

# Морской



# Вестник

№2(74)

И Ю Н Ъ

2 0 2 0

ISSN 1812-3694

*Morskoy Vestnik*

1970

2020



## ЗАО «ЦНИИ СМ»

полвека успешной работы в интересах  
Военно-Морского Флота России





#### Editorial Council

##### Chairman

**A.L. Rakhmanov**, President of JSC United Shipbuilding Corporation

##### Co-chairman:

**M.V. Alexandrov**, General Director JSC SSTS, President of the Association of Shipbuilders of St. Petersburg and Leningrad Region  
**V.S. Nikitin**,

President of the International and Russian Scientific and Technical Association of Shipbuilders named after Acad. A.N. Krylov

**G.A. Turichin**, Rector SPbSMTU

##### Council Members:

**M.A. Alexandrov**, Director JSC CRIME

**A.S. Buzakov**, General Director JSC Admiralty Shipyards

**A.A. Diachkov**, General Director JSC Severnoye Design Bureau

**V.Yu. Dorofeev**, General Director JSC SPMD Malachite

**V.V. Dudarenko**, Chairman of the Board of Director JSC Sudpromkomplekt

**G.V. Egorov**, General Director JSC Marine Engineering Bureau SPb

**S.G. Filimonov**, General Director JSC Concern Morflot

**E.T. Gambashidze**, General Director JSC Control Systems and Instruments

**E.A. Konov**, Director JSC Publishing House Mor Vest

**A.A. Kopanev**, General Director JSC SPF Meridian

**G.A. Korzhavin**, General Director JSC Concern Granit-Elektron

**A.V. Kuznetsov**, General Director JSC Armalit

**L.G. Kuznetsov**, General Designer JSC Compressor

**G.N. Muru**, Executive Director JSC 51 CDTISR

**N.V. Orlov**, Chairman St. Petersburg Marine Assembly

**A.G. Rodionov**, General Director JSC Kronstadt Technologies

**S.V. Savkov**, General Director JSC NE

**I.V. Scherbakov**, General Director JSC PDB Petrobalt

**V.A. Seredokho**, General Director JSC SNSZ

**V.V. Shatalov**, General Director JSC DO Vympel

**K.Yu. Shilov**, General Director JSC Concern SPA Avrora

**A.V. Shlyakhtenko**, General Director JSC Almaz CMDB

**K.A. Smirnov**, General Directors JSC MNS

**A.S. Solov'yev**, General Director PJSC Vyborg Shipyard

**I.S. Sukhovinsky**, Director JSC VINETA

**V.S. Tatarsky**, General Director JSC ERA

**G.R. Tsaturov**, General Director OJSC Pella

**A.L. Ulyanov**, General Director LLC Neva International

**N.M. Vikhrov**, General Director JSC Kanonersky Shiprepairing Yard

**M.V. Zakharov**, General Director JSC Pumor-north-west

## CONTENTS

<b>A. L. Rakhmanov.</b> Strategic goals of USC JSC.....	1
<b>S.E. Abdykerov, A.N. Bel'skova.</b> Methodological approaches to managing the strategic development of a corporation .....	7

### SHIP DESIGN AND CONSTRUCTION

<b>A. G. Egorov.</b> Ensuring the driving performance of a new generation of mixed navigation cruise passenger ships .....	11
<b>V. V. Yakimov, G. E. Egiazarov, T. I. Letova.</b> Further development of software for the direct calculation of loads from the effects of ice on the hull .....	21
<b>O. V. Tret'yakov, P. A. Schaub, S. V. Moskovkina.</b> Fundamentals of the dynamic unsinkability of a ship.....	27
<b>A. I. Gajkovich.</b> The Norman coefficient problem in ship design theory.....	29
<b>A. A. Forst, A. A. Shamalov.</b> Rescue ships of the Navy.....	31
<b>V. N. Polovinkin, A. B. Fomichev.</b> Current status and development prospects of universal landing ships. Part 1 .....	42
<b>R. N. Karaev.</b> Megablock formation of stationary oil platforms in the Caspian Sea. Part 2 .....	46
<b>K. V. Rozhdestvensky.</b> Linearized solution of a supercavitating thin foil problem with use of different cavity closure schemes.....	55
<b>K. V. Rozhdestvensky</b> – 75 years.....	59

