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CHAPTER 2

THE DEVELOPMENT OF MANAGEMENT METHODS BASED ON BIO-INSPIRED ALGORITHMS

CHAPTER 2

ABSTRACT

In this chapter of the research, management methods based on bio-inspired algorithms are proposed. The basis of the research is the theory of artificial intelligence. The method is aimed at solving optimization tasks, variable solutions are defined in such a way that complex dynamic objects work in their best point (mode) according to the optimization criteria determined. In the research, the authors proposed:

— management method using a bio-inspired algorithm;

— method of finding solutions using the improved flying squirrel algorithm;

— method of assessing the state of dynamic objects using the population algorithm.

Each of the methods was based on canonical optimization algorithms, but they were improved by the authors of the research.

The essence of the improvement of these methods, which is the scientific novelty of each of them:

— the initial position of the agents is determined taking into account the type of uncertainty due to the use of a correction factor for the degree of awareness of the state of the initial situation in relation to the object of analysis;

— the initial speed of each agent is taken into account, which makes it possible to research complex functions;

— the speed of movement is regulated according to the priority of finding a solution;

— using the procedure of deep learning of knowledge bases of algorithm agents due to learning both architecture and parameters of artificial neural networks;

— select the best individuals in the flock by using an improved genetic algorithm, which improves the reliability of the decisions made.

A limitation of the research is the need to have an initial condition database complex dynamic object, the need to take into account the time delay for collecting and proving information from sources of information extraction.

It is advisable to use the proposed approach to solve the tasks of evaluating complex and dynamic processes characterized by a high degree of complexity.