

# *Research of Structure of Fractals in a Life of Mankind and Fine Arts Products*

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**Abstract** - Article it is devoted studying of the cores concept of fractals of the fine arts and of human life, definition of fractals and properties of fractals. Concepts of fractals of the fine arts are considered. Any natural being is formed on a basis "фрактальной системы" natural selection.

**Keywords** - The Fine Arts, A Fractal, Fractal Geometry, Fractal The Form, A Fractal Structure, Fractal System, An Aesthetics, Gold Section.

We can observe the so-called fractal forms in nature, in many areas such as fine arts, architecture, medicine, in the human body, in all elements of the material world. It is also present in biology. Every creature or plant in nature develops on the basis of a fractal system of natural selection. Fractals play a part in our breathing, blood circulation, and heartbeat. Simply put, fractals constitute the very essence of life activity. In order to comprehend this essence, a scientist with a new perspective should be born. A new scientific worldview, called "Fractal Geometry," has solved the question, "What kind of order holds the universe in chaos?" [1,16].

Most of the forms in nature are fractals from a mathematical point of view. Fractal is not a geometric theory, it is a concept that encourages the researcher to take a new look at the world, a new perspective on what is already known, and the change in perception of the universe.

Modern mathematical models are so beautiful, charming, and mysterious that they can drive impressive students and researchers. The colorful images of fractals impress us with its unique combination.

In his scientific paper, "Fractals and Art for Science," he says, "Can a person who is unaware of the geometry of a shape determined by a simple construction rule perceive its present aesthetic value - as striking as its decorative or perhaps as a work of art?" The complete answer of Mandelbrot: "If the geometric shape is a fractal, the answer is yes". [6. 21]

A.V. Voloshinov's research on the functionality of fractals and the aesthetics of fractals highlights the important features of fractal aesthetics:

- The harmony of the universe and extreme disorder - geometry of extreme disorder, birth of order and geometry of order, emergence of extreme disorder;
- Uniformity or similarity in different regions;
- Beauty in simplicity;
- The gold cross is the most important fractal of art. [11. 125]

Although the demand for elementary knowledge is not high at the moment, it is important to develop the philosophical thinking of individuals, including the achievements of science and science in the field of culture

and art. In this article, we intend to examine the work of contemporary visual arts, computer graphics techniques, and art masters and masters, to some extent, of their fractal nature. In our context, the fractal can only be interpreted as a work of art. First of all, let's talk about what fractals actually mean.

Fractal is a geometric term that has its own similarity, that is, it consists of several parts that duplicate the whole form.

The word fractal is derived from the Latin word *fractus*, which means "divided," "composed of parts," and comes from the terms "fraction, fractional" (divide, division). To date, the concept of fractal is not precise, but mathematically, fractal  $\square$  is a set of fractional dimensions.<sup>4</sup> [1. 175]

The concept of fractal and fractal geometry was firmly embedded in the research of mathematicians and programmers in the mid-70's and early 80's.

The fractal notion was invented by Benua Mandelbrot (in Latin, *fractus* means broken, split). Mandelbrot explains fractals in his 1975 book, "Les objets fractals: form, hasard, et dimension". In this book, Mandelbrot first uses the term "fractal" to define a rare, mathematical phenomenon that is unpredictable and surprising. These emergencies occur when using a recursive algorithm to obtain a curve or set. The Mandelbrot Collection is one such event, named after its researcher.

The main feature of the fractals is their self-similar or infinite return. The emergence of fractal geometry is linked to the book *The Fractal Geometry of Nature*, published in 1977 by Benua Mandelbrot. Mandelbrot made extensive use of the findings of several scholars (Puankare, Fatu, Julia, Kantor, Hausdorf, etc.) working in this field between 1875 and 1925.

More broadly, the word "fractal" is not a mathematical expression and does not have a strict mathematical definition. It can be used when a form is being investigated, having any of the following characteristics:

1. It has an orderly structure at all levels. This is in contrast to regular forms (circle, ellipse, fluent graph of function): if we look at small sections of a regular form on large scale, it looks like a straight line. Increasing the scale for the fractal does not lead to simplification of the structure, at all levels we see the same complex picture.

2. It has a characteristic similarity or similarity.

3. Recursive (lot. *Recurcio* - return to the past).

As we have already mentioned, the fractal does not have a definitive definition, but we find different definitions in the literature.<sup>1. 175]</sup>

Fractal is a geometric fractal and consists of parts, each of which represents a copy of the whole fraction. Fractal is a geometric pattern that repeats itself over and over again by changing the size of a particular part. It is a structure that is made up of fractal parts in some ways.

The structure of fractals is not only attractive with their artistic beauty, but is also economically useful. In the 1990s, a young scientist from Boston, Nathan Kuhuen, established electronic communications using fractals. He is very interested in radio and wants to install a large radio on the roof of his apartment building. But the owner of the house did not let him. Then he discovers an antenna with a fractal structure and shrinks its size so that it will no longer appeal to the host. Cohen's experiments lead to such a new invention that fractals can further extend the range of radio waves by reducing the antenna scale. As a result, the range of telephones will be improved.

The heartbeat of a healthy person also has a fractal structure. Determining the degree of disturbance of fractal structure can prevent heart disease. Human eye movement is also a fractal structure. Scientific data have shown that when studying objects, eyes do not always collect data with careful, careful and uniform observation.