### TECHNOLOGY OF SHIPBUILDING, SHIP REPAIR AND ORGANIZATION OF SHIPBUILDING

<b>K. V. Tsvetkov, E. V. Kipreev, O. V. Syrkova, V. A. Sinitsky, S. F. Milyuev.</b> The use of a laser projector as part of a measuring and projection marking complex in shipbuilding.....	60
---	----

### SHIP POWER PLANTS AND THEIR ELEMENTS

<b>L. G. Kuznetsov, A. V. Burakov, A. S. Perminov, S. N. Serebrennikov, O. K. Kotov.</b> Nitrogen compressor stations for Navy ships, LNG tankers and the LNG icebreaker fleet .....	67
<b>M. I. Ivanov.</b> The method of setting ball valves with threaded bushings .....	73
<b>L. I. Vishnevsky, A. R. Togunjac, Duc Chin Luk.</b> Features of reversing ships equipped with propellers with different blade contours .....	74



## INFORMATION-MEASURING AND MANAGEMENT SYSTEMS

- G. A. Korzhavin, Yu. F. Podoplyokin, O. G. Mal'tsev.** Search optimization of a radiating marine target by a ship direction finder according to data from an external information source..... 81
- A. V. Anisimov, A. G. Yureskul, A. N. Popad'in, T. A. Spasova.** The synthesis technique of the mathematical model of the electro-hydraulic steering gear of autonomous moving objects..... 85
- I. I. Zaitsev, D. V. Shamanovskiy, E. V. Buter.** Problems of integration of complexes of automated control systems when creating submarines of small displacement ..... 89
- D. S. Babkin, I. V. Kapustin, A. V. Kir'yanov, K. A. Smirnov, P. G. Fedorov, R. E. Khan.** Navigation support and control system for a group of underwater robots..... 93
- S. K. Volovodov, A. V. Smol'nikov, Yu. V. Yasinskaya.** A velocity-invariant system for stabilizing the motion of MPO ..... 99

## OPERATION OF WATER TRANSPORT, SHIP NAVIGATION

- G. N. Muru, V. I. Sutyurin.** Forecast of changes in the frequency of free oscillations of the hull structure of the vessel in operation..... 103
- V. Yu. Makarov, M. Yu. Khokhlov.** A mathematical model of an autonomous pontoon launching device for evacuation systems of offshore oil and gas facilities .... 105
- S. A. Kondrat'yev.** A platform for developing a system of information support for decision-making on the implementation of combat missions ..... 109
- A. V. Andreeva, A. D. Suslova.** Investigation of factors negatively affecting shipping, and analysis of innovative technologies that can eliminate them ..... 112
- A. V. Pustoshny.** The study of the International Maritime Organization of the prohibition of heavy diesel fuel in the Arctic ..... 117

## THE HISTORY OF SHIPBUILDING AND FLEET

- V. V. Shatalov.** Design Office Vympel during the Great Patriotic War..... 123
- B. A. Barbanel, S. V. Fedulov, N. N. Mizirkina.** Organization of inventive work in the Design Bureau of the NKVMF (Navy) in Berlin (1945–1947)..... 126

