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Kashutin A.N., Kashutina I.A.

SOIL MIGRATION OF MARINE SEDIMENTS IN THE LITTORAL OF AVACHA BAY (SOUTH-EASTERN KAMCHATKA) UNDER THE INFLUENCE OF HYDRODYNAMIC WATER CURRENTS AS ONE OF THE FACTORS OF INTERSEASONAL CHANGES IN THE AREA OF BROWN ALGAE *FUCUS DISTICHUS* SUBSP. *EVANESCENS*

Abstract. This article presents the results of the transfer of marine sediments and the features of their circulation, under the influence of hydrodynamic water currents in the littoral zone of Avacha Bay, which are one of the important factors of interseasonal changes in the area of the brown algae *F. distichus* subsp. *evanescens*. The work is based on experimental studies conducted by the authors in 2016-2022 in two areas of the bay – Seroglazka bay and Zavoyko bay. The total length of the off-season study of the dynamics of sedimentation in the middle and lower horizons of the littoral was 11.25 km. In the studied bays, the seashores have a complex kaleidoscope in terms of granulometric composition. The material collected during the field work made it possible to identify the most characteristic features of individual sections of the littoral and to determine their regional and typological features. Unsuitable substrates, with a length of about 4.05 km, for the spread of fucus, were silt and sand with different particle size modules. Multiple redeposition of clastic material in the littoral is clearly visible on the open coast of Seroglazka Bay, where the boundaries of sedimentation are very clearly demarcated: (I) – silt; (II) – accumulation of coarse-grained sand-gravel-pebble sediments; (III) – coastal strip of coarse-grained sand. Significant sand displacements Вестник Керченского государственного морского технологического университета. 2023. № 1 Биологические науки 9 are noted on the coastal strip of Zavoyko Bay, which contributes not only to changes in the coastline, but also to the absence of *F. distichus* brown algae.

Keywords: Avacha Bay, middle and lower littoral horizons, hydrodynamic impact, substrates, soil movement, *Fucus distichus* subsp. *evanescens*.

Kulish A.V., Kibenko V.A., Turkulova V.N.

PROSPECTS FOR CREATING A COASTAL INDUSTRIAL-SCALE FACILITY FOR COMMERCIAL CULTIVATION OF VALUABLE AQUACULTURE TARGET SPECIES (STURGEONS, SALMONIDS) USING SEAWATER IN THE CONTEXT OF THE NORTHWESTERN REGION OF THE REPUBLIC OF CRIMEA

Abstract. This work presents the analysis of the historical and current literature, as well as of the data collected through research and practice, pertaining to the main trends in the development of industrial-scale aquaculture elucidating the world's and domestic experience of fish cultivation; it also addresses ecological, biological and cultivational characteristics of the valuable anadromous fish species-sturgeons, their hybrid forms, and salmonids and the prospects for their use in the commercial mariculture, namely in the fish farms operating on seawater; the physiographic, oceanographic and hydrochemical conditions, as well as ecological and toxicological status of the Kerch Strait providing the water for the coastal facility are also elucidated. The technology and practice of the commercial cultivation of bester beluga and sterlet hybrid and rainbow trout from externally supplied stocking material to a marketable product in a recirculating aquaculture system ensuring controlled aquatic environment is briefly described. Estimated capacity for a coastal fish farm using the Kerch Strait as a water source is identified, along with the recommendations for its construction and arrangement.

Keywords: industrial-scale facility, seawater, commercial aquaculture, bester, rainbow trout, estimated capacity, technological process, feeding, production, profitability.

Vyngra A.N.

DETERMINATION OF PROBLEMS OF SUSTAINABLE DEVELOPMENT OF COASTAL TERRITORIES OF THE REPUBLIC OF CRIMEA

Abstract. Coastal areas are characterized as extremely sensitive to anthropogenic impacts of the territory. The Republic of Crimea is washed by two seas and has a long coastline, so it is important to develop an integrated approach to managing coastal areas. This article discusses the main principles of sustainable development of coastal regions, which are disclosed in the European Code of Conduct for Coastal Zones and the Model Law on sustainable coastal zone management. This article identifies the problems of using the coastal territories of the Republic of Crimea in various areas of activity and considers ways to solve them. The work of ports, recreational, fishery and other activities increase anthropogenic pressure on the water protection zone. The proposed activities will help reduce the negative impact and preserve coastal areas for further long-term use. **Keywords:** Coastal territories, Republic of Crimea, legislation, integrated management, sustainable development, water protection zone.

Sytnik N.A.

NATURAL AND CLIMATIC CHARACTERISTICS OF THE LOCATION OF THE KERCH STRAIT CROSSING

Abstract. The article considers the natural and climatic conditions of the Kerch Strait, the Taman Peninsula and the Kerch Peninsula through which passes the transport crossing that connects the Republic of Crimea with the Russian mainland. The paper presents data on average annual temperatures, intensity of precipitation, directions, frequency and speed of winds in the areas under consideration – as factors of dispersion of pollutants entering the atmospheric air from vehicles, due to the operation of the Crimean bridge. The article contains hydrological and hydrochemical characteristics of the Kerch Strait, and also data on engineering-geological, hydrogeological conditions of the area, and also relief, soils, flora and fauna in the area of location of the transport passage. As a result of these studies, it was determined that the area where the crossing is located is subject to dangerous meteorological phenomena, such as storm winds, ice piles on the bridge supports, fog and heavy precipitation, thunderstorms and tornados, which can hinder the operation of the bridge crossing. The data presented in the work can be the basis for the assessment of the current state of the environment within the environmental project support and the subsequent ice and hydrometeorological monitoring in the area of the Crimean bridge.

Keywords: transport crossing, Kerch Strait, Taman Peninsula, Kerch Peninsula, natural and climatic conditions, dangerous meteorological phenomena.

Ivanovskaya A.V.

PRINCIPLES OF MODELING THE DRIVE OF SHIP LIFTING EQUIPMENT

Abstract. The paper considers another principle of modeling the drive of a ship's lifting device. A feature of the operation of such a drive is the movement in different media: air, water and at their interface. Also, the dynamic processes occurring in the system are significantly affected by external hydrometeorological factors and unsteady loading. All this leads to difficulties in predicting the behavior of the elements of the system. Therefore, it is proposed to consider the drive as a multi-body system consisting of interconnected solid and deformable bodies experiencing various translational and rotational displacements. The configuration of such a system is determined by a set of variables called generalized coordinates that completely determine the location and orientation of each body in the system. The configuration of a particle in space is determined using three coordinates that describe the movement of this particle relative to the three axes of the inertial frame of reference. This method will increase the number

of degrees of freedom when formalizing the drive elements, which is relevant in the development of an automated control system for the drive of ship lifting devices.

Keywords: lifting device drive, multibody system, generalized coordinates.

Konyukov V.L.

ESTIMATION OF THE RANGE OF PERMISSIBLE LOADS OF A MARINE FOUR-STROKE DIESEL ENGINE BASED ON THERMAL CALCULATIONS

Abstract. Based on the computational and theoretical studies of the ship's four-stroke diesel engine, a series of restrictive characteristics were obtained that exclude its mechanical and thermal overload. The studies were carried out in a wide range of loads for a series of screw characteristics with different weighting coefficients. The obtained restrictive characteristics were examined for compliance with the assigned restrictive characteristics included in the diesel operating instructions. The most consistent were the restrictive characteristics constructed according to the permissible maximum combustion temperature of the fuel and the permissible temperature at the end of the expansion of the working fluid in the cylinder. Based on these characteristics, as a result of the expansion in rotation frequency, a zone of operating modes limited in load and operating time is formed. Based on the results of comparing the obtained and assigned restrictive characteristics, it is assumed that the restrictive characteristics given in the diesel operating instructions are obtained based on the thermal state of the exhaust valve, which corresponds to the gas temperatures at the end of the expansion process in the cylinder.

Keywords: diesel, load, screw characteristic, restrictive characteristic, thermal stress, mechanical stress.

Turneev V.R., Bogatyreva E.V.

WATER HAMMER AND CAVITATION AS COMPONENTS OF COMPLEX BALLAST WATER TREATMENT

Abstract. In the field of modernity, all the maritime powers of the World community for the control of ballast water operations over the past three decades have been constantly improving the legislative framework for the protection of their marine economic zone from invasive living creatures in the ballast waters of ships. The quality of ballast water must fully meet the stringent requirements of Regulation D-2 of the Ballast Water Management Convention. Shipowners are faced with the task of re-equipping sea vessels in order to install the latest innovative ballast water management systems that would meet IMO requirements, which is an expensive procedure. The article presents a comparative characteristic of the mechanical methods of ballast water preparation during complex disinfection. The article describes such phenomena as water hammer and cavitation. As a result, the assessment of the possibility of their use in the complex disinfection of ballast water in ship conditions is given, the tasks of further research are outlined.

Keywords: water hammer, cavitation, ballast water, biological invasions, disinfection of ballast water.

Titov I.L., Osipova M. A., Frolova S. N.

THE CONTROLLING OF GAS DIESEL GENERATING SETS USING FUZZY CONTROLLER

Abstract. The paper considers the controlling of gas diesel generating sets using fuzzy controller named proportional-integral-differential controller (PID controller) and its clear definition is given. The profound investigations of supplemental devices application necessity which regulate the PID controller operation are performed. The paper presents the analysis of gas diesel generator operation means with the use of a fuzzy controller making an actuating signal composed of the sum of three summands. It is defined that due to abrupt changes of the object

operation mode over which the controlling is carried out or while transmitting of the given object to the alternative mode of operation the quality of transmitting process in the system with the PID controller can be unsatisfied. Therefore, the need for using supplemental devices to correct the operation of the PID controller arises. It is proved that the technology of fuzzy logic can be used in the gas diesel generator (GDG) rotation frequency control system.

