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Section I
Waterways, ports and hydraulic engineering constructions

Yablokov A.S., Zamyatin A.V., Nikitaev I.V., Khvostov R.S.,
The stressed-deformed state assessment of the mooring loading crane to determine the possibility of the lifting facility, that has worked out the normative time, on the basis of the damaged metal construction state assesement

Keywords: *mooring loading crane, deformation of a metal construction, stress-deformed state, stress concentration, safety factor, safe operation.*

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Annotation. *This article discusses the possibility of operating the mooring loaders KK-26.0-33-10.65-17.5-17.5, manufactured by Kranbau Eberswalde GmbH, operated on the Joint-stock company «Volga» forest exchange. The main problem in the operation of these cranes is the cracks in the diaphragms of the metalwork turning into the base metal of the supports uprights. These cracks occur due to the structure of the metalwork, namely the hinged joint of the supports on the front and rear sides. The used construction leads to the occurrence of an additional bending moment with alternating loads caused by starting overloads with an unsteady motion of the material handler. These defects can be determined by technical diagnostics, which is part of a full and partial technical examination of the lifting structure, as well as by assessing the state of metal structures by non-destructive testing methods when performing industrial safety expertise of a hazardous production facility. The article analyzes the causes of the cracks and defects in the metalwork of the mooring loading crane occurrence and determines the ways of their further occurrence.*

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

Borisov A.M., Girin S.N., Prjanichnikov K.N. Comparative analysis of the Russian Maritime Register of shipping rules requirements and the Russian River Register rules requirements to the construction and strength of mixed river-sea-going ships (classes «R3-RSN» and «M-SP 3,5»)

Keywords: *dry cargo ship, oil tanker, Rules of The Russian Maritime register of shipping, Rules of the Russian River Register, hull layout, hull compartment design, overall strength, local strength, bending moment, stresses, metal content of the compartment.*

Annotation. *The article represents the results of a comparative analysis of the rules requirements of the Russian Maritime register of shipping (PMRS) and the Rules of the Russian River Register (PRRR) to the hull design and strength of ships - representatives of the mixed river-sea-going classes «R3-RSN» and «M-SP 3,5» similar by the main characteristics and operating conditions on the example of the design of a dry cargo ship and tanker middle part of the hull compartment. It is shown that the values of wave bending moments are significantly higher (for dry cargo vessels – 1,8 times) in comparison with the vessels designed for PMRS according to PRRR. In the Rules there are significant differences in the determination of the total bending stress, but the safety factors for the allowable stresses of bulk carriers are approximately the same. It is noted that PRMS are more critical to the appointment of the minimum thickness and size of the ship hull connection, so the weight of the dry-cargo ship compartment designed by PRMS is higher by 17,8% compared to PRRR, for tanker – 5,8%. Отмечено, что ПРМС более жестко подходят к назначению минимальных толщин и размеров связей корпуса, поэтому масса отсека сухогрузного судна, спроектированного по ПРМС, оказалась больше на 17,8% по сравнению с ПРРР, для танкера – на 5,8%.*

Vaskin S.V., Rekhalova N.A., Sustretova N.V.
Suggestions for amendments and additions in the requirements of the Russian River Register in the field of environmental protection

Keywords: *environmental safety, the vessels mixed (river-sea) navigation, floating objects, Russian River Register*

Annotation. *The purpose of the work was to develop requirements aimed at improve the environmental safety of ships supervised by Russian River Register and operated mainly in marine areas, but not making international voyages.*
The article presents the results of the proposals development to amend and supplement the Rules of the Russian River Register for the prevention of environmental pollution from ships and floating objects with oily, waste and ballast water, garbage and prevention of atmospheric pollution from ships.
The development of these proposals was carried out on the basis of the analysis of a large number of regulatory legal and normative-technical national and international documents containing requirements for the environmental safety of different vessels types.
The composition of the information to be specified in the documents issued by the Russian River Register to vessels operating in marine areas, including small vessels and floating drilling rigs, has also been clarified.
The problems encountered in the development and improvement of the requirements of the Russian River Register for environmental safety are noted in the article.
The article represents the results of calculations by different methods of daily accumulation of oil-containing waters formed in the engine rooms of ships and the comparative analysis of the results of calculations.
The information presented in the article can be used in the preparation of subsequent editions to the Rules of the Russian River Register.