### Editor-in-Chief

**E.A. Konov, Ph. D.**

### Deputy Editor-in-Chief

**D.S. Glukhov**

Phone/Fax: +7 (812) 6004586

Fax: +7 (812) 3124565

E-mail: morvest@gmail.com

www.morvest.ru

### Editorial Collegium

**G.N. Antonov, D. Sc.**

**V.I. Chernenko, D. Sc., Prof.**

**A.I. Gaikovich, D. Sc., Prof.**

**E.A. Gorin, D. Sc.**

**V.N. Ilukhin, D. Sc., Prof.**

**B.P. Ionov, D. Sc., Prof.**

**D.V. Kazunin, D. Sc.**

**R.N. Karaev, Ph. D.**

**Yu.N. Kormilitsin, D. Sc., Prof.**

**A.I. Korotkin, D. Sc., Prof.**

**P.A. Krotov, D. Sc., Prof.**

**P.I. Maleev, D. Sc.**

**Yu.I. Nechaev, D. Sc., Prof.**

**Yu.F. Podoplyokin, D. Sc., Prof.,** member of the Academy

of Rocket and Artillery of Sciences of Russia

**V.N. Polovinkin, D. Sc., Prof.**

**L.A. Promyslov, Ph. D.**

**A.V. Pustoshny, D. Sc., Prof.,** corresponding member

of the Academy of Sciences of the Academy

**A.A. Rodionov, D. Sc., Prof.**

**K.V. Rozhdestvensky, D. Sc., Prof.**

**N.P. Shamanov, D. Sc., Prof.**

### Editorial staff

Phone/Fax +7 (812) 6004586

E-mail: morvest@gmail.com

### Editor

**T.I. Ilyichiova**

### Design, imposition

**S.A. Kirillov, V.L. Kolpakova**

### Editorial office

office 13H, 84, Nab. r. Moyki,

190000, St. Petersburg

The magazine is registered by RF Ministry of Press,

TV and Radio Broadcasting and Means of Mass

Communications, Registration Certificate

ПИ № 77-12047 of 11 march 2002

### Founder-Publisher

JSC Publishing House «Mor Vest»

office 13H, 84, Nab. r. Moyki,

190000, St. Petersburg

### The magazine electronic version

is placed on the site LLC «Nauchnaya elektronnyaya

biblioteka» www.elibrary.ru and is also included to the

Russian index of scientific citing

**By the decision of the Council of VAK** the Morskoy

Vestnik magazine is entered on the list of the leading

scientific magazines and editions published in the

Russian Federation where basic scientific outcomes of

doctoral dissertations shall be published.

www.perechen.vak2.ed.gov.ru

You can **subscribe to the Morskoy Vestnik** magazine

using the catalogue of «Rospechat» agency (subscription

index 36093) or directly at the editor's office via the

Morvest Publishing House

**Printed** in the Printing-House «Premium-press»

Circulation 1000. Order № 691

Authors and advertisers are responsible for contents of

information and advertisement materials as well as for use of

information not liable to publication in open press.

Reprinting is allowed only with permission of the editorial staff

1. Authors shall submit articles of up to 20,000 characters, including figures, in electronic form. The text shall be typed in MS Word under Windows, formulas – in the equation editor «MathType.» Illustrations present in the article shall be submitted additionally, in the following formats: TIFF CMYK (full color), TIFF GRAYSCALE (grayscale), TIFF BITMAP (dashed), EPS, JPEG, with resolution of 300 dpi for grayscale figures and 600 dpi for dashed ones and in sizes desired for placement.

2. Articles shall contain an abstract of up to 300 characters, keywords, and bibliographic library UDC identifier. Authors shall indicate their degree, academic status, place of employment, job position, and telephone number, as well as provide a written permission of the Editor to place articles on the Internet and in the Scientific Electronic Library after publication in the journal. Articles shall be submitted with reviews.

3. The articles of postgraduate and degree-seeking students shall be accepted for publication on a free and royalty-free basis.

4. The control review of these articles shall be performed by the editorial board, with the assistance of dedicated experts, if necessary. Reviews of articles are stored in editorial office of the magazine within 5 years.

5. In case of refusal to publish articles, reviews shall be sent to authors. Copies of reviews go to the Ministry of Education and Science of the Russian Federation at receipt of the corresponding inquiry in editorial office of the magazine.

6. The contents of the journal shall be submitted to the editorial board quarterly. The decision concerning the next issue of the journal shall be formally established with the protocol.

**ABSTRACTS**

UDC 629.551.001 **Keywords:** USC JSC, USC Group, development strategy, events, indicators, plans

**A.L. Rakhmanov. Strategic goals of USC JSC // Morskoy Vestnik. 2020. № 2 (74). P.6**

In its entirety, the development strategy of USC JSC in cooperation with other partners, plans, events, strategic goals and objectives is considered. T.2. Fig.1.

UDC 65.011.12 **Keywords:** USC JSC, shipbuilding industry, corporate strategy, methodological tools, strategic development problems

**S.E. Abdykerov, A.N. Bel'skova. Methodological approaches to managing the strategic development of a corporation // Morskoy Vestnik. 2020. № 2 (74). P.7**

Corporations compose their methodological set of strategic management based on their own problematic issues. The article identifies several types of corporate strategies, as well as an example of the stages of development of a high-level corporate strategy at USC. One of the critical problems in the implementation of corporate strategic documents is the redundancy of policy decisions. T.1. Fig.1. Bibliography 6 titles.

