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Section I
Shipbuilding, ship repair, and ecological safety of the ship

Astashin A.E., Badyin M.M., Samoylov A.V., Ryzhov E.V., Fomina A.I., Vlasov A.V.
Dynamics of channel network extention of elementary water currents of the mixed coniferous and broad-leaved woods zone in the 21st century (by the example of a catchment basin of the Veletma river of the Nizhny Novgorod region)

Keywords: *an elementary waterway, a catchment basin of the Veletma River, a zone of the mixed coniferous and broad-leaved woods, dynamics of extent of channel network, the Nizhny Novgorod Region.*

The article contains the results of studying of dynamics of extent of channel network of elementary water currents in a zone of the mixed coniferous and broad-leaved woods within the Nizhny Novgorod Region (a catchment basin of the Veletma River) in the 21st century. The research is based on materials of the forwarding researches conducted during the summer period of 2018 and the GIS-analysis of data of remote sensing of Earth during the period from 2001 to 2018. Based on the results of the study, the current locations of the sources of elementary watercourses in the Veletma river catchment area of the Nizhny Novgorod region are determined, the dynamics of elementary watercourses relative to 2001 is calculated. The fact of significant reduction of extent of channel network of elementary water currents is established and strong dependence between woodiness of the territory and extent of channel network of elementary water currents is revealed.

Kessler A.A.
Usage of rowing wheels on river crafts

Keywords: *propulsion and steering complex, rowing wheel, steering column, main propulsion system of the river ship*

The trend on revival of application of rowing wheels on river crafts was outlined in modern domestic practice of navigation. Along with the «traditional» field of their use, i.e. on vessels for the small rivers with depths less than 1 m, installation of wheels is planned on the passenger ship of class «O» of the Russian River Register (RRR) at draft about 1.2 m. Such «expansion»of the field of application of rowing wheels in modern conditions is doubtful and is a consideration subject in this article. The paper presents the results of generalization and the analysis of materials on efficiency of application of rowing wheels on river boats. It is noted that use of rowing wheels is expedient in the conditions of the small rivers and considerable loads of the propeller. The comparative data of the main power station efficiency of the passenger ship class «O» RRR with application of a steering column as the propeller or a rowing wheel are obtained. It is noted that installation of steering columns on this vesse, instead of fodder rowing wheels will allow to reduce, according to approximate calculations, the necessary power of the main engines and, besides, to improve controllability of the vessel.

Mizgirev D.S., Borisov M.A., Vlasov V.N.
The actuality of improving systems for maintenance of the microclimate of ship spaces to meet modern regulatory requirements

Key words: *air quality, microclimate, microclimate of ship spaces, the microclimate of ship's rooms, the ventilation ship system, optimal microclimatic conditions, allowable microclimatic conditions, regulations, regulatory requirements. air ionization.*

The actuality of requirements to the systems of the microclimate of ship spaces to meet modern regulations is considered in the present article. The aim of the work is to review the norms, rules and requirements concerning the microclimate and air quality in the premises of ships. The existing regulations have been in action for more than 15 years and do not cover the full range of assessments. This paper reviews and compares the requirements with the norms of international norms and standards. The more stringent requirements that should be applied in the design of ventilation and air conditioning systems, as well as ensuring the microclimate of the ship's premises are identified. To achieve modern requirements for air quality and maximum effect in economic and environmental aspects, it is necessary to use modern universal methods and techniques.