Keywords: PID controller, gas diesel generating set, automatic control systems, Matlab, fuzzification unit, fuzzy logic controller.

Ovsiannikov V.Yu., Antipov S.T., Panfilov V.A.

DESIGNING THE APPLIANCES OF THE FUTURE OF FOOD TECHNOLOGY: A CONCEPTUAL BASIS

Abstract. In this article, on the basis of a set of requirements for modern devices, technological processes that directly ensure the transformation of the technological environment into a finished food product are analyzed. The existing technological and design problems characteristic of installations that carry out complex energy effects on food semi-finished products, as well as measures to eliminate them, are indicated. The proposed principle of idealization of the technological process of processing technological raw materials and apparatus makes it possible to create prerequisites for a directed impact on the technological, technical and constructive characteristics of technological equipment in order to improve it. It is shown that the development of food production apparatus designs is inextricably linked with the mutual adaptation of the technological properties of the media processed in them and the technical features of installations designed to conduct heat and mass transfer processes.

Keywords: food technology, ideal apparatus, development of structures, mass transfer, heat and mass transfer processes.

Prokopenko I.A., Yashonkov A.A.

TECHNOLOGY IMPROVEMENT RESTRUCTURED HAM PRODUCTS FROM POULTRY MEAT

Abstract. The paper analyses and presents the results of experimental studies to determine the feasibility of an innovative technology for the production of restructured poultry meat products. High hydrostatic pressure treatment of food products is used in many foreign countries. In Russia scientists conduct experimental research on automated high-pressure units (AHPU). Literature sources were analysed, on the basis of which it was decided to study static and cyclic high pressure treatment modes in order to obtain finished products. The technological process was carried out at 700 MPa during 45 minutes, the control sample was a boiled ham. In this work we studied the change in organoleptic indicators, paying special attention to the consistency, the type of minced meat on the cut, taste and aroma of meat products. At the second stage of research determined the change in structural and mechanical properties of the new products. The most rational mode of high pressure processing for the manufacture of restructured meat products was proposed. **Keywords:** high hydrostatic pressure, ham, poultry meat.

Fomenko E.V., Zaporozhec E.Yu., Rudenko M.F., Aleksanian I.Yu., Andreeva E.V.,
Nugmanov A.H.-H.

THERMOPHYSICAL AND STRUCTURAL PARAMETERS OF THE ECTOCARPU

Abstract. The most widely used biopolymers in the food industry are polysaccharides, such as sodium alginate. In the Caspian basin, among the species of brown algae rich in alginates, one can classify the family of Ectocarpus. Sodium alginate typically uses pre-dried algal raw materials, but of all food production processes, dehydration is the most energy-intensive procedure. The final result of the operation of drying algal raw materials is the production of

material with the best biological value, as well as the best parameters for its preservation. Determination of rational regime indicators of moisture removal from algae is based on the description of the transfer of thermal energy and mass, the forms of moisture-dry residue bonding, on the physicochemical and other parameters of materials at individual stages of the recommended technology. In this regard, the purpose of the study for the correct conduct of thermal calculations was the determination of the thermophysical and structural-mechanical characteristics of the ectocarpus. To carry out calculation procedures in the design of thermal processes and equipment for dehydration, the thermophysical parameters and physical density of algal raw materials are theoretically and experimentally determined within certain limits of varying the humidity of the dehumidification object, its temperature and coolant parameters, which determine the choice of rational mode parameters for drying the indicated algae.

Keywords: Brown algae, ectocarpus, alginates, thermophysical characteristics, density, drying, heat transfer coefficient.

A. I. Klyuchnikov, B. N. Fedorenko, S. T. Antipov, V. A. Panfilov

FUNDAMENTAL CREATION CONCEPTS FOR FOOD TECHNOLOGIES BIOREACTORS CONSTRUCTIONS OF THE FUTURE

Abstract. The article is devoted to some aspects concerning the creation of equipment for the biotechnology of the future within the context of the agro-industrial complex of Russia. The focus is on the idealization of the constructed object that shows the necessary trends in the development of real technique. The range of issues discussed includes: model of an ideal bioreactor; specifics of biosynthesis processes; specifics of biocatalysis processes; requirements for an ideal bioreactor; problems hindering the implementation of a bioreactor which is close to the ideal one; issues of mutual adaptation of technological properties of food media and bioreactors designs. Particular attention is paid to the dialectical complication of bioreactor designs.

Keywords: ideal bioreactor, biosynthesis processes, requirements for the design of bioreactors, adaptation processes in biotechnology.

Ganieva A.K.

UPDATING PROGRAMS FOR DIAGNOSTICS AND PREVENTION OF PROFESSIONAL BURNOUT OF PERSONNEL

Abstract. The article summarizes the concept of professional burnout, reveals its essence and stages, highlights symptoms, including emotional, physical, intellectual, behavioral, social. The factors causing the occurrence of professional burnout syndrome at work, which are classified as external and internal, have been identified. Methods of diagnostics and prevention of professional burnout of employees are presented, they include empirical, diagnostic, expert evaluation, quantitative and qualitative data processing. The directions of the development of a program for the diagnosis and prevention of professional burnout of employees are proposed, which provides for a system of principles of its structure and implementation; actual goals and program tasks; information of theoretical and applied content; possible effects and dynamics of approaching them; criteria for the effectiveness of expected results. It is proved that one of the key methods of prevention of professional burnout is the creation of a system of personal and managerial efficiency, which are characterized by a positive attitude to oneself, optimal professional development, self-actualization of the individual.

Keywords: professional burnout, stress, symptoms, diagnostic methods, burnout prevention program, staff.

Evsyukova T.G.

APPROACHES TO UNDERSTANDING THE NETWORK INTERACTION OF ECONOMIC AGENTS

Abstract. The article considers network interaction as a fundamentally new form of interaction between economic agents, based on the transformation of the economy and the transition to a new technological order. The degree of study of the issue of a new integration form - "network interaction", and various approaches to the interpretation of this term are determined. A monographic analysis of various approaches to understanding network interaction is presented, the main directions of the development of the term are highlighted. The institutional aspects that cause the emergence of a new form of interconnection between economic actors are studied. As a result, the basic principles of network interaction are defined and presented. The role of the digital transformation of the economy and the transition to a new technological order in economic relations are determined. The main provisions of the difference between the digital form of interaction and the traditional one within the framework of the network approach are presented. A scheme for calculating the coefficient of modernization for determining potential participants in network interaction is proposed.

Keywords: network interaction, institutions, economic agents, actors, organizational system.

Kvasko M.A.

STATE AND ASSESSMENT OF FUTURE DEVELOPMENT OF URBAN AGGLOMERATIONS IN THE RUSSIAN FEDERATION

Abstract. The paper considers features of the spatial development of urban agglomerations. The purpose of the study is to analyze the current development of urban agglomerations in the Russian Federation, as well as the subsequent assessment of their impact on regional socio-economic complexes. The paper identifies the factors that have a stimulating and constraining effect on the development of urban agglomerations. A retrospective analysis of the formation of urban agglomerations in the Russian Federation and its subjects was conducted. The estimation of the most significant urban agglomerations from the position of economic and social development of the Russian Federation. It was found that the development of urban agglomerations as a form of spatial organization directly depends on the approved and/or require the development of spatial planning schemes. It is the approved spatial planning schemes for remote territories at the level of normative-legislative acts of the Russian Federation and its subjects will allow to form a coherent and effective system of regional development.

Keywords: urban agglomeration, development, factor, effect, remote areas.

Kotenev A.D., Zhikrivetskaya Yu.V., Kryjevskaya N.N.

THE STANDARD OF LIVING OF THE POPULATION AS A FACTOR IN ENSURING THE ECONOMIC SECURITY OF THE STATE

Abstract. The issues of falling living standards of the population in modern conditions are among the most urgent, caused both by general economic problems and by the peculiarities of the development of individual regions. The complexity and heterogeneity of the causes require the development of heterogeneous solutions that have a complex scientifically substantiated character. The authors noted the relationship between the living standards of the population and economic security, which have similar socio-economic imperatives. The duality of the reasons, due to both economic and psychological components, does not allow the use of measures of state influence, due to their universality and isolation from regional characteristics. The authors focus on the need to rethink the stated issues from the standpoint of motivational principles, as well as

taking into account the cost of labor, taking into account modern realities. The results of the study revealed a number of key points that allow an adequate assessment of the relationship between the standard of living of the population and its impact on the economic security of the state as a whole. **Keywords:** standard of living, poverty, economic security, poverty, labor productivity, government support.

Mnatsakanyan A.G., Kharin A.G.

A STUDY OF THE PRICE AVAILABILITY OF FISH PRODUCTS IN THE KALININGRAD REGION

Abstract. Food prices have a strong impact on food availability and therefore are a critical element of food security. The purpose of the paper is to study the patterns and features of price changes for one of the basic groups of food products – fish products. These goods should objectively occupy a significant place in the diet of residents of the coastal region of Russia - the Kaliningrad region. To do this, a short-term component is distinguished in the dynamics of retail prices for fish products. Following the provisions of the classical concept of food security, we consider this component as a destabilizing factor. The results of our study allow us to evaluate one of the components of food security - the economic availability of fish products for the inhabitants of the region, serve to explain the reasons that affect this parameter, and can become the basis for the development of appropriate compensatory measures.

