

ABSTRACT

Master dissertation: 110 p., 33 fig., 20 tab., 1 appendix, 84 sources.

Relevance. The importance of usage of unmanned aerial vehicles (UAVs) is difficult to overestimate, particularly in the conduct of hostilities. The ability to conduct reconnaissance and video capturing of the countervalue targets without risking a human life provides a significant advantage in the planning of operations. This dissertation considers a situation in which a certain number of UAVs having certain characteristics are located at different depots and take out departures for capturing specified territories. The ultimate goal of such an operation will be to obtain images of these territories and minimize the risk of loss of the equipment.

An important aspect of the task is that airplane control in real time is largely impossible due to intentional interference with radio communications. This means that the operation must be fully planned in advance and the UAV must have a complete program for the automatic flight.

Relationship of work with scientific programs, plans, themes. The work has been carried out 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" within the framework of the research topic of the Glushkov Institute of Cybernetics of National Academy of Sciences of Ukraine: "To develop a mathematical apparatus focused on the creation of intelligent information technologies for solving combinatorial optimization and information security problems" (topic code: VF.180.11).

The aim of the work is to reduce energy costs during the operation of unmanned aerial vehicles, increasing the percentage of explored terrain due to the operation, reducing the duration of the operation. **The object of the study** is the operation of intelligence with the UAV, **the subject of the study** - the preliminary planning of such an operation.

Research objectives:

- to analyze the needs for UAV flight planning;
- to develop a mathematical apparatus for the solution of the problem of their routing, taking into account the constraints specific to the subject area;

- to study the results of planning using the mathematical apparatus and conclude if it is expedient to use it further;
- to develop a software package for automating flight plan creation.

The scientific novelty of the results obtained is the development of a scheduler of the operation of flying these targets using one or more UAVs and the ability to use many depots, as well as in the development and comparative analysis of a new algorithm based on the method of optimization of ant colonies.

CARTOGRAPHY, ROUTING, UNMANNED AERIAL VEHICLES, THREATS,
MISSION PLANNING, VEHICLE ROUTING PROBLEM, ANT COLONY
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