Osovskii D.I., Sharatov A.S.
The influence of limited space on results of a computational and pilot study of the propeller with additional jet impact of water on blades

Keywords: *propeller, slot nozzle, jet impact, experimental study, computational hydrodynamics, coefficient, limited space*

Thermal and mechanical tension of the main engine working for marine propeller of the fixed step depends on the changing service conditions. Restriction of influence of external service conditions on the main engine can be achieved by supply of additional water on the blade of the propeller. Purposeful change of parameters of the water pumped through bladed slot-hole nozzles provides change of hydrodynamic parameters of the propeller that provides change of thermal and mechanical tension of the main engine. The possibility of carrying out a pilot study of propeller with jet influence of water, at operation of the main propulsion plant is limited to vessel trial conditions. To confirm the theoretical data an experimental study of propellers in hydrodynamic pipes as well as numerical simulation of processes in computational hydrodynamics complexes is important. At a research of the propeller with jet, influence of water in a hydrodynamic pipe the constant error of an experiment comparatively with theoretical data is established. There is a presence of a constant error in the experimental study, which is taken into account by the correction factor due to the influence of the limited space of the hydrodynamic pipe. The known correction factors describing the work of the propellers do not fully take into account the peculiarities of work of the propeller with a jet effect. In order to determine the correction factor, a numerical simulation of the models of the experimental test bench and the propeller screw under study was carried out in the computational complex dynamics According to the results of the design study, the dependence of the correction factor was obtained which takes into account the influence of the constrained space on the results of an experimental study of the propeller equipped with a slotted nozzle for additional jet action.
When using the computational hydrodynamics complex, the influence of the computational domain on the reliability of the results obtained and the confidence interval of the obtained coefficient values are determined. The results obtained can be used to clarify the size of the computational domain in a numerical study and the choice of the optimal size of hydrodynamic tubes in the experiment. In future, it is of interest to research propellers by parallel modeling of processes in a hydrodynamic pipe and its 3D copy in the computational fluid dynamics complex.

Pokusaev M.N., Sibryaev K.O., Khmelnitskaya A.A., Kovalev O.P., Bulgakov V.P.
Experimental evaluation of hydrosphere contamination by oil products suspended «veterok-8m» boat motor

Keywords: *small size boat, outboard motor, ecological characteristics of ship engines, pollution of the hydrosphere by motor boats*

The article is devoted to the experimental assessment of the pollution of the hydrosphere with oil products by the outboard boat engine of domestic production of the Veterok-8M type, operating on a two-stroke cycle with a nominal capacity of 8 hp. The widespread use of boat engines and the increase in environmental requirements for them require an assessment of their ecological characteristics. Research into the pollution of the hydrosphere by outboard motors is associated with a number of difficulties: the design features of their gas exhaust system; the need to install non-standard measuring equipment; testing in small wholesale pools to localize emissions to a limited amount of water; the complexity of theoretical calculations of the level of harmful emissions in water. The studies carried out by the specialists of the Marine Technology Service testing center at the Federal State Educational Institution of Higher Education ASTU made it possible to quantify the pollution of the hydrosphere's oil with the Veterok-8M outboard boat engine in different modes of its operation in a small experimental basin, and also to get empirical formulas for estimated calculations of oil content in water depending on the power and fuel consumption of the engine of a small vessel.

Savinov V.N.
Non - self-propelled floating crane with fixed lifting device stability

Keywords: *Stability, the floating crane, designing, building, calculations, wind loadings, criterion of weather.*

Heavy-duty floating cranes Design and construction is carried out to achieve increased efficiency of loading, unloading, rescue, repair and construction work in the offshore drilling rigs construction, such as self-lifting floating drilling rigs (SPBU) and semi-submersible floating drilling rigs (PPBU), in factory areas, the river waters (in the bridges construction o), lakes, seas, as well as participation in other technological operations. The floating cranes work often occurs in adverse hydrometeorological conditions. Therefore, when designing a floating crane, it is necessary to check its stability by the weather criterion , and in the most unfavorable working or non-working state for various cases of a floating crane loading. The purpose of the work is to determine the floating crane stability by the weather criterion for the early stage of its design. On the performed calculations basis, the shoulders static stability diagram was constructed, confirming its sufficiency.