Keywords: fish products, prices, volatility, availability, food security.

Ostrik V.Yu., Sukhomlin I.A.

STRATEGIC MODELING OF MODERN HR MANAGEMENT SYSTEMS IN ORGANIZATIONS

Abstract. An overview of the main models of personnel management at the present stage, identifies the main requirements for modern personnel management systems, taking into account digital transformations of socio-economic processes are presented in the article. The main stages of building an effective model of strategic management of the organization's personnel, as well as the necessary professional digital competencies that form the effective use of human resources in the organization are highlighted. The results of a study on the introduction and use of digital tools in management, taking into account the impact of the use of human resources on organizational results are given. Specific recommendations for the implementation of directions for modeling personnel management systems for enterprises are given. The development prospects and threats in domestic personnel and management systems, taking into account the needs of the external environment and modern personnel technologies are summarized.

Keywords: human resources, modeling, system, personnel, organization, strategy.

Plotnikova V.V., Garmashova E.P.

STATISTICAL ANALYSIS OF CONSUMER SPENDING IN SEVASTOPOL

Abstract. This article is devoted to the statistical analysis of consumer spending in Sevastopol. The level of spending of the population largely determines the quality of life and affects the structure of demand. In this regard, it is important to analyze and evaluate the composition and structure of household consumer spending by groups of food and non-food goods and services in modern conditions, as well as to identify key factors affecting the level and structure of expenditures of the population of the Sevastopol region. The authors gave a clear-cut presentation of the average per capita monetary expenditures of the population in comparison with income, the composition and structure of household final consumption expenditures, the composition and dynamics of consumer spending in the context of urban and rural population of Sevastopol. Based on the results of the analysis, the main factors influencing the level of

household spending were formulated.

Keywords: composition and structure of expenditures, households, average per capita income, average per capita expenditures, consumer price index, rural population, urban population.

Rysina V.A.

APPLICATION OF DIGITAL TECHNOLOGIES IN ACCOUNTING

Abstract. The article considers the main directions of application of digital technologies in the field of accounting for the purpose of its effective management. The characteristics of cloud services and online accounting services developed in the Russian Federation are given. The advantages and disadvantages of blockchain technology for accounting and financial reporting are revealed. The main capabilities of two types of robotic solutions, such as RPA (Robotic Process Automation) and IA (Intelligent Automation), used to automate routine accounting operations, are studied. The “digital twin” technology is considered, which allows creating virtual models of a physical object or process to automate the process of compiling primary documents, maintaining operational records and conducting asset inventories. The scheme of information support of accounting with the use of digital technologies is constructed, with the help of which a single information space is formed that meets the needs of various users.

Keywords: digital technologies, digitalization, blockchain, robotics, chatbot, artificial intelligence.

Skorobogatova V.V., Mukovina T.V.

ART MARKETING AS ONE OF THE DIRECTIONS OF SALES PROMOTION OF ART BUSINESS PRODUCTS

Abstract. This article discusses the concept of art marketing as one of the main directions of stimulating the sale of products of domestic and global art business. The analysis of the formation and development of the art business and the art market in Russia and in the world is carried out. The basic structure of the art market is described, which includes: a seller of works of art, their buyer and an intermediary acting as a third party in the process of buying and selling. The main goals and objectives of art marketing are revealed. The features of the general concept of art marketing are described and the main marketing model in the field of art business is analyzed, which is an augmented 4P model of the general theory of marketing and consists of seven elements: product (product), price (price), place (place), promotion (promotion), people (people), physical evidence (physical presence), process (process). It also provides examples of the successful use of the art marketing system in the field of art business in Russia and examples of the use of art and culture as the main sales promotion tools for various world-class companies.

Keywords: marketing, art business, art market, art marketing, art, culture, strategy, advertising.

Yarkina N.N.

CLASSIFICATION OF FACTORS OF INCREASING THE EFFICIENCY OF THE USE OF RESOURCES OF ENTERPRISES OF THE FISHERIES COMPLEX

Abstract. The subject of the study was the factors of increasing the efficiency of the use of resources of enterprises of the fisheries complex. The purpose of the work was to concretize and classify them taking into account the specifics enterprises of fishing, aquaculture and processing of fish and other aquatic biological resources. The research is based on logical methods of connection research, such as inductive methods of establishing a causal relationship, methods of generalization and classification. The connection of the production resources of the enterprises of the fisheries complex with aquatic biological resources, which form the basis of fish and other products from aquatic biological resources, is emphasized. The limitations and exhaustibility of aquatic biological resources are indicated, which actualizes the study of factors for increasing the

efficiency of the use of all resources involved in the production activities of the enterprise, taking into account interaction and interdependence. Among the main classification features, such as the type of resource component, the essential basis, the qualitative nature of increasing the efficiency of the use of resources of fisheries enterprises and their direct ability to influence it were considered.

Keywords: resources, factors, efficiency of use, classification, enterprises of the fisheries complex.

ISSUE 2, 2023

Saenko E.M., Zhukova S.V., Kosenko Yu.V., Trushkov A.V., Baskakova T.E., Karmanov V.G.,
Burlachko D.S., Lutynskaya L.A., Podmareva T.I.

ASSESSMENT OF THE CRAYFISH POPULATION HABITAT IN THE SAL RIVER BASIN UNDER MODERN HYDROLOGICAL CONDITIONS

Abstract. We present a review of research literature and the results of our studies bearing on the current state of the living conditions of crayfish in the basin of the Sal river within the boundaries of the Rostov region. In the summer and autumn of 2022, the hydrological regime developed according to the scenario of the years with reduced water content. Some sections of the riverbeds were characterized by shallowing and decreased flow velocities that are manifestation of incipient drying-up processes. Hydrochemical parameters in the basin of the Sal river (oxygen regime, pH value, level of nutrients, concentrations of the main salt-forming ions and total mineralization of water) indicated the suitability of the aquatic environment for the vital activity of the crayfish. In the water bodies of the Sal river basin, the crayfish were found at most sample stations, except the areas 0.35-0.50 m/s (at a depth of 0.0-0.8 m). The distribution of crayfish in the areas with a surface flow velocity of 0.05-0.21 m/s and near-bottom flow velocity within 0.02-0.12 m/s varied within 900-5067 specimens/ha. Crayfish were represented by almost all size groups. By their size and production characteristics the populations of crayfish were estimated as medium-productive (10-20 kg/ha) and highly productive (over 20 kg/ha) ones.

Keywords: the basin of the Sal river, crayfish, flow velocity, degree of overgrowth, oxygen regime, total mineralization of water, biogenic substances.

Gamayunov O.A.

THE STRATEGY OF INCREASING THE SPECIALLY PROTECTED NATURAL TERRITORIES OF THE KERCH PENINSULA AS A FACTOR IN THE DEVELOPMENT OF ECOLOGICAL TOURISM

Abstract. This article presents a strategy for increasing specially protected natural areas (protected areas) The Kerch Peninsula, the analysis of the development of the protected areas of the Crimea and the statistics of the increase in the reserve fund in the Russian Federation over the past 9 years, the main scientific developments in this area were analyzed. Now the network of protected areas on the Kerch Peninsula is mainly represented along the coastline of the Azov and Black Seas. As a result of the conducted research, the main promising territories of the Kerch Peninsula have been identified, which can become part of existing protected areas or newly created ones by increasing the existing area of the reserve fund by 2 times. The strategy is aimed at increasing the area of protected areas, mainly steppe landscapes, the preservation of which, in an intact state, will make it possible to expand the range and increase the populations of red book species of flora and fauna. In general, the increase in the territories of the reserve fund will give a positive dynamic in preserving the biodiversity of the region, will improve the quantitative and qualitative indicators of ecological tourism and will contribute to an increase in the overall tourist flow to the Kerch Peninsula.

Keywords: Republic of Crimea, specially protected natural areas, ecological tourism, biodiversity conservation.

Grinev V.F., Demidova M.E., Turyanova A.G.

PHYSICAL ASPECTS OF GLOBAL WARMING

Abstract. Thermodynamic processes are considered, happening on earth in the context of global warming. The main role of thermal energy released by the surface of the tropical belt of the planet is shown. The existing potential projects to combat global warming are analysed. A hypothesis is

given about the complex thermal effect of motorway traks, walls and roofs of urban buildings on the thermodynamics of the tropical belt of the planet. A new potential project to combat global warming by changing the thermophysical properties of megacities of the tropical belt is proposed. The project also provides for the reduction of carbon dioxide emissions by streamlining automobile traffic within urban neighborhoods. The model of the organization of urban neighborhoods is considered, where there is no intra-district automobile traffic, which eliminates significant amount of carbon dioxide emissions. Automobile traffic within the territory of the microdistrict is carried out on a ring road. It is proposed to install engineering equipment on the sides of this road for the disposal of waste produced by population of the microdistrict. The important role of satellite monitoring of greenhouse gas emissions is emphasized.

Keywords: thermodynamic, equator, tropical belt, ocean, carbon dioxide, car, megapolis, microdistrict, the satellite monitoring.

Klimenko N.P., Chernuha V.S.