UDC 629.5.01 **Keywords:** cruise passenger ship, new generation mixed navigation vessel, contours, driving performance, propulsion system, model and full-scale tests

**A.G. Egorov. Ensuring the driving performance of a new generation of mixed navigation cruise passenger ships // Morskoy Vestnik. 2020. № 2 (74). P.11**

The main projects of the new generation of mixed-use cruise passenger ships (PS) are presented, the features of their contours are emphasized in comparison with the classical ships of the Soviet period. Shown are the results of studies on the driving performance of a new-generation PS using the methods of computational fluid dynamics. The data of full-scale sea-going tests in 2019 of the new generation SS «BBK max» of concept class PV09 are also presented and analyzed. Satisfactory convergence of the results of model and field tests is shown. T.7. Fig.9. Bibliography 18 titles.

UDC [624.042.43: 629.5.023]: 004.42 **Keywords:** ice load, ship hull, direct calculation, RMRS rules, software

**V.V. Yakimov, G.E. Egiazarov, T.I. Letova. Further development of software for the direct calculation of loads from the effects of ice on the hull // Morskoy Vestnik. 2020. № 2 (74). P.21**

Two basic approaches to determining the loads from the impact of ice on the ship's hull are presented – calculation according to the requirements of regulatory documentation and direct calculation, involving the use of physical models of the mechanical interaction of the ship's hull and ice cover. A brief review of specialized software designed for the implementation of direct calculation and found application in domestic practice. A general description of the current computer programs developed with the direct participation of the authors is given, with particular attention paid to a comparative analysis of their functionality, the results of which are presented in a systematic way. T.1. Fig.1. Bibliography 11 titles.

UDC 629.12: 532.0419075.8 **Keywords:** da-

maged ship, dynamic unsinkability, rolling, parameters, estimation

**O.V. Tretyakov, P.A. Schaub, S.V. Moskovkina. Fundamentals of the dynamic unsinkability of a ship // Morskoy Vestnik. 2020. № 2 (74). P.27**

Dedicated to the study of the rolling of the damaged ship, the ship in complex modern stormy conditions. A system of differential pitching equations is derived taking into account the non-linearity of the static stability diagram, the presence of flooded compartments of all categories (1–3), pitching, non-linearity, and roll angle using harmonic linearization methods for any stability diagram that is recommended when assessing a ship capsizing, taking into account the mutual influence of the angle pitching and roll drift. Bibliography 11 titles.

UDC 629.5.01 **Keywords:** ship, Norman coefficient, feedback coefficient, structural interactions

**A.I. Gajkovich. The Norman coefficient problem in ship design theory // Morskoy Vestnik. 2020. № 2 (74). P.29**

The Norman coefficient is considered as a feedback coefficient in the theory of ship design. Its dependence on the adopted structure of the complex technical system «Ship» is shown. The idea of the Norman coefficient as a feedback coefficient, in addition to the load, can be extended to other properties of the ship. Fig.3. Bibliography 5 titles.

UDC 656 **Keywords:** Navy, Almaz CMDB, rescue ships, diving bell, characteristics, construction, features, prospects

**A.A. Forst, A.A. Shamalov. Rescue ships of the Navy // Morskoy Vestnik. 2020. № 2 (74). P.31**

Milestones of the work of Almaz CMDB on the design of rescue vessels for the Soviet and Russian Navy since the 50s. of the 20th century are indicated in detail. Fig.26.

UDC 621.039.53 **Keywords:** universal landing ship, tasks, features, foreign states, strategic plans, Navy

**V.N. Polovinkin, A.B. Fomichev. Current status and development prospects of universal landing ships. Part 1 // Morskoy Vestnik. 2020. № 2 (74). P.42**

The trends in the implementation of the «projection of forces» strategy in the USA, Great Britain, and the Netherlands are analyzed, the main element of which are universal landing ships. Particular attention is paid to their features and weapons. T.2. Fig.10.

UDC 627 (26) (075) **Keywords:** megablock formation, platform building, support bases, upper structures, integration, algorithm, installation

**R.N. Karaev. Megablock formation of stationary oil platforms in the Caspian Sea. Part 2 // Morskoy Vestnik. 2020. № 2 (74). P.46**

The experience of introducing innovative technologies for the formation of oil offshore stationary platforms from megablock structures weighing 14,000–15,000 tons on the Caspian shelf is analyzed. Technical requirements are considered that provide the possibility of building, transporting and integrating megablock structures of support bases and upper structures of platforms within the framework of the sliding and inland methods of carrying out cargo and installation operations. Algorithms for the construction of supporting foundations and upper structures on the slipway and their subsequent integration into the

sea are described. Fig. 12. Bibliography 4 titles.