Soloviev A.V., Zelichenko E.V., Golubev I.V.
About the choice of anchor equipment for inland navigation vessels

Keywords: *anchor equipment, Rules of the Russian River Register, Resolution №61, ES-Trin standard, DNV GL rules, inland navigation vessels, European regulations, Inland waterways of the Russian Federation, European Inland Waterways, conditional holding mass of anchors.*

This article presents the calculations results on the anchor choice of the various types inland navigation vessels supply and dimensions according to the Russian River Register Rules (hereinafter referred to as the RRR Rules) and the European regulations – Resolution No. 61 of the United Nations Economic Commission for Europe «Recommendations concerning the European level harmonized technical requirements applicable to inland navigation vessels», Directive (EU) 2016/1629 of the European Parliament and of the 14 September 2016 Council and the European Standard, establishing technical requirements for inland navigation vessels (ES-TRIN standard) edition 2019/1, as well as common rules for Det Norske Veritas and Germanischer Lloyd for inland navigation vessels 2018 edition (hereinafter DNV GL Rules). Work on the different methods regulated anchor supply comparison of inland navigation vessels is relevant, due to the fact that there are non-compliance anchor supply cases concerning Russian vessels entering the inland EU waterways, European regulations, as well as the RRR unjustified overstatement cases rules dealing with the requirements on anchor supply in relation to displacement vessels with the hull material other than steel. Matching anchors the weight is determined in accordance with clause 3.2.1 of Part V of the Ships Classification and Construction Rules on the one hand, and clauses 1–6 of Article 13.01 of the ES-TRIN standard (the same methodology is used in the DNV GL rules) on the other hand. To assess the main holding power anchor supply component with different approaches to the anchor supply ships strategy , the conditional holding anchor weight supply concept was introduced. The comparison conditional holding weight results when placing the vessel only on the bow anchors are summarized in the table presented in the article. The results analysis shows that in most cases, the methods for selecting anchor supplies according to the RRR Rules and European regulations do not allow obtaining comparable results, which to some extent can be explained by different approaches to supply characteristics definition – the calculated dependencies determining factor.

Yakovlev S.G.
The basis of the design of the straightening apparatus of the ground pump

Keywords: *dredger, performance on the ground, booster dredge pump, mixed flow pump, impeller, vipassi apparatus, the blades input (inlet) edge, the circumferential velocity component, meridional velocity component*

To improve the suction pipes performance on the ground, in the case of the limited suction capacity a booster pump installing is neede. Using as a booster diagonal pump involves a straightening apparatus installing. At the same time, it is advisable to design a straightening apparatus with cylindrical blades in order to simplify its manufacture, restore and ensure stable parameters during operation. The straightening apparatus blades must have a profile that provides a shock-free flow input. To do this, it is necessary to know the liquid velocity circumferential component directly behind the pump impeller and the flow velocity circumferential component in front of the blades inlet edges straightening apparatus. Due to the straightening machine input edges distance from the impeller output edges to the cross section size , the circumferential speed will decrease.
The proposed calculation method makes it possible to determine the circumferential velocities at the entrance to the straightening apparatus at different radii, which completely determines the blade inlet edge position with minimal hydraulic losses.

Section II
Financial and accounting-analytical problems of the modern economy

Sidyakova V.A.
Economic efficiency of measures evaluating the quality of consumers service on the example of restaurant business

Keywords: *food service, consumer, customer service, beer restaurant, events, electronic menu, profit, profitability, discount system.*

The article deals with the economic efficiency of measures to assess the quality of customer service. In the conditions of market competition, great importance is given to the customers servicing of food service companies, since the effective activity of any enterprise, the main indicator of which is the amount of profit, depends on the quality and level of service. The problem of service quality is constantly concerned by visitors and staff.
The need to improve the efficiency of measures for customer service is associated with the introduction into the practice of the restaurant business organization of event events and improvement of the information base of service. The author substantiates the implementation of measures for a set of effects, such as: increasing the amount of the average check, increasing the speed of service, reducing the load on staff while reducing staff and, accordingly, reducing PAYROLL, improving the level of service. The author's study presents calculations of economic indicators of implemented measures, as well as an assessment of the results of their calculation.