In the medical field, there is a time when fractal structures can prevent and treat cancer.

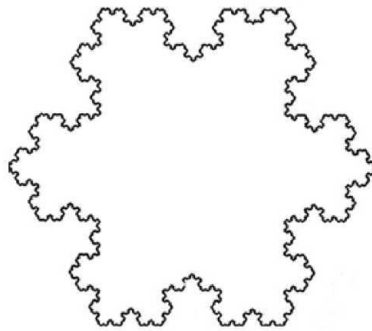
For example, if we visualize a fractal as a balloon, we can see that the same balls appear and continue to expand in scale. The fractal nature of the thing can be observed in the example of cabbage head. [Picture.1].

For example, the Koha snow sparks. 2] and the Peano curve [Fig. 3] before the use of the phrase fractal in scientific lexicon.

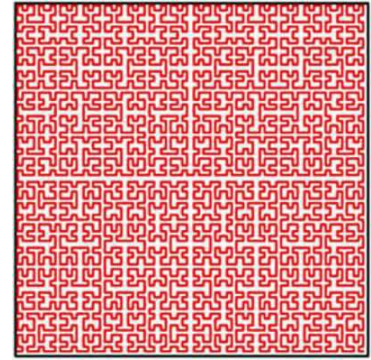
Cox's fractal snow spark is one of the most famous and mysterious geometric objects, which was scientifically described in 1904 by Swedish mathematician Helge von Koch.



Fig.1. It's empty.



Picture 2. Koha Rescue.



Picture 3. Piano Eggio Chicken.

Fractal is a broken spatial shape, flat or uneven, chaotic, or chaotic or complex and repeating itself at different scales. These are self-similar structures of images that are not fractal scales.

In addition to being of great importance to the science of mathematics, the images of fractals have aesthetic value. It is noteworthy that this technique was first used by 17th-century Italian artist Giovanni Castilone. One day, Mandelbrot redesigned fractal structures in the work of artist

Leonardo da Vinci. Maurice Esher also created fractal works. There are many examples of fractals in the fine arts.

The work of the Japanese artist Katsusika Hokusai (1760-1849g.) "Faces of the Fujiama Mountains" in the series of works, shows that Leonardo da Vinci's "Flooding World" features fractal symptoms. Natural fractals have been known to humanity since ancient times, and they are represented only by works of art. (Fig. 4-5).



Picture. 4. K. Hokusai, The Big Wave, 1832.



Picture.5. Leonardo da Vinci. Flooding of the Universe.

V. According to Kandinsky, "where existing characters begin to form symbols, modern art can take place." [9. 124]

Benoit Mandelbrot expresses his conviction that the roots of art go back a long way: "Fractal 'new geometric art' shows a striking resemblance to the paintings of great masters, or" exquisite creativity in architecture.»

It must be admitted that the fractal fragments of Mandelbrot are not alike, but rather alike. It is this quality that makes them attractive.

Today, fractal art has also become an independent networking tool through digital art.



Thus, the notion of "fractal art" is now developing in other areas besides mathematics, algorithms, and digital arts.

In nature, it is found that there is functionality not only in the flora but also in the structure of rivers, animals, blood vessels, and nervous systems. Since atomic models, solar systems, and galaxy structures have similarities, they may also be fractal structures. It is no coincidence that Kepler created his famous work on the "Harmony of the Universe" with a striking similarity between the laws of gravity and the laws of beauty. In the fine arts and in the work of each artist as a whole, it is important to perceive the functionality of the human head and body and convey it to the audience. Particularly in portrait art, the sense of "similarity" between the facial features (for example, between the nose wings and the jaws, the bottom of the nose - the small trapezoidal shape, and the inside of the large trapezoid), and the "rhyme" has been one of the factors that gives life and charm to the art.

While the works of art reflect the unique harmonies of natural forms, their images must, of course, be unique.

In response to a question about the extent to which the inner harmony of the integrity system can be reflected in works of art, we recommend viewing the portrait of Sandro Botticelli's "Young Woman Portrait".

Note that the frontal line is repeated over the nose (in a different direction only), and the obtuse angle formed by the two surfaces corresponds to the oblique corner of the nose with the forehead and groin. We can see that the oblique angle (primary rhythm) of the forehead and nose is fractional in the chest and abdomen, in the back and shoulder surfaces, even at the bent shoulders and elbows. The fact that the portraits of the portrait on a smaller scale of the portrait circulation, including the forehead, nose, thighs, neck, and neck (backdrop) also indicate that the laws of Harmony apply in art.

An example of how the harmonious relationship between the two systems of integrity is an example of Leonardo da Vinci's portrait of a woman with a white knight.

If you look closely, you will see that there are many similarities between a woman and a white watercolor artist. The woman's right hand, the white watery left hand raised, her eyes read with the same precision, the normal brightness of both of them, the image of a woman's fingernail, like a white thirst, as if imitating a white watermelon axis; their charm, sophistication and sensitivity make the two images very similar.

Fractal expressionism or "fractalization" in the formation of the fractal concept, Derek Nielsen, analogous fractal painting, Lea Livshits, fractal monotype, Victor Ribas, fractal abstraction, Vyacheslav Useinov and Alexei Sundukov, Rakibotov, A. Rakibot, Rakabotov, S., A. Pettay i dr.) Led to the emergence of new forms. Many paintings depicting fractals in various compositions are on display in many exhibitions.

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