UDC 551.046.077: 529.584 **Keywords:** supercavitation, small perturbations theory, models and schemes of cavity closure

**K.V. Rozhdestvensky. Linearized solution of a supercavitating thin foil problem with use of different cavity closure schemes // Morskoy Vestnik. 2020. № 2 (74). P.55**

The solutions of the linearized problem on a supercavitating thin profile are presented using various cavity closure schemes – analogues of the corresponding non-linear closure models of Ryabushinsky, Efros-Gilbarg, Tulin and Vu-Fabula. The results of comparing the theory and experimental data on the coefficient of lift related to the angle of attack as a function of the ratio of the cavitation number to the angle of attack are presented. Fig.5. Bibliography 3 titles.

UDC 681.786: 621.751: 629.5 **Keywords:** marking system, laser projector, base system, reference points, object reference, prism reflector, projected contour

**K.V. Tsvetkov, E.V. Kipreev, O.V. Syrkova, V.A. Sinitsky, S.F. Milyuev. The use of a laser projector as part of a measuring and projection marking complex in shipbuilding // Morskoy Vestnik. 2020. № 2 (74). P.60**

It is shown that the best results of using a laser projector can be achieved by using it simultaneously with discrete and scanning SRs as part of a measuring and projection marking complex. Discrete SIs, such as laser trackers and optoelectronic tacheometers, allow you to create a high-precision base system, organize a local reference network around and/or inside the object, designed to determine the proper position of the projector relative to the coordinate system of the object. Scanning measuring systems such as laser scanners due to the high density of measurement of object points allow you to create or refine the existing model of the surface on which the marking should be applied. Fig.11. Bibliography 1 title.

UDC 621.51 **Keywords:** Compressor JSC, nitrogen compressor station, nitrogen generation methods, membrane gas separation unit, material, characteristics

**L.G. Kuznetsov, A.V. Burakov, A.S. Perminov, S.N. Serebrennikov, O.K. Kotov. Nitrogen compressor stations for Navy ships, LNG tankers and the LNG icebreaker fleet // Morskoy Vestnik. 2020. № 2 (74). P.67**

Introduces in detail the products of Compressor JSC, primarily with the production of nitrogen plants for the Navy and civil shipbuilding, their characteristics, nitrogen generation methods, materials used, and membrane systems. T.2. Fig.8. Bibliography 7 titles.

UDC 629.5.035.58 **Keywords:** ship pipeline valves, ball valves, setting method

**M.I. Ivanov. The method of setting ball valves with threaded bushings // Morskoy Vestnik. 2020. № 2 (74). P.73**

A method has been developed for adjusting ball valves with threaded bushings. The method is successfully used in the manufacture of serial samples of ball valves at the enterprise Armat JSC. Fig. 2. Bibliography 2 titles.

UDC 621.436 **Keywords:** propeller (GV), saber-shaped blade, traditional blade, comparative char-



acteristics, braking, calculation, prospects of use

**L.I. Vishnevsky, A.R. Togunjac, Duc Chin Luk. Features of reversing ships equipped with propellers with different blade contours//Morskoy Vestnik. 2020. № 2 (74). P.74**

Numerical studies of the comparative characteristics of a vessel equipped with alternately traditional and saber-shaped warheads have been performed. It is shown that giving the blades of the mover a saber shape is advisable not only to reduce vibration activity when the mover is operating in an uneven flow, but also favorably affects the reverse characteristics of the vessel. This opens up the prospect of creating sufficiently flexible saber-shaped blades capable of twisting towards a large step in reverse modes without violating their integrity. T.3. Fig.9. Bibliography 5 titles.

