ABSTRACT

Master dissertation: 93 pp., 22 fig., 7 tab., 1 app., 42 sources.

The revelance. The approach for multiagent systems' simulation models' adaptation is proposed. It uses the methods of swarm intelligence and fuzzy logics to describe the collective behavior of decentralized system agents. The practical use of this approach is demonstrated by the simulation model of a distributed power system. Against the background of the growing and changing demand for electrical energy, the problem of its optimal distribution among consumers is exacerbated. Along with traditional energy fossils, renewable sources are increasingly being used. Technologies of their application are becoming more profitable and convenient, and need for their modeling constantly grows. Thus, the actual scientific task is to develop an efficient simulation model to simulate the swarm intelligence of these systems.

Relation with academic programs, plans, themes. The work is performed at the Department of Computer-Aided Management and Data Processing Systems of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" under the theme "Facilities creation for the discrete eventful systems modeling" (state registration number 0117U000923).

The goal is to accelerate the pace of self-organization of the system by building a simulation model for managing large groups of agents.

To achieve this goal, it is necessary to solve the following **tasks**:

− review of the well-known theory and methods in the field of multi-agent systems with swarm intelligence;

− comparative analysis of mathematical models that are used in simulation modeling;

− formalization of the task of constructing an optimal simulation model for managing large groups of agents;

− choice of the domain which will be the basis for testing the algorithm;

− agent behavior simulation development, development of an algorithm accounting the dynamics of the model;

– software implementation development of algorithms and models in a form that can be used to construct an optimal simulation model for managing large groups of agents;

– analysis of the results.

Scientific novelty of the results. The simulation model of swarm intelligence is developed. System agents of this model use fuzzy logic to dynamically form strategy of their behavior. This approach facilitates agents' adaptation to system environmental factors and stabilizes the network of agents – if one fails, the others continue their work.

Publications. The materials of this work are published in the scientific conference of students, undergraduates and graduate students "Informatics and Computer Science", and in the reviewed journal Electronics and Control Systems 2017.

SIMULATION MODELING, SWARM INTELLIGENCE, FUZZY LOGIC, MAMDANI ALGORITHM, PARTICLE SWARM OPTIMIZATION ALGORITHM.