RATIONING AND RELIABILITY INDICATORS CALCULATION OF SHIP'S TECHNICAL MEANS

Abstract. For a case of approximation of distribution of probabilities of a maximum load Veybull's law with known parameter of a form and of coefficient of a variation, one may use sequences of calculation of the lower confidence bounds of an indicator of reliability of strength characteristics of designs of ship technical means with a help of fiducial probabilities method. The developed method is applied to an assessment of the lower confidence bounds of an indicator of reliability of vessels of a high pressure on the basis of results of their tests for bearing ability by internal pressure. The method of confidence sets is used for calculation of the lower confidence bounds of an indicator of reliability of strength characteristics of designs of agricultural cars at approximation of distribution of their maximum load by Veybull's law. A numerical algorithm has been developed to obtain the lower confidence bounds of a -the reliability indicator. The issues of normalization of reliability indicators for sudden destruction are considered. On the basis of the probabilistic model "load-strength", the upper limits for the safety margin factor are determined, providing a given probability of non-destruction.

Keywords: reliability indicators, confidence limits, strength characteristics, normalization of indicators, probability of non-destruction.

Konyukov V.L.

ANALYSIS OF OPERATIONAL PARAMETERS OF A MARINE FOUR-STROKE DIESEL ENGINE WHEN CHANGING THE SCREW CHARACTERISTICS

Abstract. In this work, studies have been carried out on the influence of the weighting of the screw characteristics of the vessel on the main operational parameters of the ship's four-stroke diesel engine. The studies were carried out by the computational and theoretical method for wide ranges of changes in the weighting coefficient and relative diesel power. The dependences of pressures and temperatures at characteristic points of the cycle on the weighting coefficient are obtained. The transition to a weighted characteristic leads to a decrease in the turbocharger power, a decrease in air consumption and a decrease in boost pressure, as a result of which the excess air coefficient for gorenje fuel decreases and the specific effective fuel consumption increases. An increase in gas temperatures at the characteristic points of the cycle leads to an increase in the thermal stress of the diesel engine, on the basis of which temperatures are identified that can be used as determining when assigning restrictive characteristics for thermal tension. The choice of such temperatures is made in accordance with the nature of their change from the speed of the diesel engine.

Keywords: diesel, operational parameters, load, screw characteristic, weighting coefficient, limiting characteristic, thermal stress, mechanical stress.

Dekan A.A., Sokolov S.A., Yashonkov A.A.

EXPERIMENTAL STUDY OF COMPRESSION CHARACTERISTICS OF LIQUID EGG MELANGE

Abstract. Intensive development of food processing technology using physical processing methods is caused not only by their ability to destroy microorganisms, but also by the prospects for improving the quality of finished products and intensification of processing. The introduction in industrial production of the most promising modern physical methods of food processing, in particular, their complex processing by high pressure and ultrasound requires a comprehensive study of them. The paper analyzes and presents the results of experimental studies of the effect of complex processing by high pressure and ultrasound on the compression characteristics of liquid chicken melange and such components as protein and yolk. Data on changes in values of relative volume, density, compressibility coefficient, modulus of volume elasticity of liquid chicken melange of protein and yolk are obtained.

Keywords: Egg melange, high pressure, ultrasound, compression characteristics, complex processing.

Klimov V.A., Nikiforov-Nikishin D.L., Kochetkov N.I., Smorodinskaya S.V.

FORMATION OF THE QUALITY OF FISH PRODUCTS PRODUCED FROM RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) THROUGH THE APPLICATION OF FEED WITH CHELATE COMPOUNDS OF MICROELEMENTS AND CAROTENOIDS

Abstract. In article, the possibility of in vivo formation of the quality of fish products by introducing additional components into the production feed, such as chelate compounds and carotenoids (lycopene), is considered. The technology of adding active components to compound feeds at the stage of granulation without losing the functional properties of additives is presented. Evaluation of the quality of rainbow trout fillets after experimental feeding showed an improvement in both the organoleptic indicators of the product (smell, texture, taste) and an increase in the content of a number of microelements. A significant increase in the relative content of iron and cobalt was recorded ($p < 0.05$). In the experimental group, an increase in the intensity of the color of muscle tissue was noted, which indicates the effective use of lycopene in the feed mixture for fish. According to the results of the analysis to determine the mass content of microelements, the resulting fish products can be classified as functional.

Keywords: Rainbow trout, formation of product quality, fish products, microelements, organoleptic indicators.

Logunova N.A., Yashonkov A.A., Kurash M.A.

FOOD WASTE MANAGEMENT AND NUTRIENT RECYCLING: PROBLEMS AND SOLUTIONS

Abstract. The paper considers the economic and social aspects of food waste management. Information is provided on the feasibility and technological prospects of their processing. The assessment of the global problem of food surpluses and food waste is given, the solution of which will help to cope with the food crisis. The continuous growth of the world's population increases the demand for food, thereby increasing the loss of food throughout the supply chain, which leads to a shortage of natural resources and, as a result, environmental pollution. Recycling and reuse are the basic principles of a closed-loop economy that focus on extracting energy and resources from food waste for a sustainable environment. Food waste is mainly rich in organic substances, such as carbohydrates, proteins and lipids, which can be used as raw materials for the production and/or recovery of biofertilizers, biofuels, biogas, valuable biologically active compounds, natural nutrients and enzymes. When analyzing the problem,

studies by domestic and foreign authors, as well as statistical data from open sources were used. The results of the study cover international and Russian experience and are aimed at finding ways to solve problems related to food waste. **Keywords:** food industry, food waste, food surpluses, waste-free technologies, closed-cycle economy, food losses.

Mazalova N.F., Babich V.V., Bitutskaya O.E.

COLD SMOKED STICKS FROM SHARKS-KATRAN WITH THE APPLICATION OF SMOKING LIQUID

Abstract. Technologies development of new products types from shark meat, as a little-used raw material, remains an urgent area of research. Only shark liver was in demand, from which a number of biologically active additives are produced. However, experts agree that ready-made shark meat balls taste and look like similar products from sturgeon fish. The aim of the work was to expand the assortment of delicatessen cold-smoked fish products. The assessment of physico-chemical and microbiological parameters of raw materials and finished products was carried out according to standard methods. The results of the experiments allowed us to recommend cutting into chopsticks and soaking katran meat combined with salting (12 % salt solution at pH 6.5) to reduce the urea content to 1200 mg% and reduce the time of the soaking-salting process to 3 hours. In order to increase the shelf life of the finished product and give the product new organoleptic properties, an aqueous solution of walnut extract was introduced into the smoking liquid. A package of technical documentation for the production of cold-smoked fish sticks from shark katran has been developed.

Keywords: shark katran, smoked products, smoke preparation, walnut extract, antimicrobial properties.

Oleynikova R.E., Gukasyan A.V., Stepanov D.V.

INVESTIGATION OF THE HYDROPNEUMATIC METHOD OF CUTTING SMALL FISH

Abstract. Topical issues of mechanization of labor-intensive manual cutting of small fish with a length from 90 to 120 mm are considered on the example of the Azov-Black Sea hamsa. The prospects of using a hydropneumatic method for removing the entrails of small fish are shown. The approximation of the shock wave by applying the Burgers method is described, as a result of which a two-dimensional rectangular area is obtained. The application of the principle of superposition of one-dimensional solutions made it possible to obtain an approximate solution of the differential equation of the two-dimensional shock wave flow in a rectangular channel. The solution of the differential equation is designed for a wide range of Reynolds numbers. The factors influencing the process of removing the entrails of small fish are described. Rational parameters of the process of removing the insides of 100% of the processed whole carcasses of the Azov-Black Sea hamsa have been established. The regularities of the process of removing the entrails of small fish by the hydropneumatic method are revealed.

Keywords: fishing industry, cutting, fish, removal of entrails, process.

Podolskaya O.G.

SOFTWARE CALCULATION OF STABILITY OF A LINEAR AUTOMATIC SYSTEM IN THE FOOD INDUSTRY

Abstract. In all branches of modern industrial production, high-quality packaging of products is required. In the food, chemical, medical industry, packaging lines are widely used for hermetic packaging of products, sealing, cutting off the packaged package and moving it for further operations. Packaging lines in the food industry are used for packaging fish products, confectionery, sweets, etc. The main requirement of modern production is the full automation of

packaging equipment. The creation of high-quality automatic systems is impossible without fulfilling the necessary stability condition, which ensures the normal functioning of linear automatic systems. The article deals with the definition of stability of linear automatic systems using the algebraic criterion of Rouse. Examples of calculating the stability of a linear automatic system by the "manual" method, using MS Excel spreadsheets and using the Mathcad program compiled by the author of the article, which allows you to determine the stability of an automatic system by a characteristic equation of any order, are considered. The use of the program for solving the applied problem of the food industry in determining the stability of the flying shear system is considered.

Keywords: food industry, packaging lines, automatic control systems, Rous's algebraic stability test, flying scissors, stability calculation program, MS Excel, Mathcad.

Sokolov S.A., Krasnogradov A.V., Sevatorov N.N.

COMPARISON OF ENERGY CONSUMPTION IN THE PROCESSING OF BOILED SAUSAGES USING DIFFERENT METHODS OF ENERGY TRANSFER

Abstract. The article presents a comparative assessment of energy consumption for traditional food processing (using high temperature) versus using high pressure, determining the ways in which the internal energy of the processed object changes and comparing them for different processing methods: traditional thermal and high pressure processing. The results show that energy consumption is lower when using the high pressure method compared to traditional thermal processing. The concept of internal energy and its relationship to energy transfer is also discussed. The use of high pressure as a method of food preservation is explored, and the thermodynamic principles involved in the process are explained and compared to traditional thermal processing. The advantages and disadvantages of the high pressure method are presented, as well as its potential for improving food quality. The study found that the high pressure method requires 3.4 times less energy than traditional thermal processing. The temperature changes in food products during high pressure processing are also analyzed, and further research is suggested to determine the optimal process parameters.

