DESCRIPTION OF PERSISTENT DYNAMICAL SYSTEMS METHOD OF FRACTAL APPROXIMATION

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Summary. **There is proposed description of persistent provisions of dynamical systems by fractal approximation methods on the example of distant galaxies. During the study was found that subordination steady of the dynamic system to stochastic fractal, which is built on the iterative Fibonacci`s law , and accuracy of such Fractal approximation.**

Keywords: **dynamical system, fractal approximation, the Fibonacci`s, the galaxy.**

Formulation of the problem. In the study of images of galaxies question of the mathematical description possibility of their relative position rises. It was found that fractal that is built on the iterative Fibonacci`s law describes their closest [1]. For transient processes of any dynamical systems, stable position is defined by critical points, fractal dimensions which are subordinated to Fibonacci`s numbers.

Analysis of recent research. In this work [1] photos ,that NATO made in 1998 , and their interrelation with Fibonacci`s fractals are reviewed. Fractal dimension of distant galaxies is 4.25, which corresponds to the obtained by using the algorithm data [2]. In the work [3] the development of fractal object is showed, which is built on Fibonacci`s numbers, building by number Fibonacci on base of its fractal dynamical conditions. In the work [5] the transients by using the fractal dimension was reviewed and the variation of fractal dimension of critical points were installed.

Forming the purposes of article. We must to approximate picture of distant galaxies, which was obtained by NATO in 1998, by Fibonacci`s fractal. We must to count the fractal approximation accuracy. On the basis of fractal approximation to investigate the stability provisions of the dynamic system, which is described by the built on the Fibonacci`s number fractal.

Main part. Let us consider Fibonacci`s number, that obeys the law $z_i = z_{i-1} + z_{i-2}$. We receive accuracy fractal approximation k = 0.21by using the program on [2,3] and data [1] (Figure 1).

Fig.1. Screenshot of distant galaxies, which was fixed by NATO in 1998

Distant galaxies are described by Fibonacci`s fractal, which belongs to a system of integrated functions. Investigated fractal objects have property of scale invariance. Let us consider transitional provisions of this dynamic system from chaos to a sustainable position. Schedule changes of the fractal dimension is shown in Figure 2. The graph shows, that the critical point of transition provision corresponds fractal dimension 4.12. Fractal dimension installed critical point corresponds laws $z_i = z_{i-1} + z_{i-2} - 1$ [4].

Since galaxies are in a stable position [4] and by using data from [1] we may claim, that stable provisions correspond to the critical point of transition.

The dynamic system stability of galaxies established during the transition from chaos to a sustainable position.

Conclusion. Distant galaxies are approximated by Fibonacci`s fractal with accuracy k = 0.21. Fractal dimension of the critical point of the transition process obeys the law $z_i = z_{i-1} + z_{i-2} - 1$ and conforms a stable position of the dynamic system. This regularity extends to other dynamic processes, that facilitates the formation of mathematical tools for their research.

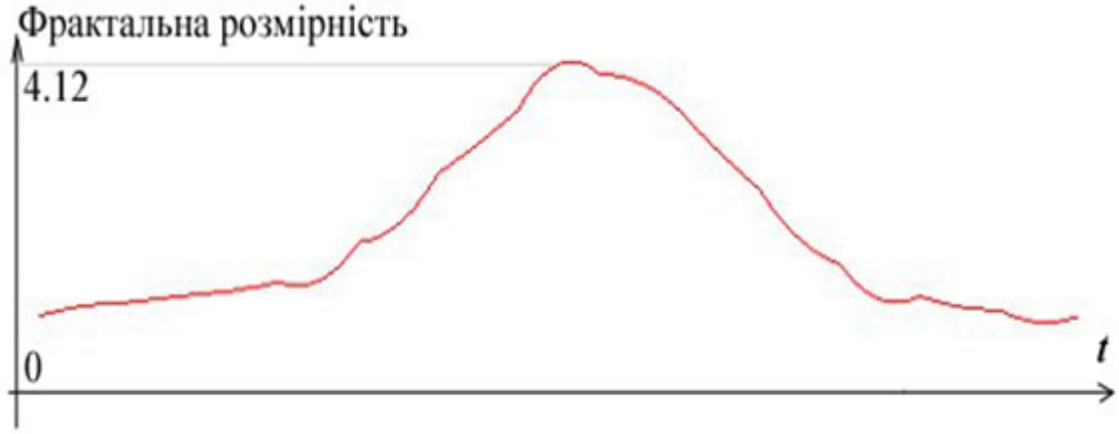

Fig. 2. Schedule fractal dimension change of transient dynamic system over time.

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