

ABSTRACT

Master's thesis: 95 p., 17 figures, 35 tables, 1 application, 66 sources.

Relevance: Unmanned aerial vehicle systems (UAS), in particular unmanned aerial vehicles (UAV), are becoming more widely used. The wide functionality of the UAS and their increased availability leads to an expansion of the scope. Today UAS is used for land audits, poaching, monitoring and control of agricultural land, the delivery of drones is becoming more popular abroad. Particularly important is the use of UAS in the military sphere for tactical or strategic reconnaissance, as it allows the army not to risk personnel.

Often during the military operation, the UAS group is used. When using the UAS group, it is important to plan the route beforehand, as opponents may intentionally create interference (radio jamming) that makes it impossible to control in real time.

The dissertation examines the route planning of the UAS group using mobile UAV launch platforms, which is especially relevant today as the United States Defense Advanced Research Projects Agency (DARPA) launched the Gremlins program, which involves launching UAV teams from existing large aircraft such as bombers, transport planes, etc.

Connection of the thesis with scientific programs, plans, topics. The thesis was written at the branch of The Department of Computer-aided management and data processing systems of the National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute» at the V. M. Glushkov Institute of Cybernetics of the National Academy of Sciences of Ukraine under the topic VF.180.11 «To develop a mathematical apparatus focused on the creation of intelligent information technologies for solving combinatorial optimization and information security problems» (2017-2021 biennium), which is executed by the Resolution of the Bureau of Informatics of the National Academy of Sciences of Ukraine from 23.06.2016 p. № 2.

The purpose of the study - to minimize the costs of fulfilling the tasks set by the UAS group acting as a team by optimizing their routes.

To achieve this goal, you must complete the following tasks:

- review the known UAV routing tasks and the combinatorial optimization algorithms used to solve them;

- formalize the task of planning the route of the UAS group using mobile platforms for launching UAV;
- develop software implementation of combinatorial optimization algorithms for route planning;
- carry out research of the offered algorithms by carrying out computational experiments.

The object of study is the functioning of the UAS group when completing the tasks.

The subject of study is the planning of routes of UAS groups with the possibility of using mobile platforms for launching and landing UAS, in particular UAV.

The scientific novelty of the results is the development of a mathematical model and algorithms for solving the problems of optimization of routes of the UAS group, as well as the implementation of the developed mathematical apparatus in the form of a specialized software complex for solving the studied routing problems.

Publications. The materials are published in the compilation "Computer Mathematics" of the Institute of Cybernetics of Glushkov NAS of Ukraine, in the professional journal «Scientific Bulletin of Uzhgorod University. Mathematics and Informatics Series» of Uzhgorod National University and at the III All-Ukrainian Scientific and Practical Conference of Young Scientists and Students "Information Systems and Technologies of Management" (ISTM-2019).

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