Keywords: comparative assessment of energy consumption, heat treatment, high pressure treatment.

Ukolov A.I., Malko S.V., Semenova A.D.

INFLUENCE OF HYDROCAVITATION TREATMENT OF BALLAST SEA WATER ON THE STABILITY OF MICROORGANISMS

Abstract. The use of hydrodynamic cavitation for water disinfection has environmental and economic benefits. This paper investigates the microbiocidal effectiveness of hydrodynamic cavitation for the disinfection of sea water. The experiments carried out in this study show that this method is a promising technology for the physicochemical disinfection of marine ballast water. The values of the degree of death and strength of the cell wall were obtained. The hydromechanical effect of cavitation, which includes cavity dynamics and turbulence, is considered, and the physicochemical conditions for damage to microorganisms by the free radical (peroxide) mechanism are described. In general, cavitation advanced technology is environmentally friendly because it does not use external chemicals, does not generate harmful by-products, is energy efficient, economical, and can be scaled up for disinfection on a large scale. **Keywords:** zooplankton, cleaning, disinfection, hydrodynamic cavitation, ballast water.

Falko A.L.

FEATURES OF DESIGN AND CALCULATION OF VIBRO-TRANSPORTING CONVEYORS WITH ELECTROMAGNETIC DRIVE

Abstract. These studies highlight the issues of designing vibration conveyors with an electromagnetic drive. In the process of working on the creation of such machines, designers get acquainted with different methods for calculating the parameters they need, while choosing those that are more suitable for their conditions. The options for production conditions are endless, therefore it is more reasonable to strive for a single calculation method using a universal design sequence. The given generalizing material shows the possibility of creating such an algorithm. When creating the algorithm, various types of electromagnetic vibrators and schemes for their attachment to the base and the moving body of the machine were taken into account. Also taken into account are the frequency characteristics of the applied voltage, the power of the vibrator, the stiffness of the springs, the frequency of oscillation of the working body with and without the load, the speed of movement of the load and the limits of its change due to kinematic parameters, the dimensions of the machine and the possibility of transporting it over long distances, as well as movement within the production premises.

Keywords: vibrator, vibration conveyor, cargo movement, oscillations, working body, electromagnetic drive, oscillation frequency calculation.

Aleksakhina L.V.

ORGANIZATIONAL AND ECONOMIC MECHANISM FOR ENSURING CONFIDENTIALITY OF INFORMATION IN THE MANAGEMENT SYSTEM OF FUNCTIONING AND DEVELOPMENT MARITIME TRANSPORT AND LOGISTICS OF THE REGION

Abstract. The article presents an organizational and economic mechanism for ensuring the confidentiality of information in the management system for the functioning and development of maritime transport and logistics in the region, aimed at improving the level of information security of the transport and logistics complex and increasing its competitiveness. The information flows that flow within the framework of the maritime transport and logistics system, considered as a set of interrelated main, auxiliary and mediating communication processes for the creation of a transport and logistics product, are structured. The system of information interaction of elements of the maritime transport and logistics system of the region, formed for the purpose of information exchange and coordination of actions to ensure safe and efficient transportation of goods and passengers by sea, is presented. The necessity of forming an organizational policy in terms of information protection, involving the introduction of rules and procedures for access to information, compliance with the conditions of its use and strengthening responsibility for confidentiality violations, is demonstrated.

Keywords: maritime transport, logistics, trade secrets, information security, confidentiality, management, development.

Verna V.V., Hoyna M.N.

MODERN APPROACHES TO ADAPTATION OF PERSONNEL OF ORGANIZATIONS: EXPERIENCE OF RUSSIAN COMPANIES

Abstract. The article discusses the concept of staff adaptation, its impact on the effective functioning of the organization. The types of adaptation of employees, the most common in organizations, are presented. The directions of adaptation of personnel are identified depending on the category of employees adapting to the conditions of the enterprise. The conditions that have a direct impact on the quality, timing and effectiveness of the adaptation of specialists in the organization are indicated. Modern approaches to the adaptation of the personnel of organizations that have an impact on both the newest employee and the team, and the entire organization as a whole are considered. The main steps that must be followed for the successful adaptation of employees are shown. The article provides examples of successful implementation of adaptation programs in Russian companies. Based on the results of the study, the most

effective methods of personnel adaptation are presented. The need to introduce a program for the adaptation of employees in the organization has been updated.

Keywords: adaptation of personnel, adaptation program, training and development of employees, working conditions, mentoring.

Voytyuk V.N.

UNIFICATION OF PROCEDURES FOR ANALYSIS AND ESTIMATION OF RISKS FOR THE INVESTMENT STAGE OF CREATE INDUSTRIAL COMPLEXES PROJECTS

Abstract. The article is devoted to identifying the typology and decomposition of the main tasks for the implementation of the project to create an industrial complex that generate risks. The purpose of the work is to develop standard unified procedures for analyzing and estimation the risks of the investment stage of projects to create industrial complexes. Subject of research: organizational and economic relations that give rise to risks of the investment stage of the project to create a production complex. The research methodology is based on the works of domestic and foreign authors devoted to the theoretical substantiation of the economic feasibility of localizing industrial enterprises. Analytical and statistical reports of resident companies of industrial parks, industry associations and executive authorities were used as initial data. The hypothesis of the study is to improve the quality of risk estimation of investment projects based on groupings of typical risks and procedures. As a result of the analysis, typical tasks of the investment period were identified and grouped, and a unified algorithm for analyzing and estimation the risks generated by these tasks was proposed. The conclusions and recommendations of the study can be used by private investors, state executive authorities and local governments in the development and evaluation of investment projects for the creation of industrial complexes.

Keywords: industrial park, investment potential, investment risks, attraction of investments, concentration of productive forces, industrial park resident, state support measures.

Deduh V.I, Garmashova E.P.

TRENDS IN THE DEVELOPMENT OF THE LABOR MARKET OF THE CITY OF SEVASTOPOL

Abstract. This article is devoted to the analyses of Sevastopol labour market during the period from 2018 to 2022. The topic of research is relevant as the national well-being and stability of society depend on the labour market. The purpose of this article is to investigate the main factors of labourmarket on the basis of the analyses of labour resources, dynamics of the employed and unemployed rate, as well as on the study of the real and nominal wages. The evaluation of the labour market and the level of employment in the city of Sevastopol was carried out on the basis of statistical data of the Ministry of Labour and Social Protection of the Russian Federation in the city of Sevastopol and of Federal State Statistics Service of the Republic of Crimea and Sevastopol City.

Keywords: employment, unemployment rate, nominal and real wages, population, labour market, Sevastopol City.

Diviza N.A., Umanets V.A., Logunov N.S.

INTRODUCTION OF DIGITAL TECHNOLOGIES INTO THE SOCIO-ECONOMIC LIFE OF SOCIETY

Abstract. Digital technologies are rapidly penetrating into all spheres of modern society. Studies devoted to the study of the degree of penetration of digital technologies into the socio-economic life of society have revealed the insufficiency of disclosure of issues of digital transformation of

the socio-economic infrastructure of society. The article discusses the directions of the introduction of digital technologies into the main elements of subsystems (economic, political, social and spiritual). The functioning of the economic subsystem is presented as a single complex of interrelated elements of the information system and the process of social production. A mechanism for processing, transmitting and storing information has been developed. The main trends of the digitalization of society are identified, which make it possible to assess the expediency, necessity and expected positive effect of the introduction of digital technologies into the life of a modern individual. The complexes of problems arising as a result of the introduction of digital technologies into the modern life of society are formulated.

Keywords: digital technologies, socio-economic life of society, communication, information technology, transformation, economic subsystem, economic processes.

Ivanov A.V., Kovalenko O.A.

REGIONAL VIEW ON THE VALIDITY OF THE APPLICATION OF THE MAIN PPP MODELS IN THE FISHING INDUSTRY

Abstract. The article analyzes the regulatory framework concerning public-private partnership. Contradictory facts have been revealed in legislative documents regulating legal relations in cooperation between the state and entrepreneurs in the Russian Federation. The objects of the concession and GSP have been grouped. The definition of the definition of "public-private partnership" is formulated. The importance of GSP for the state economy is systematized. The most popular GSP models are highlighted and the fundamental differences between them are indicated. An interim analysis of the results of the implementation of the public-private partnership program has been carried out and, based on it, proposals have been developed for the formation of a system of indicators for a more correct assessment of the effectiveness of individual organizational and legal forms at the regional level, and in particular in the fishing industry. A conditional division of organizations is proposed depending on the type of fishing carried out. The necessity of taking into account the importance of conformity and adaptation of models and methods in order to take into account the specifics of the RCC is justified.

Keywords: public-private partnership, state, region, business, investment projects, economic efficiency.

Kirilchuk S.P., Simchenko N.A.