Zuev V.A., Kalinina N.V., Moskvicheva Y.A., Sebin A.S.

Model tests of icebreaking platform on air cushion in broken ice

Keywords: icebreaking platform on air cushion, broken ice, resistance, model of icebreaking platform, modeling of ice conditions, experimental studies.

Annotation. Preliminary experimental studies of the resistance of water and broken ice during the movement of a model of icebreaking platform on air cushion in the experimental basin of the Nizhny Novgorod State University are presented in the article. A model of broken ice, modeling conditions for the interaction of a ship with broken ice and a method for converting test results of model to a full-scale ship are described. Curves of resistance to movement of a model and full-scale ship in water, in broken ice with a thickness of 0,65 m for icebreaking platform, designed to work in the Obsko-Tazovskoy Bay were received. The data of the model experiment are of interest for the development of a model ice of composite structure.

Zyablov O.K., Kochnev Y.A., Kochneva I.B.

Automated generation of the ship fault detection report by using the graphical-mathematical model of the hull

Keywords: *ship repair, ship fault detection, total strength calculation, AutoCAD, Microsoft Office*

Annotation. The article considers a model allowing automated information transfer from graphics and tabular processors to the final text document and calculation procedures execution based on the integration of Microsoft Office tools and developed by the authors additional modules (add-ons) Autodesk AutoCAD. The structures of add-ons made in Visual Basic for Application and Visual Lisp languages, automating the process of repair documentation development in the field of fault detection and calculation of the overall strength of the hull, are proposed. The flowcharts developed by the authors allow to demonstrate clearly at what stages full automation is possible, and where it is necessary to apply the knowledge and experience of the design engineer-technologist. The developed model can significantly reduce the labor input cost in the preparation of the ship hull fault detection documentation.

Stepanova A.A., Mikheeva T.A.

The rationale of insulation-sewing materials selection with reference to the grade «r» floating restaurant spaces

Key words: *insulation-sewing materials, safety, fire safety, sound insulation, heat insulation, floating restaurant, comfort, domestic companies, foreign companies.*

Annotation. *This article deals with the problem of choosing and applying insulation-sewing materials for the grade «R» floating restaurant spaces. Due to the fact that the restaurant will be operated on the river Thames, London, not only Russian safety rules [1] and insulation-sewing materials, but also European ones [2] were considered. On the basis of the considered materials the most suitable for this ship were selected. In modern shipbuilding extremely high requirements are put to ships' safety and comfort. In many ways, these requirements parameters depend on the insulation materials used on board a ship. For example, the fire safety of a ship depends on insulation materials quality and structures. In addition, heat insulation materials used in shipbuilding should maintain their efficiency in different climatic conditions [3].*

Cheban Y.Y., Martemianova O.V., Gachev S.V., Mukhina A.A.
A study of the «RIB» boat's hull form effect on the hydrodynamic characteristics by numerical methods

Key words: *computer fluid dynamics (CFD), RIB, planing, high-speed boat, porpoising stability, towing test, NUMECA FINE /Marine™*

Abstract. *Boats of the «RIB» type due to many advantages are a quite popular type of small vessels among consumers. The design of such boats requires taking into account a set of complex hydrodynamic processes arising from the hull flow features having a complex shape. However, existing methods of planing vessels design do not allow to fully take into account the simultaneous effect of the longitudinal, transverse steps and cylindrical floats on their hydrodynamic characteristics. In the presented study the hydrodynamic characteristics estimation for the RIB boat by means of CFD methods of the software complex NUMECA/ FineMarine™ was completed. Based on the results of the analysis of the velocity and pressure fields obtained in the course of numerical modeling, both on the surface of the boat hull and in the fluid flow, changes in the boat design were proposed to reduce its resistance and reduce porpoising stability.*