UDC 621.396.67 **Keywords:** radiating sea target, ship radio direction finder, external information source, variable scanning sector, optimal search strategy, dynamic programming method

**G.A. Korzhavin, Yu.F. Podoplyokin, O.G. Mal'tsev. Search optimization of a radiating marine target by a ship direction finder according to data from an external information source//Morskoy Vestnik. 2020. No2 (74).P.81**

A search strategy of a sea emission target by shipboard direction finder with changed sector of scanning, providing optimal (as per the maximum criteria of target detection probability to the given term) distribution of search forces in target probable area (TPA) is investigated. For TPA, assigned as the errors ellipse, the numerical examples of estimation of the efficiency of target with the use of developed (optimal) strategy are provided. Fig. 2. Bibliography 8 titles.

UDC 661.5.015–26 **Keywords:** electro-hydraulic drive, control object, mathematical model, semi-natural modeling, highly maneuverable objects

**A.V. Anisimov, A.G. Yureskul, A.N. Popad'in, T.A. Spasova. The synthesis technique of the mathematical model of the electro-hydraulic steering gear of autonomous moving objects//Morskoy Vestnik. 2020. № 2 (74). P.85**

The article discusses the question of constructing a mathematical model of an electrohydraulic drive as a control body for a highly maneuverable object, as well as ways to increase accuracy and speed by introducing additional structural elements. Fig. 4. Bibliography 3 titles.

UDC 623.9: 002 **Keywords:** submarine, automated control system, integration, problems

**I.I. Zaitsev, D.V. Shamanovsky, E.V. Buter. Problems of integration of complexes of automated control systems when creating submarines of small displacement//Morskoy Vestnik. 2020. № 2 (74). P.89**

The current issue of integration of automated systems and systems when creating submarines of small displacement is considered. T.2. Fig. 3. Bibliography 3 titles.

UDC. 629.584 **Keywords:** hydroacoustics, robotics, group of robots, navigation

**D.S. Babkin, I.V. Kapustin, A.V. Kir'yanov, K.A. Smirnov, P.G. Fedorov, R.E. Khan. Navigation support and control system for a group of underwater robots//Morskoy Vestnik. 2020. № 2 (74). P.93**

The current state of the prospects of creating a control system for a group of underwater robots is considered. It is shown that with the advent of such groups, a new approach to the principles of positioning of underwater objects and their connection with them is required. A method for solving the problem of navigation support and control of a group of underwater robots is given. Fig. 5. Bibliography 4 titles.

UDC 629.5.05 **Keywords:** marine moving object (MPO),

speed, control system, control law, transfer function, characteristic polynomial

**S.K. Volodovod, A.V. Smol'nikov, Yu.V. Yasinskaya. A velocity-invariant system for stabilizing the motion of MPO //Morskoy Vestnik. 2020. № 2 (74). P.99**

A method is proposed that allows providing a change in the MPO speed. constant type of the characteristic polynomial of a closed stabilization system and a transition characteristic by changing the parameters of the control law The method includes the synthesis of a characteristic polynomial using standard coefficients and determining the geometric mean root from the condition of a given transient time. Standard coefficients are determined for each speed mode, then they are used to find the parameters of the control laws that ensure the identity of the transition characteristics for different MPO speeds. A particular problem in this case is the determination of standard coefficients for the transfer functions of systems having several zeros. Fig.2. Bibliography 3 titles.

UDC 624.042: 629.5.024 **Keywords:** design of ship hull, simulation, finite element method, modal analysis, corrosion

**G.N. Muru, V.I. Sutyryn. Forecast of changes in the frequency of free oscillations of the hull structure of the vessel in operation//Morskoy Vestnik. 2020. № 2 (74). P.103**

When considering the vibration of the ship, researchers are faced with the problem of determining disturbing forces, reactions of hull structures for dynamic effects, and also with the choice of acceptable values of vibration parameters. A serious aspect of consideration of the first two problems is the phenomenon of resonance. The article discusses a method of vibration control of vehicle based on the prevention of resonance phenomena at the design stage of the vessel. This is determined by the natural frequency of the body, which are mapped to the frequencies of the perturbing external forces. Changing in the process of the ship design process distribution of stiffness and mass of its constructive elements, it is possible to provide the relative offset of these frequencies, and thereby to prevent extreme vibration. However, the choice of values specified offset requires forecasting of possible changes of natural frequencies in the operation of the vessel. The problem is solved by modeling the ship's hull with the use of program complexes ANSYS and FEMAP With Nastran. The residual thickness of the structural elements of the model are determined by subtracting from the design thickness values of the average velocities of wear multiplied by the period of operation taken in the interval from 0 to 30 years. Fig.7. Bibliography 2 titles.