PECULIARITIES OF TRANSFORMATION OF PROFESSIONAL ORIENTATION OF THE POPULATION IN THE LABOR MARKET

Abstract. The article provides an empirical analysis of the study of the transformation of the professional orientation of the population in the labor market. The article analyzes trends in the variability of the level of professional orientation of the country's population, followed by an assessment of the comparability of the strategic priorities of the socio-economic development of the country's economy with the trends in the development of professional preferences of workers in various sectors of the economy. The authors have identified certain meaningful characteristics and relationships in the study of the professional orientation of the population and the formation of measures to ensure the flexibility of the labor market. The conclusion is drawn regarding the need for strategic monitoring and strategic planning of quotas for training personnel for strategically important sectors of the country's economy. It is emphasized that the digital society strives to achieve a high standard of living and a sustainable rate of economic growth, which is achievable due to the compliance of the areas of professional orientation of the population with the strategic priorities of the country's development.

Keywords: labor economics, labor market, professional orientation of the population, digitalization, transformation.

Yarkina N.N., Yakubova E.S.

DECLARATION AND CERTIFICATION OF FISH PRODUCTS AS A SAFETY TOOLS

Abstract. The subject of the study is such safety tools as declaration and certification of fish products. The purpose of the work is to study and characterize their specifics in the context of ensuring security for consumers and businesses. The research is based on empirical and theoretical methods of scientific cognition, including the study and generalization of various primary sources, problem formulation, analysis, synthesis, specification, etc. The directions of modern research on the safety of fish products are considered. It is emphasized that the issues of declaration and certification of fish products as tools to ensure the economic security of the fishing business in the domestic scientific field were practically not considered. It is noted that the declaration and certification of fish products is based on a system of technical regulations and international and national standards in the field of quality management and food safety. The characteristics of internationally recognized certification systems in the field of food products such as MSC environmental standards certification and BRC certification for food safety are given.

Keywords: safety, fish products, declaration, certification.

Ivanova O.A., Kuzmina A.V., Rodkina A.V.

JUSTIFICATION OF THE ELEMENTS CHOICE OF THE HULL SET WHEN DESIGNING OF THE SHIP'S HULL STRUCTURE

Abstract. The article considers the requirements of the Rules of the Russian Maritime Register of Shipping for the design of sea vessels and offshore drilling platforms metal structures, the requirements for choosing a structural type and a system for a set of main load-bearing floors, determined the design loads, loads on the hull from the transported cargo and ballast, the moment of section modulus of the main beams direction and frame. The authors of the article performed an analysis of various multi-criteria assessments methods. The hierarchy analysis method is proposed to use in the design of ship hull structures and offshore drilling platforms to structure the complex problem of substantiating the choice of hull elements. Based on this method, matrices of pairwise comparisons of criteria were developed, numerical estimates of criteria preferences were given, a comparative analysis of alternatives for main beams and frame beams was performed, as a result of which the optimal types of the hull set elements were determined that best meet the selection criteria and requirements of regulatory documents in the design ship hull structures and offshore technical structures. The prospect of further research is considered.

Keywords: analysis, criteria, ship, hierarchical model, matrix, numerical estimates.

Ilyin B. V.

ON THE APPROACH TO DOMAIN MODELING IN DATABASE DESIGN

Abstract. The article considers the approach to formalization of the information model of the subject area in the design of the database of an automated information system. The process of information modeling, inseparable from human speech-thinking activity, is considered as a sequence of display stages: "subject area" → "mental model" → "language model" → "written model". The basic concepts used to display the components of the corresponding model at each stage are considered. Increasing the semantic expressiveness of the information model is realized through the introduction of multilevel conceptual structures formed using generalization and aggregation methods. The result of the research is a proposal to represent the information model of the subject area in the form of a uniformly structured textual description formalized using the language of predicate logic of the first order, objectively reflecting the semantics of the subject

area.

Keywords: subject area, object, property, relation, information modeling.

Maksimov A.B., Kuzmenko S.N.

INFLUENCE OF DISLOCATION STRUCTURE TRANSFORMATION ON MECHANICAL AND MAGNETIC CHARACTERISTICS OF STEEL

Abstract. When metals are deformed, a complex evolution and transformation of the dislocation structure occurs as a result of the processes of self-organization of dislocations. Taking into account these effects complicates the simple statistical theory of the interaction of the elastic and magnetic subsystems of the crystal, the processes of magnetization reversal. In particular, this should lead to an increase in residual magnetization and coercive force. The effect of cyclic bending deformation on the dislocation structure is investigated. The main stages of transformation of the dislocation structure during deformation by cyclic bending are established. Based on the data obtained, it is possible to explain the behavior of mechanical properties depending on the density of dislocations and their distribution. The relationship between the dislocation structure and the nature of the movement of the domain walls is traced. Analysis of the literature data shows that dislocation clusters hinder the movement of domain boundaries. This should lead to an increase in coercive force. The trends of the influence of dislocation density and their distribution on strength and coercive force are close. Therefore, there is a stable relationship between strength and coercive force. Based on the established connections, it is possible to determine the strength properties of steels by the coercive force.

Keywords: steel, dislocation structure, self-organization, fractal clusters, magnetization curves, hysteresis loop, residual magnetization, coercive force.

ISSUE 3, 2023

Abramchuk A.V., Moskul G.A., Pashinova N.G.

ON THE MORPHOBIOLOGICAL CHARACTERISTICS OF THE RUSSIAN BYSTRYANKA (*ALBURNOIDES BIPUNCTATUS ROSSICUS* BERG, 1924) OF THE KUBAN BASIN

Abstract. The biological, ecological and morphological characteristics of the population of the Russian bystryanka (*Alburnoides bipunctatus rossicus* Berg, 1924) of the rivers of the Kuban basin are given. Russian bystryanka is found in almost all rivers of the Kuban basin. It has no commercial significance, but it is an important component of trophic chains in the ecosystem. The Russian bystryanka in the rivers of the Kuban basin is characterized by intensive linear mass growth. Morphological features of the studied fish are characterized by relative uniformity. The coefficients of variation of meristic and plastic signs of the rapid of the Psekups River (Kuban basin) do not exceed 10% for any of the 37 indicators, which indicates a weak degree of variation. It reaches puberty in the second year of life. Spawning takes place in the spring (May – June), on stony-pebble rifts. The individual absolute fertility of females averages $997,5 \pm 4,74$ eggs. The range of nutrition of the Russian bystryanka in the rivers of the Kuban basin consists of both plant and animal organisms of various taxonomic groups.

Keywords: river, Kuban basin, Russian bystryanka, biology, ecology, morphology.

Bragina T. M., Meng A.O.

DYNAMICS OF THE HARVESTING LIMITS FOR THE BRINE SHRIMP *ARTEMIA* SP. (CRUSTACEA, ANOSTRACA) IN THE SALINE LAKES OF NORTHERN KAZAKHSTAN (KOSTANAY REGION) AND SOME MORPHOMETRIC DATA ON THE INDIVIDUALS REARED IN CULTURE

Abstract. *Artemia* sp. is a commercially valuable biological resource used in the cultivation of fish and crustaceans. Many hypersaline lakes in Northern Kazakhstan are prospectively suitable for *Artemia* harvesting for aquaculture purposes. However, the information on the biological characteristics of brine shrimps is scarce, and the changes in harvesting limits for the region are poorly analyzed. This article is aimed at the analysis of the limits for commercial exploitation of the branchiopod *Artemia* sp. in Northern Kazakhstan (based on the data collected in Kostanay Region) in 2018–2022 and examination of the morphometric characteristics of the specimens reared in laboratory conditions from the cysts harvested in the lakes of the region. Following the surveys conducted in Kostanay Region, the morphometric data of sexually mature *Artemia* individuals have been obtained for two parameters (body length and body weight), and the harvesting limits for this region have been analyzed.

Keywords: brine shrimp, harvesting, exploitation limits, morphometric parameters.

Bulli L.I., Guryeva I.S., Nikolaeva A.N.

MORPHOLOGICAL AND PHYSIOLOGICAL-BIOCHEMICAL CHANGES IN THE EMBRYOGENESIS OF MULLET OF THE FAMILY MUGILIDAE

Abstract. The paper summarizes long-term materials on morphological and general biochemical analysis of mullet caviar developing under optimal conditions. It is shown that changes in the composition of caviar during embryonic development are mainly associated with the processes of osmoregulation and metabolism. During the swelling of a fertilized egg, the formation of a blastodisk and the first stages of crushing, glycogen is consumed, then lipids are mainly consumed for energy expenditure. After the completion of the epiboly, an increase in the lipid content in the developing eggs of mullets begins due to the expenditure of protein and carbohydrates. Apparently, all metabolic processes during the embryonic development of mullets

are interconnected and are aimed at optimizing and adapting the growth and development of the organism in the pedagogical. The use of glycogen and lipids as the main energy sources at the beginning of embryogenesis, and then proteins, extractives and, probably, newly synthesized glycogen, ensures the accumulation of lipids in an amount that allows the eggs and mullet pre-larvae to maintain positive buoyancy during embryonic development.

Keywords: Azov-Black Sea basin, mullets, dry weight of caviar, embryogenesis, energy expenditure, lipid content, buoyancy of caviar.

Golovko G.V., Saenko E.M.

