

ABSTRACT

The dissertation is performed on 96 sheets, it contains 2 appendixes and a list of references to used sources of 280 titles. The paper presents 7 figures and 2 tables.

Topic relevance. Developments in the field of artificial intelligence for various types of propellers, in order to reduce the role of man in their management, are conducted in recent years very actively. But the most successes in this area belong to the developers of unmanned cars, which can only move on the roadway. The generalization of such models to arbitrary terrain will allow the use of unmanned propellers also in military operations on rough terrain and on the surface of remote planets. Now for such tasks are using remotely controlled motors, which have a lot of limitations because of the need for a reliable communication channel with the operator.

For movement on an arbitrary location, individual models are developed for each task, which takes a lot of time to work highly skilled personnel, and this makes such decisions extremely costly. Therefore, the actual task is to develop a conceptual model for managing a moving object on the ground.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”

Research goal and objectives. The purpose of the dissertation is formalization and development of a conceptual model of the system of control of a moving object on the ground and the development of a mathematical apparatus suitable for solving a generalized task of planning of motion in any locality for the engines of arbitrary construction.

To achieve this goal, the following tasks were solved:

To systematize existing methods of constructing automated control systems for moving objects;

develop a conceptual model for managing a moving object on the ground;

develop methods for planning the movement and implement them programmatically;

carry out pilot studies to compare the effectiveness of manual control with automated.

The object of the study is the classification of moving objects, the model of control of a moving object, classes, types, types of management models, classification of moving objects, models of moving objects, models and algorithms of mathematical representation of the topology of terrain in real time, classification engines, types, types, models of engines, the theory of dynamical systems.

The subject of the study is the mathematical models of calculation of the general type of families of trajectories of movement of an engine with arbitrary construction in any locality, the criteria for choosing mathematical models for calculating families of trajectories of movement of a propulsion, the conceptual model of control of a moving object in the area.

Methods of research. To solve the problem, the following methods were used: the methods of the theory of management (for the construction of the model of the control system method of optimization (for finding the optimal path); methods of algorithm theory and programming (for software implementation of developed algorithms), methods of graph theory (for building a model of terrain), methods of the theory of dynamic systems (for developing a model of movement of a moving object).

Scientific contribution of the obtained results consists of the following provisions:

for the first time a universal conceptual model of the control system for a moving object for an arbitrary locality and various models of a propeller has been proposed;

methods of traffic planning are improved, which differ from the existing possibility of planning the entire trajectory of motion at the beginning of the task;

Practical value of obtained results. The methods, which can be used during the development of unmanned mobile objects of public, military or research purpose, which have the opportunity to work in rough terrain, are offered.

Approbation of the thesis results. of the dissertation. The main positions and results of work are presented at the scientific and technical conference "Applied Mathematics and Computing" of the PMK, 2017 and "Applied Mathematics and Computer", 2018

Publications The results of the dissertation are presented in 2 scientific papers, including:

2 articles in the scientific journals included in the List of scientific professional editions of Ukraine on technical sciences;

Keywords: autonomous moving object, control system, motion planning.