN and YANG, which represents the imaginary axis x and real axis y of the complex mathematical plan.

Relations between YIN and YANG, usually complementary, meet in various aspects in Divine and Real planes.

Example:

- A first application is the DIVINE PLAN (DP) that God's plan, or the CREATION PLAN (CP) or COMPLEX PROTOPLAN (CPP), and the creation is represented by a point.

  Complex Protonumber (creation) can be written

  $K = WORLD+iNATURE$ or

  $K = MANIFESTATION+iSTATE$

  $K=W+iN$ or $K = M+iS$.

Complex Protoplan origin is (O_D).

- The second application concerns the COMPLEX PLANE OF MANIFESTATION (CPM). Obviously, in this plan, the world is the human world **Lu** and the world of animal + the world of birds+ the insects world etc., called generic world **La**.

Take account that each manifestation can be represented by a point M (La, Lu), the affix of M has the complex form, $\mu = la+ilu$.

- COMPLEX PLAN OF STATE (CPS) has two axes S_v and S_o where affix has the form $\sigma = S_o+iS_v$.

All complex plans are a generalization of the well known complex plane from analytical geometry.

7. PRINCIPLE OF COMPLEMENTARITY

The idea of complementarity, which we introduced in the previous paragraphs, can be materialized in two ways, as an expression of daoist principles

1. ONE gives birth toTWO, which contains TRIAD
   a. Linear complementarity
   b. Hyperbolic complementarity
   c. Circular complementarity;

a. Linear complementarity implies that, the sum of the two principles A (possibly YIN) and B (possibly YANG) is equal to ONE, which, mathematically is expressed by

$$A+B=1 \qquad (28)$$

b. Hyperbolic complementarity implies that, the multiplication product of the two principles A (possibly YIN) and B (possibly YANG) is equal to ONE, which, mathematically is expressed by

$$A\cdot B=1 \qquad (29)$$

c. Circular complementarity implies that, the sum of of the two principles squares A (possibly YIN) and B (possibly YANG) is equal to ONE, which, mathematically is expressed by

$$A^2+B^2=1 \qquad (30)$$

2. TWO gives birth to THREE, which contains MONAD

d. Complementarity Newtonian, implies that, mathematically is a combination of the first three complementary and is given by relationship

$$(A+B)^2 = A^2+B^2+2A\cdot B \qquad (31)$$

or, symbolic $a^2 = c+2b$. (32)

The final challenge is the answer to the following questions: when, where, how, we can apply the four archetypes of complementarities mentioned.

The authors suggest you few options:

a. In statistics

reliability+failure probability=1

b. - In Einstein's special relativity

space·time=const.

- The quantum theory, Heisenberg's uncertainty principle
- In quality

quality·quantity=1

c - In mathematics

$$\sin^2 x+\cos^2 x=1.$$

In all these concepts, principles A and B are harmonic, noting that in a. harmony is linear, in b. harmony is reversed , and in c. is the harmony is wave.

Therefore "Diagram of the Supreme Ultimate", T'AI-CHI-T'U, respect linear complementarity, the principles $YIN \approx \sin^2 t$ (33)

and $YANG \approx \cos^2 t$. (34)

The same complementary principle applied God in creating Cosmos.

REFERENCES

[1] *R., Cournt, H. Robbins,* Ce este matematica?, Editura Ştiinţifică, Bucureşti, 1969;

[2] *T., Toro,* Fizică modernă şi filosofie, Editura Facla, Timişoara,1972;

[3] *M., Evgrafov, ş.a.,* Collection of problems on the theory of analytic functions, Moscowa, 1974;

[4] *I.M., Anghileico, R.V., Kozlov,* Problems and theory of complex function, Publisher „College", 1976;

[5] *A., Filip,* Dicţionar de filosofie indiană, Editura Glasul Bucovinei , Iaşi, 1996;

[6] *F., Capra,* Daofizica (The Dao of Physics), Editura Tehnică, 1999;

[7] *G., Oshawa,* Principiul unic al filosofiei şi ştiinţei din Extremul Orient, Editura Orfeu, 2000;

[8] S., *Hawking,* Universul într-o coajă de nucă, Editura Humanitas, Bucureşti, 2004;

[9] *M., Granet,* Gândirea chineză, Editura Herald, Bucureşti, 2006;

[10] *Osho* , Cartea despre TAO, Editura Mix, Bucureşti, 2006;

[11] *N., Lesmoir-Gordon, W. Rood, R. Edry,* Introducing Fractal Geometry, TotenBook, 2006;

[12] *A.* S., *Posamentier,* Ingmar Lehmann, The Fabulous Fibonacci Numbers, Prometheus Books, 2007;

[13] *LAO TSE,* Dao Te Jing (Cartea despre Dao si Virtute), Editura Herald, 2009;

[14] *Linne., McTaggart,* Câmpul, căutarea forţei secrete a Universului, Editura Adevăr Divin, 2009;

[15] *V., Stanciu,* Ştiinţă şi spiritualitate, Bucureşti, 2010;

[16] *V., Stanciu,* Religie, Filosofie, Ştiinţă, Editura Printech, Bucureşti, 2013.