OPTIMIZATION OF THE NATURAL CONSUMPTION OF THE MACROPHYTE RESERVE OF THE VESELOVSKAYA RESERVOIR

Abstract. An analysis of the development of phytocenoses of the Veselovsky reservoir in the historical aspect showed a high density of overgrowth of its water area with submerged vegetation in the modern period and the level of specific biomass of macrophytes, which indicates a significant violation of the ecological balance of the entire ecosystem of the reservoir and determines the conditions for the effective reproduction of phytophilic fish, worsening them. In this regard, it became necessary to regulate the degree of overgrowth of the reservoir. The aim of the research was to quantify the species composition of macrophytophage fish of the Veselovsky reservoir, calculate the volume of macrophytes consumed by them, and assess the trophic reserve of macrophytes for the introduction of grass carp. For this purpose, the amount of biomass consumed by macrophytophages – rudd, ram and infested grass carp – was determined. The value of the trophic resource of macrophytes (1440 thousand tons) and the number of macrophytes consumed by these populations at the present time, which is 0.64 % of the total resource, were calculated. The volume of annual potential fish productivity was calculated due to the use of macrophytes with the annual stocking of 2.7 million juvenile grass carp, which for the 10th year will be 1029 tons, while the potential annual fish productivity of macrophytophages at the current level of development of macrophytes can be 14400 tons.

Keywords: Veselovskoe reservoir, degree of overgrowing with macrophytes, macrophytophage fish, reserve of macrophytes, stocking with fish, increasing fish productivity.

Koulish A.V., Saenko E.M.

SIZE COMPOSITION AND FECUNDITY OF THE BALTIC PRAWN *PALAEMON ADSPERSUS* RATHKE, 1837 IN THE KERCH STRAIT (SEA OF AZOV)

Abstract. The structure of the assemblage of the Baltic prawn (*Palaemon adspersus*) females that already spawned, the species important for commercial catch, has been studied. The material for the research was samples of prawn (females that already spawned) from the Kerch Strait (Sea of Azov). The limits of variation of the total (3.6-7.2 cm) and commercial (2.6-5.6 cm) length of egg-bearing females with absolute realized fecundity from 500 to 2560 eggs in a clutch were determined. Fecundity values were calculated for all length groups of the marketable size females with an interval of 0.1 cm. The analysis of changes in the number of developing eggs in the “reconstructed” clutch was performed and the approximate percentage of the yield of juveniles at its hatching was calculated. A comparative analysis of the size composition and fecundity of the Baltic prawn in various parts of its range is presented.

Keywords: *Palaemon adspersus*, Kerch Strait, females that already spawned, size composition, realized fecundity

Kashutina I.A., Kashutin A.N.

INFLUENCE OF SAND AND VALVES OF THE PACIFIC MUSSEL MYTILUS TROSSULUS (BIVALVIA: MYTILIDAE) ON CHANGES IN THE AREA OF THE BROWN ALGAE FUCUS DISTICHUS SUBSP. EVANESCENS IN AVACHA BAY (SOUTH-EASTERN KAMCHATKA)

Abstract. This article discusses the erosion and transport of bottom sediments of sand with destroyed valves of different sizes of the Pacific mollusks *Mytilus trossulus*, under the turbulent regime of tidal water currents in the littoral zone of the eastern coast of Avacha Bay. The paper uses observations made by the authors in 2022 in Mokhovaya, Seroglazka, Petropavlovsky kovsh and Zavoyko bays. The main climatic factor in the areas under consideration, which determines the density of the settlement and the distribution of fucus, is the direction and speed of the wind. In the cold period of the year, the highest frequency (31 %) is the north wind with an average speed of 10.8 m/s. In the summer months of the year, the wind of the southeast, south directions prevails with a frequency of 31 % and an average speed of 4.3-4.7 m/s. The material collected during the field work made it possible not only to understand the distribution of sand with admixtures of mussel valve fragments by particle size distribution in the littoral zone, but also showed that their repeated impact on the brown alga *F. distichus* subsp. *evanescens* contributes to a change in their population density.

Keywords: east coast of Avacha Bay, littoral, turbulent regime of currents, wind speed, sand, fragments of valves *Mytilus* (*Mytilus*) *trossulus* A.A. Gould, *Fucus distichus* subsp. *evanescens*.

Sytnik N.A.

ASSESSMENT OF THE IMPACT ON THE ATMOSPHERIC AIR OF RECLAMATION OF THE SOLID MUNICIPAL WASTE LANDFILL IN THE CITY OF KERCH, REPUBLIC OF CRIMEA

Abstract. The article considers the impact of Kerch landfill on the atmospheric air during its reclamation. The technical and biological stages and technologies of landfill reclamation are described, providing a set of works aimed at the restoration of disturbed lands, and reducing the negative impact on the environment. According to quantitative indicators, the greatest impact will be on the atmospheric air during the technical stage of recultivation – emissions of 23 pollutants with a total mass of 974.6269 tons/year. Analysis of the obtained results of the calculation of dispersion of pollutant emissions, performed taking into account the peculiarities of natural conditions of the object location area, showed that the concentrations created by emissions of pollutants of the landfill before, during and after its recultivation do not exceed the maximum permissible values. The work provides a set of measures aimed at reducing the negative impact on the atmospheric air during the works.

Keywords: landfill, solid municipal waste, reclamation, negative impact assessment, atmospheric air, pollutants.

Tikhonova E.A., Burdiyan N.V., Doroshenko Yu.V., Budarova V.Yu.

MICROBIOLOGICAL AND HYDROCHEMICAL INVESTIGATIONS OF COASTAL AREA NORTHEAST KARA SEA IN SUMMER 2022

Abstract. In the present work, results of microbiological and hydrochemical investigations of coastal area northeast Kara Sea are given. Data obtained during the 50th expedition RV "Akademik Boris Petrov" (July-August, 2022) according to program «Training-Through-Research». The quantitative characteristic and distribution of bacteria transforming the main classes of organic compounds (proteins, lipids, carbohydrates), including oil hydrocarbons (diesel fuel) in the surface and near-bottom horizons of the water column was studied. It was established that in the surface waters the number of bacteria using protein substrate varied from 1

to 10^6 cel./mL (in the bottom waters from 10^2 to 10^5 cel./mL), respectively, carbohydrates (glucose) – from 10 to 10^4 cel./mL (in the bottom – from 10^3 to 10^5 cel./mL), lipids – from 1 to 100 cel./mL, also in the bottom. Hydrocarbon-oxidizing bacteria (HOB), diesel fuel degraders, in the surface waters were detected in 53 % of samples, in the bottom waters, respectively, in 36 % of samples. Quantitative HOB values ranged from 1 to 10 cel./mL. An uneven distribution of the studied groups of bacteria was noted. The low concentration of hydrocarbon-oxidizing bacteria indicates the absence of fresh pollution of the water area by diesel fuel. During the considered period, surface water temperature varied from $+1,5^{\circ}\text{C}$ to $+5^{\circ}\text{C}$, bottom water: from $+2^{\circ}\text{C}$ to $+4^{\circ}\text{C}$. The concentration of hydrogen ions (pH) in surface water ranged from 7,67 to 8,20 in bottom water: from 7,43 to 7,90. Depth at the bottom water sampling stations varied from 54 to 193 m. The content of hydrocarbons (HC) in the surface waters of the Kara Sea insignificantly exceeds (by 1,2 times) the maximum permissible concentration (MCP) of this class of substances for fishery reservoirs (0,05 mg/l), in the bottom horizon the average concentration of HC exceeds the MCP by 2 times. Significant correlations between the observed groups of microorganisms and physico-chemical parameters were not revealed.

Keywords: hydrocarbons, water, heterotrophic bacteria, pollution, Kara Sea

Ageev O.V., Yashonkov A.A., Samojlova N.V.

DEVELOPMENT OF CALCULATION METHOD FOR DETERMINING THE PARAMETERS OF THE WORKING BODIES OF FISH-WASHING MACHINES

Abstract. The relevance of improving the calculation methods for the scientifically substantiated determination of the parameters of the working bodies of fish-washing machines is shown. It has been established that the main working bodies of fish-washing machines are currently reels of various designs. During the development of the calculation method, expressions were proposed for determining the total resistance moment to rotation of the reel of a fish-washing machine with a water-fish mixture. At the same time, the following are taken into account: moments from the forces of gravity of the mass of fish and water moved by the blade of the reel, the moment caused by the interaction of fish with water, the moment due to the friction of the shaft in fixed supports and seals, as well as the moment arising from the interaction of the working body with a layer of water and water movement in the gap between the reel and the outer case of the machine. Also, the period of acceleration of the drive electric motor of the machine when it is started, as well as the required starting power of electrical equipment, taking into account friction forces, masses of fish and water, and the degree of filling of the reel with raw materials, are also determined. A calculation graphing scheme for calculating mechanical stresses and bending moment arising in a reel working body is proposed. As a result of numerical calculations, diagrams of the transverse force and bending moment were obtained.

Keywords: fish washing, work body, reel, calculation method, resistance moment, durability.

Zotova I.A., Kurash M.A., Sokolov S.A.

EXPERIMENTAL ASSESSMENT OF THE INFLUENCE OF PASCALIZATION OF APPLE PUMES ON THE YIELD AND MAIN CHARACTERISTICS OF EXTRACTABLE PECTIN

Abstract. Apple pomace is produced in huge quantities in juice processing plants around the world, and continuous efforts are made to utilize it holistically. This study assessed the effect of high pressure on apple pomace in order to increase the yield of pectin and determined rational processing parameters – a pressure of 400 MPa and an exposure time of 15 minutes, at which the pectin yield increases from 25 to 31.5 % compared to the yield of pectin from untreated pomace. The molecular weights of pectins and their IR spectra were studied and it was shown that they are not affected by the pressure treatment experienced by pectin-containing raw materials. Thus, pre-treatment of apple pomace with high pressure allows you to increase the degree of pectin

extraction and does not destroy its molecular structure.