Section III
Economics, logistics and transport management

Zmachinski V.I., Gavrilov A.I.
Entrepreneurship and enterprise: the nature and content, the similarities and differences

Keywords: *entrepreneurship, enterprise, business activity, property relations, personal and public interests, means of production, management*

In modern economic science and the practice of market relations, there is a situation in which the economic categories «entrepreneurship» and «enterprise» are interpreted as adequate concepts. This leads to a lack of a common understanding of the business activity of market entities. Such situations are typical for many areas of economic activity.
The article considers the dual nature of ownership and, accordingly, the separation of the functions of the owner and the functions of an economic entity as the methodological basis (root cause) of the distinction between the concepts of «entrepreneurship» and «enterprise». In this regard, it seems quite relevant consideration of the nature and content, similarities and differences of these two concepts.

Ivanov V.M., Gordleeva V.V., Lisin A.A.
Prospects of vehicles on alternative energy sources (on the example of types of Multihull vessels)

Keywords: *alternative energy, water transport, renewable sources, multihull vessels, design, shipbuilding, environmental friendliness, energy resources, efficiency.*

The article touches upon the issues of saving energy resources in water transport through the use of alternative energy sources, and, as a result, the reasons for the transition to the construction of multihull vessels by operating them in the non-production sphere. The prospects for the design and construction of such vessels and the tasks that they set for themselves are becoming obvious – they are environmentally friendly sources of fuel, development of water transport, ecotourism, respect for resources, involvement of the younger generation in science and industry. At the same time, technical and economic problems arise, such as the high cost of projects, small capacity, low speed, environmental pollution with the modern use of similar types of vessels. As a comparison, foreign and domestic projects were studied, most of them developed in Europe. On the basis of the performed analysis, characteristics of project success, such as the used energy source, the allocated budget, the implementation, and the achieved effect, are formed. Key points were identified on the problem of implementing the production line of such vessels in our country – a cheap type of raw materials, a shortage of resources, a high payback period, a low rate of scientific research, geographical and climatic features, the absence of a careful energy consumption culture, and so on. In this regard, a set of measures was developed aimed at their elimination – all sorts of economic benefits, investment subsidies, training, support for scientific research, production of industrial equipment.

Ilyushchenko I.G., Xiangyu Wu, Lisin A.A.
Organizational, economic and methodological preconditions of forming a network of transport and logistics centers (TLC)

Keywords: *preconditions, transport and logistics center (TLC), TLC network, transport infrastructure, identification method, «industry attractiveness», «territory potential».*

In the article organizational, economic and methodological preconditions for the formation of transport and logistics centers (TLC) in the area of transport corridors are considered on the basis of changes in the process of transport service of

the territories and analysis of the existing cargo delivery schemes. The expediency of using network models for locating TLC is determined using the method of identification (compliance) with efficiency criteria using the example of territories located in the North-South-North international transport corridor (ITC) area. The following indicators have been selected as criteria: the attractiveness of the industry and the potential of the territories, which were determined by the method of expert assessments. The survey involved experts in the industry, territories, scientists.

Kraynova O.S.
Monitoring of the corporate culture of the enterprise for the purposes of the implementation of the logistic management

Keywords: *corporate culture, knowledge management, logistics management, staff satisfaction, organizational culture.*

In the article the need for application of the concept of the logistics management when considering the flow of work as a result of use of human capital and documentation of the management procedures through a corporate culture that contributes to the successful development of the organization, is defined. For this purpose, the results of the monitoring of satisfaction of the staff of enterprise with the overall management system, as well as such element as corporate culture are presented in this article. As part of the author's research, the following methods were used: OCAI K. Cameron and R. Quinn, I. D. Ladanov's methodology for assessing the level of corporate culture. Research method-survey, tools-questionnaire, scale of assessment – from 0 to 100 points; number of respondents-400 people; data presentation-radar charts. The author's vision presented in the article is that logistics management is focused on meeting the needs of internal customers – the staff of the organization, thus providing optimal conditions for the creation of a chain of values of external consumers of logistics processes that create demand. And in this plane of consideration, the human capital of the organization through the construction of an effective corporate culture carries out a collaboration of internal and external logistics service flows, which forms a high relevance of the development of these issues in relation to any object orientation.