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

Mosintsev A.V.
Tax payments optimization as a way of reducing company expenses

Keywords: *expenses, optimization, tax payments, assessment, cadastral value, project office, property owner, litigation*

Annotation. *This work is devoted to solving the problem of reducing the expenses of a company, being a property and land owner, by optimizing tax payments. The paper's purpose is to determine the enterprise operation directions with the analysis of existing tax payments. For the present land tax and property tax (for a number of objects) payments are determined by their cadastral value, which, in some cases, exceeds the real market value up to 10 times. The authors propose to work out the issue of exclusion from the tax base the objects included in it on such a formal basis as the name. It is necessary to create a permanent project office in the company to optimize the tax burden. The implementation of these proposals in the Gorky railway company made it possible to optimize more than 111 million rubles.*

Section IV
Economics, logistics and transport management

Baigaliyeva A.N.
Offers to expand the list of actions aimed to ease the trade procedures in the Republic of Kazakhstan in order to implement the chinese economic integration initiative «one belt one road»

Keywords: *trade, initiative «One Belt and One Road», customs, WCO, Authorized economical operator (AEO).*

Annotation. *The need to increase Kazakhstan's trade turnover and promote national interests has been repeatedly noted by the President of Kazakhstan in the orders to the Government as urgent measures to achieve the goals of joining the thirty most developed countries of the world, as well as the implementation of the plans for participation in the PRC «One belt – One road» «Economic belt of the Silk Road».* [1] *In the implementation of these measures, state bodies turn their attention to international non-profit organizations, the main activity and priority of which are cooperation strengthening and sustainable development in all countries of the world. Such organizations are the specialized agencies of the United Nations – the Economic Commission for Europe (UNECE) and the World Customs Organization (WCO).* [2] *In the circumstances of this situation, the question arises: can the actions of the Government of Kazakhstan on the Chinese initiative of economic integration «One belt – one road» be developed on the basis of the recommendations of the specialized agencies of the United Nations. The urgency of the work is that, in accordance with the draft of the Economic Belt of the Silk Road adopted in 2010, the creation of three trans-Eurasian economic corridors is being considered, one of which runs through Kazakhstan (China-Central Asia-Russia-Europe). In pursuance of this project objectives the governments of the two countries – China and Kazakhstan – are actively working to find new mechanisms for economic development and deepening market integration. The study hypothesis is that initiatives to manage trade procedures in Kazakhstan can be developed based on the*

UNECE recommendations and WCO. The aim of the study is to determine the specific actions needed to improve the trade turnover in Kazakhstan.

Zhmachinsky V.I., Ilyushchenko I.G., Xiangyu W.

Transport and logistics centers (TLC) network organizational and economic designing in the Russian Federation Arctic zone

Keywords: *organizational and economic design, the Arctic zone Russian Federation, Northern Sea Route (NSR), object placement, Public-Private Partnership (PPP).*

Annotation.*The article based on the organizational and economic prerequisites study for the accelerated the Russian Federation Arctic zone development (natural resources availability, social backwardness, «regionalization» of management, etc.) the main offers concerning the transport and logistics centers network organizational and economic design. the Russian Federation Arctic zone area socio-economic and territorial characteristics, the basic TLC network strategic development directions are given as well as placing them on the compensation for additional transport costs basis due to savings resulting from the production concentration o. Taking into account the territorial and sectoral macroregion,specificity a scheme for the TLC network phased formation in the macroregion is proposed.*
As the calculations result the map shows the TLC boundaries geographical location in the Chukchi macro-regions.

Zaretskaya E.V., Zhavoronkov N.A., Isaeva A.A.