UDC 627: 629.523 **Keywords:** launching device, evacuation, offshore oil and gas facilities

**V.Yu. Makarov, M.Yu. Khokhlov. A mathematical model of an autonomous pontoon launching device for evacuation systems of offshore oil and gas facilities//Morskoy Vestnik. 2020. № 2 (74). P.105**

The problems arising during the evacuation of personnel from offshore oil and gas facilities are analyzed, analytical dependencies are given, according to which a mathematical model of the launching device can be compiled, the main parameters that affect the descent process are determined. Fig.9. Bibliography 4 titles.

UDC 004.416.6 **Keywords:** software platform, software framework, decision support system, graph, database, software architecture

**S.A. Kondrat'yev. A platform for developing a system of information support for decision-making on the implementation of combat missions//Morskoy Vestnik. 2020. № 2 (74). P.109**

The option of building a software platform (framework) for solving the functional task «Information support for the work of the ship's commander and other

ship's officers in deciding to carry out the assigned combat mission» is considered, while two options for integrating the calculation modules are analyzed: by timer or by subscription. In the object representation of the solution at VPBZ, elements of graph theory are applied. T.1. Fig.3. Bibliography 2 titles.

UDC 656.078 **Keywords:** shipping, blockchain, Internet of things, artificial intelligence, big data, 5G networks, robotic process automation

**A.V. Andreeva, A.D. Suslova. Investigation of factors negatively affecting shipping, and analysis of innovative technologies that can eliminate them//Morskoy Vestnik. 2020. № 2 (74). P.112**

The research is devoted to studying the impact of problems associated with shipping. The article also provides a comparative analysis of modern innovative solutions, which can optimize the process of sea transportation and improve the interaction of transportation participants. Coverage of the disadvantages and advantages of technologies, a description of foreign experience in application made it possible to assume future implementation results, as well as the effect of their joint use. T.1. Fig.4. Bibliography 21 titles.

UDC 623.98 **Keywords:** ecology, Arctic, heavy diesel fuel, IMO

**A.V. Pustoshny. The study of the International Maritime Organization of the prohibition of heavy diesel fuel in the Arctic//Morskoy Vestnik. 2020. № 2 (74). P.117**

The areas of activity of the Committee for the Protection of the Marine Environment of the International Maritime Organization (IMO) on the limitation of the impact of ships on the marine ecology in the Arctic are analyzed. Particular attention is paid to the discussion on the prohibition of the use on ships and the transport of heavy diesel fuel in this region. Such a decision directly concerns the interests of the Arctic shipping of Russia. Various aspects of two main negative factors when using heavy diesel fuel are considered – a greater amount of soot emissions, which, according to ecologists, contributes to the melting of ice, and the complications of dealing with accidental spills. It is shown that in both cases the arguments presented are not indisputable and, at least, need additional research. In general, a balanced assessment of all aspects, including technical, social and economic, should precede the solution of the issue. Bibliography 9 titles.

UDC 629.5 **Keywords:** Design Office Vympel, World War II, submarine chaser, landing boat, motorboat, barge, loading barge, designers

**V.V. Shatalov. Design Office Vympel during the Great Patriotic War//Morskoy Vestnik. 2020. № 2 (74). P.123**

Introduces the designs of the ships of the Design Office Vympel during the Great Patriotic War, the names of their designers, the contribution of workers – engineers and designers – to the Great Victory. Fig.4. Bibliography 7 titles.

UDC 629.5 **Keywords:** inventive and rationalization work, Department of inventions, NKVMF, Navy, Design Bureau, patent, applications, German specialists

**B.A. Barbanel, S.V. Fedulov, N.N. Mizirkina. Organization of inventive work in the Design Bureau of the NKVMF (Navy) in Berlin (1945–1947)//Morskoy Vestnik. 2020. № 2 (74). P.126**

It is dedicated to organizing mass inventive and rationalization work in the Navy, and specifically at the Design Bureau of the NKVMF (Navy) in Berlin as one of the structural units of the Navy. The peculiarity of this structure was that German specialists worked in it and got involved in mass inventive work. At the same time, they enjoyed the same rights to obtain patents and monetary rewards as Soviet specialists. Fig.3. Bibliography 12 titles.