Mordovchenkov N.V., Kuzmichev S.V., Panina E.V.,
The concept of guidelines for calculating the efficiency of transport infrastructure, the service sector in the region's economy: a managerial and consulting aspect

Keywords: *analysis, possible scenarios, government regulation, graphical and econometric models, intellectual capital, meso-level, R & D projects, transport infrastructure, economic effect, efficiency.*

The integrative method can be applicable to the list of socio-economic components of the transport infrastructure at the meso-level. At the same time, the interconnected links of the regional economy directly and / or indirectly correlate with the modern transport infrastructure.It is necessary to create a comprehensive system that ensures effective monitoring and leverage of a single shipping company, a transport enterprise, which are the main, supporting structure of a profitable (in socio-economic terms) transport infrastructure. Competitive transport and logistics infrastructure contributes to raising the status of the social sphere. In case of using the concept proposed by the authors of the article, the method of calculating of the economic effect on the formation and functioning of transport infrastructure, it is necessary to strengthen the complex system and cause-effect relationships in solving infrastructure problems at the industry level, which will create real conditions for achieving maximum agglomeration efficiency.

Tsverov V.V., Levochkina M.A.
The study of factors, destabilizing the terms of delivery by river transport

Key words: *delivery of goods, «just in time», the time of delivery, failure to deliver, river transport.*

The article defines the relevance for river transport delivery on the «just in time» principle. The results of in - situ observations of the transportation process in 2016–2017 on the Cherepovets-St. Petersburg line are presented and groups of river transport-specific factors leading to delays in the delivery process are identified. A quantitative assessment of the impact of complex fleet maintenance operations on the stability of the delivery process is given. The possibility of using river transport at present (without work to create a system that ensures delivery on time on specific lines) in the «just in time» principle is evaluated. The directions of actions to improve the readiness for delivery «just in time «on river transport are identified.

Section IV

Operation of water transport, navigation and safety of navigation

Veselov G.V., Kartashov M.V., Mineev V.I.
The current state of passenger traffic in the Russian Federation

Keywords: *population mobility, passenger traffic, passenger turnover, structure of passenger traffic by type of transport, transportation safety*

The article presents a general description of the current state of passenger traffic, an analysis of the growth rate of the number of transported passengers and passenger traffic. The structure of passenger traffic by means of transport is also considered. When analyzing, particular attention is paid to assessing the current state of the country population mobility. Proposals for more active use of water transport in the organization of the passengers transportation process is formulated in the article. As arguments in favor of using waterways to transport the citizens of the country, the authors cite data on the road accidents – the most common type of transport in the Russian Federation involved in the passengers' transportation. Wider use of water transport will reduce the load on the country roads, reduce environmental damage from the use of cars.

Section VI
Operation of ship power equipment

Volodin Y.G., Marfina O.P., Matveev Y.I., Khramov M.Y.
Guidelines for preparation of articles for the academic periodical «marine intellecyual technologies»

Keywords: *the gas stream, laminarization, heat transfer, temperature difference.*

The starting mode is one of the main in the operation of all types of engines and power plants. In this mode, there is a very intense increase in temperature with very high gradients. Heat exchange in such a non-stationary process may differ from the standard, and the parameters characterizing the heat exchange process differ significantly from the calculated data. The consequence of the deviation from the normal mode can be a local excessive heating of the streamlined surface of the individual element, leading to the failure of the entire unit as a whole. Experimental studies of heat transfer in the starting mode were performed on a gas-dynamic stand of an open type with electric arc heating of the working fluid and temperature gradients up to 12,000 K/s.as a result, the phenomenon of laminarization of the thermal turbulent boundary layer (TPS) at a heat flow directed from the gas flow to the channel wall was recorded. As a parameter to the laminarization of the proposed TPS temperature pressure or temperature factor, and the border region of laminarization TPS is a variable $\Delta T \geq 700 K$.