Prospects for the development of underutilized transport and tourist potential of inland waterways due to new multimodal technological solutions

Keywords: *multimodal passenger transportation, Passenger transportation, including Russia, inland waterways , passenger ships, innovative multimodal transport technology.*

Annotation. *The article examinesthe possible directions for the multimodal passenger transportations development on inland waterways, including the new ship projects use that would improve transport services for the population, reduce the load on the road network, as well as roads and railways during the «Peak» load period, reduce the negative transport impact on the environment, as well as expand the possibilities for organizing tourist trips. It is impossible to satisfy current people demand in transport quality service increasing without multimodal technologies implementation, providing comfortable travel by several transport modes. At the same time limited inland waterways using for passenger's transportation determines the adequate research technological solutions expediency for river routes integration in passenger transport schemes.*

Mordovchenkov N.V., Poljakov V.M., Tikhomirov G.A.

The services economic efficiency development and improvement on the insurance market: domestic and foreign experience

Keywords: *car owner, car insurance, infrastructure, monitoring, profit, damage calculation, OSAGO market, car insurance systems, OSAGO standard, insurance case, economic efficiency.*

Abstract: *The article is devoted to the auto insurance problems and the OSAGO market development. The Russia, Germany, USA and other countries auto insurance market analysis was carried out. The OSAGO market efficiency typology has been determined. The OSAGO insurance essence as an economic category, an innovative organizational and economic mechanism, an insurance services market infrastructure element is defined. The insurance services market problems, including insurance fraud are considered. Measures are being proposed for the OSAGO market development, scenarios for calculating the economic and social effectiveness of these measures are indicated. The OSAGO market transformation model at the meso-level has been developed. The CTP standard introduction is justified, as well as the introduction of organizational and economic mechanisms and tools (trust, leasing, monitoring, controlling, concessions, outsourcing, comprehensive diagnostic analysis and technological audit) to improve the CTP market quality and the formation and operation efficiency.*

Tyulyubaeva D.M., Bakhareva A.D.

Development of the routes for «Carpool» service users based on the population mobility in almaty

Keywords: *«Carpool» service, urban population mobility, routes, road congestion, mobility, public transport, sustainable modes of transport, lack of parking spaces.*

Annotation. *The article describes one of the main transport problems of the city of Almaty - congestion of roads. A solution was proposed to reduce the number of cars through the use of the «Carpool» concept, widely used in Europe. Since this concept is not presented in Almaty, the need for these services has been studied. Based on the analysis of population mobility the most popular traffic routes for users of the Carpool service have been proposed. While writing the article, methods*

such as observation, comparison, and analysis were used. The results of the study can be applied in the development strategies of the Almatycity's transport industry, and can also be used as a way to reduce the number of cars on the roads and unload public transport. Due to the involvement of the population, it is possible to use the «Carpool» system to reduce the level of motorization in the city and to reduce the level of traffic jams. By reducing the number of cars, the emissions of exhaust gases emitted during the combustion of fuel are decreased. The noise pollution of urban space will also be reduced.

Section V
Operation of water transport, navigation and safety of navigation

Antonova E.I., Vasilev I. A.

Cargo shipping process modeling for cargo planning activities on container terminal

Keywords*: transport, container terminal management systems, planning automation, cargo processes on container terminals, efficient transshipment organization.*

Annotation*. The article covers problem of container terminal railway operating planning. The authors define goals and main issues discovered in planning processes taking place on container terminals. Existing container terminal management systems are listed and major blockers which prevent efficient management on planning activities are defined. The article contains definition of method forming a container set to ship on a railway car, the method of placing railway cars on the sidings at container terminal, the method of dislocation of containers unloaded from the railway cars. The algorithms to solve specified tasks are presented in this article. The article describes the architecture of computer system automating planning processes for cargo shipping activities. The possibility of integration with existing software is declared.*

Vinogradov V.N., Ivanovsky N.V.

