MODELLING OF THE ARNEODO CHAOTIC SYSTEM USING LABVIEW

**Rusyn Volodymyr Bogdanovych[1], Paraduha Artur Vadymovych[2],
Bakum Dmytro Evgenovych[3], Makarov Egor Sergiyovych[4],
Homitskii Anton Oleksiyovych[5]**

1. PhD of Engineering Sciences, Assistant Professor of the Radio Engineering and Information Security Department
Yuriy Fedkovych Chernivtsi National University, UKRAINE
ORCID ID: 0000-0001-6219-1031

2. Graduate Student of the Radio Engineering and Information Security Department
Yuriy Fedkovych Chernivtsi National University, UKRAINE

3. Graduate Student of the Radio Engineering and Information Security Department
Yuriy Fedkovych Chernivtsi National University, UKRAINE

4. Graduate Student of the Radio Engineering and Information Security Department
Yuriy Fedkovych Chernivtsi National University, UKRAINE

5. Graduate Student of the Radio Engineering and Information Security Department
Yuriy Fedkovych Chernivtsi National University, UKRAINE

A chaotic system refers to a dynamic system that appears to be random and unpredictable, even though it is governed by deterministic laws. In simpler terms, chaotic systems are sensitive to initial conditions, meaning small differences in the starting state of the system can lead to vastly different outcomes. This phenomenon is often called the butterfly effect, where small changes can have large, unpredictable consequences over time.

Chaos theory applications in many different research areas, such as electronic circuits [1-10], memristors [11, 12], secure communication systems [13-15], optics [16], economy [17] etc.

A great interest is the simulation that using different software environments allows to demonstration different information properties of chaotic oscillations.

Chaotic Arneodo system is one of chaotic systems that can be used for security of the information carrier, and described by three nonlinear differential equations:

$$Dx = x + dt*(y);$$
$$Dy = y + dt*(z);$$
$$Dz = z + dt*(-a*x - b*y - c*z + d*x*x*x);$$

(1)

where x, y, z – dynamic variables that determine the phase space; a, b, c, d – system parameters [18].

Fig. 1 shows block scheme of the chaotic Arneodo system realization for system parameters *a = -5.5, b = 3.5, c = 1, d = -1*, and dynamic variables that equal *x = 0.5, y = -1, z = 0.5*, number of iterations *N = 10000*.
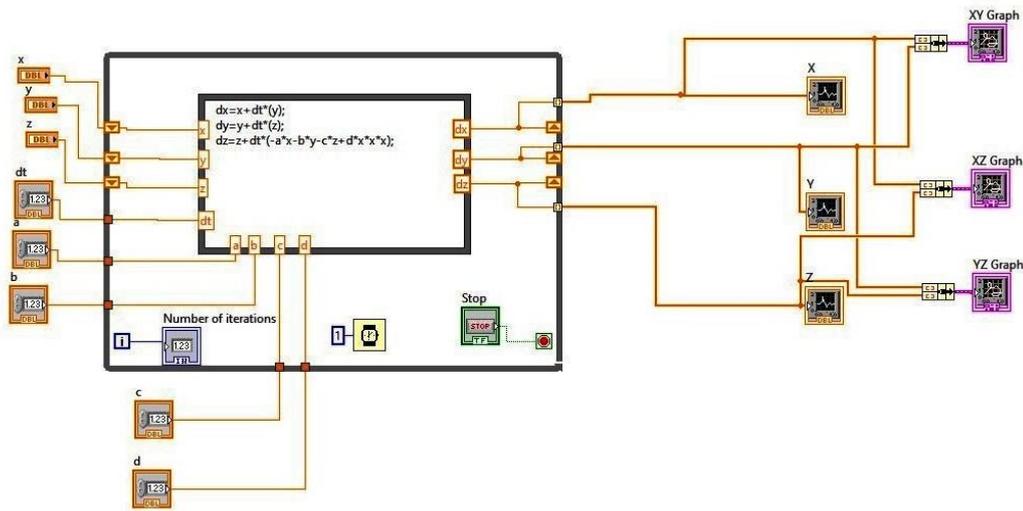

Fig. 1. **Block scheme that realize chaotic Arneodo system**

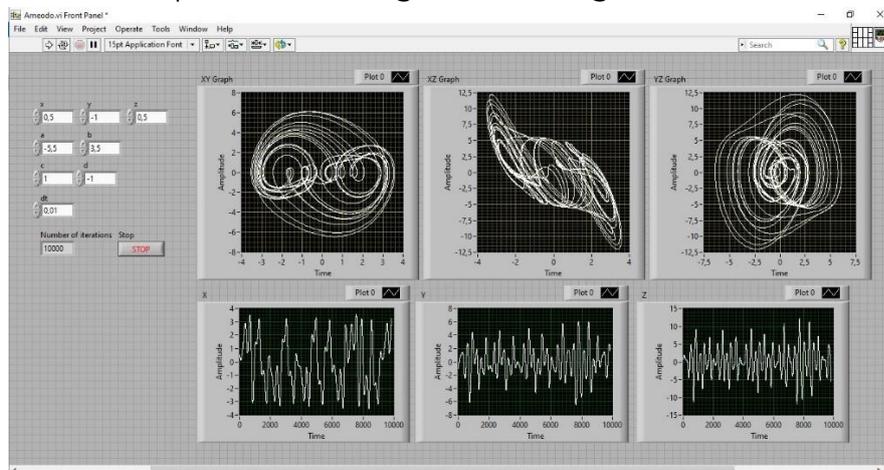Fig. 2 shows computer modelling results using LabView.

Fig. 2. **Phase portraits and time series of the chaotic Arneodo system**

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