Garshin A.Y.
Terminology, identification and probabilistic evaluation of danger and risk level of the ship technical means in post-emergency situation

Keywords: *danger, danger, risk, security, accuracy, time, resource indicators.*

The article presents one of the ways of probabilistic hazard and risk assessment of using the ship technical means in the post-emergency situation after its diagnosis and restoration on the functional structural models by analyzing the system of consistent error-free, fault-free and trouble-free indicators.

Pokusaev M.N., Zubarev A.S., Grabarchuk A.Y., Vasiliev A.V., Kovalev O.P.
Conducting field tests on the submission of dimethyl ether to the suction manifold of the diesel engine 6L 15/18 on the vessel RK-2091

Key words: *A diesel engine, battery fuel system, nitrogen oxides, field tests, marine environment protection, MARPOL, dimethyl ether.*

The authors of the article presented an experimental installation, which allows any gaseous additional component to be supplied to the suction manifold of a diesel engine at any time during a working cycle in order to reduce the content of

harmful emissions in the exhaust gases of a diesel engine. Field tests on the supply of DME to the suction manifold of the 6L 15/18 diesel engine on the vessel RK-2091 were conducted. During the tests it was found that adding DME to the air mixture causes the concentration of nitric oxide NOx maximum decrease at the crankshaft rotation speed of 640 rpm and the percentage is equal to 12.37%. With the addition of DME to the air mixture the NO2 concentration increases, the minimum value in percentage is equal to 2.67% at the crankshaft rotation speed of 856 rpm. The NO concentration decreases as much as possible at the crankshaft rotation speed of 640 rpm and the percentage is equal to 28.38%. The CO concentration increases in all operation modes, the minimum value in percentage was equal to 85.11% at the crankshaft rotation speed of 586 rpm.

Sugakov V.G., Toschev A.A., Zobov L.V.

Mathematical and imitation model of the system of automatic regulation of excitation of a shipboard synchronous generator with external forcing

Keywords: *a system of automatic regulation of excitation of a shipboard synchronous generator with external forcing, a mathematical model of the system of automatic voltage regulation, a simulation model of the system of automatic voltage regulation, simulation in the MatlabSimulink package.*

The article analyzes the existing variants of the excitation system of synchronous generators containing voltage regulators and identifies their disadvantages. The definition and requirements for the systems of automatic excitation control are given. Taking into account the identified disadvantages of the considered excitation control systems the automatic excitation control system for the ship's synchronous generator with external forcing is proposed (SARE of the shipboard SG with EF). The mathematical and simulation models of the SARE of the shipboard SG with EF are also reflected and mathematical modeling in the MatlabSimulink package is carried out. The requirements to the automatic excitation control systems as well as cases of external forcing necessity are defined. The authors describe simulation algorithms and the parameters under which the transient modes are calculated according to the type and size of the load connected to the synchronous generator; indicate the optimal settings for the output parameters of the model, specifically the generator voltage and pulses force. The model composition and the mathematical justification of the model blocks are given. The conclusions on the basis of the experience are made as well as recommendations on the further development and improvement of the quality indicators of the transition process and hence the power grid are given.

Fedorovsky K.Yu., Fedorovskaya N.K.

The influence of fouling on the heat sink through the ship's plating

Keywords: *power unit, cooling system, heat sink, heat transfer coefficient, fouling*

Currently open cooling systems for ship power units are widespread. Such systems are not always reliable and cause environmental damage to the seas. Closed cooling systems are offered to solve the problem. They exclude the intake of cooling seawater. Heat sink in such systems is often carried out through the hull plating. The ship's plating is cluttered and it leads to the heat transfer efficiency decrease. The need to evaluate the fouling effect on the heat sink arises. For this purpose experimental studies were conducted. The experimental model surface was covered with mussels. They have the largest dimensions and, therefore, contribute to the greatest thermal resistance. The results obtained allowed us to determine the data required for the calculation of the ship's plating area.