Synthesis of the vessel control algorithm in the specified water area based on an integrated risk criterion

Key words: *safety of navigation, risk assessment, mathematical model of marine vessel, automatic control, identification of random parameters of a ship.*

Annotation. *The article considers the problem of synthesis of the control algorithm of the vessel with an automated system of navigation on the criterion of the rms value of the risk of the safe passage of a vessel through a narrow Strait. The analysis of the algorithms accuracy was carried out by statistical modeling method for the vessel of «Volga-Balt» type during the passage of the Kerch – Yenikal canal. The calculation of the risk of safe passage of a narrow channel vessel was carried out for calm weather conditions for various random parameters. It should be noted that even at the maximum value of deviations of random parameters (maximum risk), the optimal control system ensures that the characteristics of the vessel's movement are found within the (safe) limits.*

Osokin M.V.

Risk assessment of loss of stability and parametric rolling on example of feeder container ship

Keywords: *Risk assessment, safety of sailing, parametric rolling, ship's stability.*

Annotation. *The article attempts to assess the effect of vessel stability characteristics at a particular load on the possibility of loss of stability and parametric rolling on following and quartering seas. A number of documents are devoted to this topic, in which the issues raised in the article are usually considered from coincidence or proximity of ship's roll periods and encounter wave periods for waves with the most unfavorable wave characteristics. The author proposes a simplified method for estimating the loss of GM and a change in the stability curve depending on the loss of the water plane area. The calculations are made using the documentation available on the vessel. The results can be used when choosing a safe route of the vessel, taking into account the weather forecast.*

Section VI
Operation of ship power equipment

Popov Sergey V., Malyshev Yuriy S.

Realization of the test unit on the basis of the educational laboratory stand

Keywords: *a program for testing electric motors, laboratory stand, the rules of the Russian River Register.*

Annotation. *The problem of using the components which are located in the warehouses for a long time and the problem of carrying out the related trials are considered. The expediency of carrying out the necessary tests on the laboratory stands of education institutions located in a small distance from the enterprises manufacturers has been revealed. The requirements of the test program are given. Two options for creating installations for carrying out technical trials were proposes The first version is made on the basis of electric transducers, while to assess real transients occurring in the motor under test, it is necessary to have either an AC network of known high power or a system for stabilizing the frequency and voltage of the supply network. The second variant is based on the frequency converter and has increased system efficiency and lower power consumption, but a higher cost. The presence of a frequency converter in the circuit can cause the appearance of additional harmonic components. The choice of the scheme for testing depends on the task, the need for measurements with the required accuracy, as well as the constructive capabilities of the laboratory bench.*

Tsvetkov Y.N., Vlasov M.Y., Dekhtyr L.I.

Evaluation of the molecular structure of lubricating oils by means of combined method of infra-red spectroscopy and viscosimetry

Keywords: *lubricating mineral oil, lubricating synthetic oil, molecular structure, molecular branching, hydrocarbon composition of oil, infra-red spectroscopy, dynamic viscosity, methyl group, methylene group.*

Summary. *There were suggested to control the rate of branching of lubricating oils by the ratio of the areas of absorbance peaks at 1380 and 720 cm^{-1} in the infra-red spectra of the oils. The first of the peak mentioned above corresponds to the bending vibrations of the methyl groups CH_3, and the second – to the rocking vibrations of the methylene groups CH_2. The eleven grades of oils were chosen to investigate: nine mineral oils – MS-20, I-50A, I-40A, I-30A, I-20A and so on – and two synthetic polyalphaolefin oils: PAOM-13 and PAOM-4. The ratio of the peaks areas at 1380 and 720 cm^{-1} for the synthetic oils equals to about 1,0, whereas the ratio for the mineral oils ranges in value from 2,0 to 3,5. The much lower value of this ratio for the synthetic oils points to the more homogenous molecular composition of the polyalphaolefin oils. One can draw the final conclusion about the similarity of the hydrocarbon composition of oils by marking the points, corresponding to different oils, on the graph of viscosity against the ratio of the areas of the absorbance peaks. The oils with the similar hydrocarbon composition form the unified dependence of the viscosity on the ratio of the areas of the absorbance peaks.*