RESUME

MILITARY TECHNICAL POLICY

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MILITARY-TECHNICAL POLICY OF UKRAINE: PROBLEMS OF FORMATION AND IMPLEMENTATION IN THE CONDITIONS OF THE CRISIS PHENOMENA AND RESOURCE LIMITATIONS

The problematic issues of the formation and implementation of Ukraine's military-technical policy in the current conditions of crisis phenomena and resource constraints are analysed. The ways of improving the military-technical policy of the state for realizing the goals and tasks of defense reform in Ukraine, as well as ensuring the development of the defense-industrial complex, taking into account not only military policy, but also state industrial, scientific, investment and innovation policies, are determined. Measures are proposed to improve the legislative framework for the implementation of projects for the development and organization of production of weapons, military and special equipment within the framework of military-technical policy.

ARMORED VEHICLES

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COMPARISON OF THE EFFICIENCY OF APPROACHES TO NUMERICAL SIMULATION OF PERCUSSION BY A HOMOGENEOUS OBSTACLE

The article presents the results of comparison of the simulation of the penetration process with a different shape of the main part of the homogeneous obstacle using the two-dimensional Lagrangian approach (2D) and the Smooth Particle Hydrodynamics (3D) method. The obtained results show the possibility of using both approaches to break through the homogeneous obstacles, taking into account the type of puncture. According to studies, the use of the Smooth Particle Hydrodynamics method is more acceptable in the study of penetration due to a much lower error in the field experiment and a more reliable description of the nature of the various types of penetration.

ARTILLERY WEAPONS & SMALL ARMS

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METHODOLOGICAL APPROACH TO ZEROING OF AK74 AND AKM ASSAULT RIFLES WITH COLLIMATOR SIGHT

The article considered special aspects of zeroing of assault rifles with collimator sights (sight line of such sights is higher than the sight line of open one) to ensure proper ballistic configuration. Fire efficiency of such type of weapons depending on fire point is discussed as well.
   Keywords: *centre of impact, trajectory elevation over the sight line*

AIR DEFENSE SYSTEMS

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GENERAL SCIENTIFIC AND METHODICAL STATEMENTS ON ORGANIZATION AND CONDUCTING WORKS FOR EXTENSION ASSIGNED MEASURES OF SURFACE-TO-AIR MISSILES. ESTIMATION OF TECHNICAL AND ECONOMIC EFFICIENCY OF WORKS

The basic scientific and methodological statements on the technical and economic estimation of the works for the extension assigned measures of surface-to-air missiles (SAM) are formulated. The characteristics of the costs associated with the extension the SAM assigned indicators are given. Equations for a comparative estimating of the costs associated with the extension the assigned measures and the purchase of new SAMs are considered. Graphs that allow estimating the permissible values of the assigned measures based on the available economic resources, as well as the graphs that characterize the dependence of the duration of the extended SAM lifetime versus originally stated lifetime of the SAMs are demonstrated.
   Keywords: works for the extension assigned measures, technical and economic estimation, permissible values of assigned measures increasing, duration of the extended lifetime.

AIRCRAFT ARMAMENT & FACILITIES

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CHOICE OF INDEXES FOR EVALUATION OF TECHNICAL STATE OF AVIATION ROCKET ARMAMENT

It is shown that the translation of aviation rocket armament on exploitation after the technical state foresees strengthening of role of measuring and control of his parameters and descriptions with the purpose to determinate the actual technical state and acceptance of reasonable decisions on its further exploitation. It requires the reasonable choice of indexes for the evaluation of the technical state. The system of indexes of efficiency of control of the technical state of aviation rocket armament is offered. Intercommunication of these indexes is shown on the different levels of cooperation.
   Keywords: *aviation rocket armament, control of the technical state, indexes of efficiency, authenticity and control cost.*

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ESTIMATION OF COEFFICIENT OF SHELL HEAD-RESISTANCE BY THE METHODS OF POLYNOMIAL APPROXIMATION AND INTERPOLATION OF COORDINATES OF CENTRE-OF-MASS ON THE STAGE OF FLYING-DESIGNER TESTS

Procedure of estimation is worked out on the area of ballistic trajectory of value of coefficient of head-resistance of shell by the methods of approximation and interpolation of co-ordinates of centre-of-mass by cube polynomials at implementation of the required terms of going down of such polynomials. The coefficients of polynomial, which approximates settle accounts after parameters, determined initial conditions of flight of shell, its construction and local aero gravity space. The coefficients of polynomial, which interpolates, are determined by a least-squares method from data of the external trajectory measuring. The assessment of the errors of determination of coefficient of shell head-resistance and estimation of possibility of the use of some stations of the external trajectory measuring for high-fidelity determination of the indicated coefficient have been conducted.

Keywords: *coefficient of head-resistance, cube polynomial, approximation, interpolation, station of the external trajectory measuring, relative error.*

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USING ACOUSTIC ANALOGY IN CALCULATION OF TURBOFAN FAN STAGE

Comparison of experimental acoustic indicators with those indicators obtained by using different modeling and acoustic analogies.

Keywords: *Fluent, CFD, blade, fan stage, fan, turbulence model, acoustic analogy, turbofan.*

UAV

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METHODOLOGY FOR ASSESSING THE TECHNICAL MATURENESS OF AN UNMANNED AERIAL VEHICLE BASED ON ITS MAIN FLIGHT PERFORMANCE CHARACTERISTICS DURING FLIGHT TESTS

Actual is a search for ways to optimize the process of obtaining the values of individual parameters during flight tests of unmanned aerial vehicles, including involvement of new scientific and methodological approaches. Obtaining (application) of complex indicators for evaluation of a number of characteristics (operating parameters) in specified conditions gives the opportunity to evaluate required parameters more accurately and reduce material costs in certain conditions, in addition, to save time and resources during tests.

For a comprehensive assessment of the qualities of unmanned aerial vehicles, with different power plants, it is proposed to apply a complex indicator of technical perfection. The article presents the results of theoretical calculations of the complex index of technical perfection for a group of unmanned aerial vehicles, a tactical class - the battlefield and the results of flight experiments. During the flight tests, an unmanned aircraft of the tactical class - the battlefield "MARA-2M" was:

the adequacy of the proposed complex indicator and methodology from its calculation was estimated;

the reliability of the results of the calculation data obtained during theoretical research was checked;

the reliability of the declared characteristics of the unmanned aerial vehicle "MARA-2M" was checked on the basis of the results of the flight experiment. The calculations of the complex indicator of technical perfection of

the unmanned aircraft on different approaches (theoretical calculation by the appropriate methodology and experimental research) show the possibility of applying this indicator to assess some flight characteristics in the course of flight tests of an unmanned aerial vehicle.

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SCIENTIFIC AND METHODOLOGICAL SUBSTANTIATION OF THE MAIN REQUIREMENTS TO AERODYNAMIC AND AEROSTATIC CHARACTERISTICS OF KYTOON OF A MOBILE BALLOON RADIOLOCATION COMPLEX FOR THE IDENTIFICATION OF LOW ALTITUDE TARGETS

In the article scientific and methodical apparatus of calculating the aerodynamic has been improved and aerostatic characteristics of a kytoon has been considered with the aim of substantiating the basic requirements for mobile balloon radiolocation complex for detection a targets with low altitude.

ENGINEERING EQUIPMENT

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EDDY CURRENT DEVICE WITH THE DATABASE, WHICH CONTAINS DIFFERENT SAMPLES OF METALS, TO IDENTIFY THEM IN THE HIDDEN OBJECTS

Represented results of researches of experimental sample of eddy current device (ECD) and methods of signal processing from ECD antenna, which improve basic technical characteristics of these devices, turning them from metal detectors, which recognize metals (black or non-ferrous), to metal-analazers, which generate an appearance of the detected object. Suggested an option of using ECD during clearing mines.

INFORMATION SYSTEMS

Frees P. V., *PhD in Engineering, Associate Professor*

TO THE PROBLEM OF MANAGING THE PROCESS OF COSMIC OBSERVATIONS OF THE LANDED EARTH REGIONS WHILE SOLVING OPERATIONAL TASKS

The author summarizes the author's results of developing the methodological foundations for controlling the process of space observations of specified regions and / or objects of the Earth in solving operational problems in conditions of limited on-board resources and unfavourable external factors. At the same time, a number of methods and models have been suggested that, to some extent, contribute to resolving the contradiction between the space capabilities and the increasing demands of customers for targeted information from them. These requirements concern both the composition, volume and quality of space information, and the speediness of its reception at any time of the day and year, regardless of external conditions. In this case, there arises the scientific and applied problem of controlling the process of space observations to meet these requirements.

In particular, in a number of author's articles, the method of formalizing processes in space systems as a basis for further modelling has been further developed. It is based on the set-theoretic approach with the complex use of analytical, logical and logical-analytical functions with their geometric interpretation.

For this purpose, an appropriate alphabet has been developed, containing both separate designations and logical, analytical and logical-analytical dependencies reflecting the processes of orders, planning, observation, the formation of target information and its transfer, management of means and processes, the state of orbital and ground facilities, external and Internal conditions of their functioning, actions and decisions of maintenance personnel, customers and users. The basis of formalization is the mathematical apparatus of set theory, information theory, combinatorial analysis, two-valued and many-valued logic. Spatial-temporal phenomena are formalized using the theory of spacecraft flight.

In addition, the method of predicting the controllability of given regions of the Earth by space means has been further developed, which differs from those known by complex consideration of the parameters of the orbital motion of space vehicles, the technical characteristics of the on-board target equipment, and the geographical coordinates of the given region. At the same time, the peculiarity of servicing of terrestrial objects by space means is taken into account when the intervals of the specified moments of time, objectively determined by the specificity of the orbital motion relative to the rotating Earth, exist objectively. In such a case, the spacecraft's survey range uncontrollably moves along the earth's surface unevenly, reaching selectively some ground objects. Therefore, there is an actual task of predicting the controllability of specified objects with the purpose of rational planning of their operational maintenance.

To do this, it is suggested to set the conditions for the controllability of any observation area by the original logical-analytical visibility function, which takes into account the geographic coordinates of the area and the current geographic coordinates of the ground objects, and the degree of controllability is the original one-dimensional cover coefficient.

To calculate the parameters of the survey (the width of the survey and capture bands, the dimensions of the scene taken, the area of the controlled areas), the author developed an analytical model for servicing surface facilities. It takes into account the parameters of the orbits, technical characteristics and shape of the field of view of the on-board target equipment (conical, pyramidal), the turns of its target axis from nadir to roll and / or pitch, as well as various models of the Earth's shape (flat, spherical, ellipsoidal).

At the same time, for the control of the process of detailed space observations, the author developed a logical-analytical model of the angular motion of a spacecraft, which allows for qualitative analysis and quantitative assessment of the effect of the angular motion parameters on the volumes and quality of target information. In addition, such a model provides the formation of rational routes for servicing specified land objects. The model is based on a formalized description of the processes of obtaining target information and controlling the angular motion in the modes of software turns of spacecraft and their precise orientation and stabilization.

PRODUCTION, MODERNIZATION, MAINTENANCE

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METHODOLOGICAL BASIS OF STRUCTURAL SYNTHESIS OF ARMAMENT AND MILITARY EQUIPMENT RECOVERY SYSTEMS OF THE FORCES

Basic principles and issues that are solved while organizing and controlling complex technical and organizational systems as well as the necessity to apply methodology of the structural synthesis to formalize correcting tasks of the main parameters of recovery system are considered.

Keywords: aggregative model, corrective maintenance, service requests, weapons and equipment, recovery system structure.

TESTING, TEST SITES

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PROPOSALS FOR DEVELOPMENT OF TRAJECTORY MEASUREMENT AND UNIVERSAL TIME SYSTEMS FOR MOBILE GROUND MEASURING-COMPUTER COMPLEX

Suggestions regarding structures and scientifically-methodical synthesis apparatus of the promising multi-parameters laser information measuring system of trajectory measuring and universal time system with the use of national standard of time and frequency, military standards and fiber-optic communications lines for the ground measuring-computer complex of the Armed Forces of Ukraine have been presented.

UNCONVENTIONAL WEAPONS

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THE PROBLEMATIC ASPECTS OF THE INTEGRATION OF NON-TRADITIONAL TYPES OF WEAPONS INTO THE PROMISING ARMAMENT SYSTEM OF THE ARMED FORCES

The system conceptual bases and methodological problematic issues related to the development and integration into the composition of a prospective armament systems into the armed forces of military-economically justified and technically (technologically) acceptable priority variants of non-conventional types of weapons using the latest defence technologies are considered. Keywords: non-traditional types of weapons, weapon system, traditional types of weapons and military equipment, innovative development.