Keywords: pectin, high pressure, processing of plant materials, molecular weight, IR spectroscopy.

Katanaeva Yu.A.

INVESTIGATION OF THE PROCESS OF CONVECTIVE DRYING OF POMEGRANATE PEEL

Abstract. During the production of pomegranate juice, a large amount of waste is generated, which can be a potential source of raw materials for food and other industries. The high level of biologically active compounds contained in the pomegranate peel makes it attractive for further processing to obtain components with high added value that can be used as functional ingredients. Due to the high humidity of the pomegranate peel, its shelf life is very limited. Various physical and chemical technologies are used to extend its shelf life. One of such technologies that significantly increase the shelf life is drying. Convective drying is the most widely used method of dehydration of high-moisture materials. To increase the efficiency of the convective drying process, it's necessary to experimentally determine the main parameters of the process and the kinetics of drying. As a result of the study, it was found that increasing the temperature in the drying cabinet increases the drying potential and, consequently, reduces the drying time.

Keywords: pomegranate peel, temperature, humidity, convective drying, diffusion coefficient.

Kim E.N., Timchuk E.G., Glebova E.V., Lapteva E.P., Zayats E.A.

QUALITY AND SAFETY ASSESSMENT MODEL OF SMOKED FISH PRODUCTS

Annotation. The article is devoted to the methodological foundations for creating models for assessing the quality and safety of smoked fish products. The results of marketing researches of smoked fish products are given. The most significant quality indicators were identified, which served as the basis for identifying consumer preferences, which made it possible to develop a matrix of consumer requirements for smoked fish products. The obtained consumer requirements, quality and safety indicators, identified in the standards and requirements of the Technical Regulations of the Customs and Eurasian Unions, made it possible to develop a tree of quality and safety indicators for smoked fish products. A calculation formula for a complex indicator of the quality and safety of smoked fish products is proposed. The principle of its construction is universal and allows assessing the quality of the entire range of smoked fish products in the process of its production, storage, transportation and sale.

Keywords: quality and safety assessment model, quality, safety, smoked fish products.

Sokolov S.A., Yashonkov A.A., Sevatorov N.N., Afenchenko D.S.

COMPUTER SIMULATION OF AERODYNAMICS IN THE PROCESSING CHAMBER DURING DRYING IN A CENTRIFUGAL FLUIDIZED BED

Abstract. The two main problems which humanity is facing at the present stage of its development are supply of food and energy for the population. These problems, in the context of an imperfect quality control system for industrially produced food products, have led to a tendency to replace many natural components in food products with cheaper, but less qualitative and in many cases harmful to human health substances that are artificially synthesized from non-food raw materials, grown via genetic modification and produced using other dubious technologies. Among the ways preventing this trend is improving of traditional technologies for cheap food raw materials processing. The paper considers the computer simulation process of the drying agent aerodynamics under the process of fluidized drying. The influence of the ratios

between the main design parameters of the drying plant on the field of air velocities was determined, that made it possible to obtain their rational values.

Keywords: computer simulation, drying chamber, fluidized bed drying, drying agent aerodynamics.

Astasheva O.M.

KHERSON REGION: SOCIO-ECONOMIC POTENTIAL AND DEVELOPMENT PROSPECTS

Abstract. Within the framework of the subject of research of regional economics as an applied economic science that studies the features and patterns of rational allocation of productive forces, production and sales markets, it is relevant to study and compare the socio-economic potential, features and prospects of development of various regions of the country. This is due to the fact that the economy of various territorial socio-economic systems is distinguished by the originality, interconnectedness and unity of its objects and their combinations (complexes). The article examines the main components of the socio-economic potential of the Kherson region, formed during its stay in the structure of the national economy of the USSR and post-Soviet Ukraine, factors and opportunities for its development in accordance with the integration processes of entering the economic space of the Russian Federation, shows priority directions of socio-economic development of the region for the near future.

Keywords: regional economy, Kherson region, socio-economic potential, region, development prospects.

T. O. Glechikova, M. A. Osipova, S. N. Frolova

THE PECULIARITIES OF LEGAL REGULATION OF FSBEI ACTIVITY FINANCIAL SUPPORT PLANNING

Abstract. The main stage of state-funded educational institutions financial activity connected with the definition of main funding sources of higher educational institutions statutory activities and peculiarities of legal regulation of relationships arising at this stage are reviewed. Legislative and regulatory compliance practices which are accompanied by the identification of modern legal base possible deficiencies determining requirements and regulations controlling and limiting rights of funded institutions when planning their activities are appraised. Relation between funded institutions planning and the government strategic planning is defined. A review of legal and regulatory framework regulating the planning process at different stages and relationship with regulatory authorities of this process is performed. The necessity to pay more attention to the discussed theme if state-funded educational institutions financial activity planning is the basis of qualitative performance of the governmental task for training the specialists needed for development of the Russian Federation national economy branches is demonstrated.

Keywords: financial and economic activity planning, legal regulation, governmental task, legal entities, financial law, budget law.

Mnatsakanyan A. G., Mnatsakanyan R. A., Tomkovich A. V.

BOND FINANCING FOR SUSTAINABLE FISHERIES

Abstract. The transition of fisheries to sustainable development requires the search for new ways of financing. One of them is "blue" bonds – a promising, but so far little-studied investment tool. The article provides an overview of the features of this tool, provides recommendations for its use in Russian conditions. It is argued that the development of bond financing of the "blue" economy will not be successful without the creation of an appropriate institutional environment and market infrastructure, one of the elements of which can be the Fund for sustainable fisheries

– a specialized organization that coordinates activities and consolidates resources in the field of the "blue" economy in the country. It is also necessary to unify the methods of evaluating projects focused on sustainability goals, taking into account the specifics of the "blue" economy and wide disclosure of information about projects and enterprises financed by "blue" bonds.

Keywords: fisheries, sustainable development, investments, funding sources, bonds.

Nekhaychuk D.V., Verna V.V., Skaranik S. S., Vorobyova A.N.

MODERN PROBLEMS IN THE DEVELOPMENT OF RURAL TOURISM IN THE REPUBLIC OF CRIMEA

Abstract. The article is devoted to the analysis of current trends in the development of rural tourism in the Republic of Crimea. The study defines the essence of rural tourism, identifies its advantages and disadvantages, and examines its role in the development of rural areas and domestic tourism. Depending on the potential of the agrotourism industry in the context of the regions of Crimea, various types of territories have been identified for the development of rural tourism in the region. The specifics of the functioning of rural tourism objects in the Republic of Crimea are characterized by systematizing them into main groups depending on the scale and types of activity. The socio-economic effect of the functioning of rural tourism in the Republic of Crimea is substantiated. The objectives and strategic guidelines for the development of rural tourism in Crimea have been identified, which will increase the number of tourists visiting the region year-round, expand the range of tourism services provided in the field of rural tourism, and will also stimulate the development of the economy of rural areas.

Keywords: rural tourism, agrotourism, rural area, tourism industry, tourist product, tourist services, agrotouristic potential.

Samonova T.G., Sushko N.A.

ANALYSIS OF METHODOLOGICAL APPROACHES TO ASSESSING THE LEVEL OF ECONOMIC SECURITY OF THE ENTERPRISE

Abstract. The previously developed methodological approaches to assessing the level of economic security of an enterprise are classified. The essence of each of the presented methodological approaches is highlighted. The advantages and disadvantages of methodological approaches to assessing the level of economic security of an enterprise are disclosed. The essence of the resource-functional approach, which provides for the assessment of the components of the economic security of the enterprise, is revealed. The indicator approach based on the use of a system of indicators and comparison of the actual values obtained with indicators is characterized. The characteristic of the expert method of assessing the level of economic security of an enterprise is presented, which provides for the use of expert opinions to evaluate individual components or the entire enterprise as a whole. The essence of the matrix approach based on the use of matrices to assess various aspects of the economic security of the enterprise is revealed. The expediency of using the method of economic and mathematical modeling to assess the level of economic security of the enterprise is revealed.

Keywords: economic security, method, approach, assessment, level, advantages, disadvantages.

Boyko E.A., Shestak O.I.

INSTITUTIONAL ASPECTS OF TRANSFORMATION OF THE MANAGEMENT OF THE FISHERY COMPLEX OF RUSSIA: 1917-2022

Abstract. In the proposed study, we will try not only to study and evaluate the effectiveness of the system of public management of the Russian fishery complex, but to identify those decisions and positive experiences of public administration in the past, as well as to identify exactly those management practices that can be used in the present. To identify the features of managing the

development processes of the fishery complex, we will use not only the traditional descriptive-analytical methodology of working with sources of information, but also the method of content analysis, which allows, by calculating documents of similar origin and nature, to fairly objectively identify the main mechanisms, strategies and tools for managing fisheries. industry, whose experience has theoretical and practical significance for improving the management efficiency of the fishing industry of the Russian Federation.

Keywords: Fishery complex of Russia, management of the fishery complex, evolution of management of the fishery complex of Russia in the 20th – 21st centuries; management approaches, management mechanisms, efficiency of public administration.

Maksimov A.B., Gadeev A.V.,

COERCIVE MONITORING OF STEEL STRUCTURES AND STRUCTURES

Abstract. The paper substantiates and corrects the methodology for determining the residual life of steel by a non-destructive coercimetric method. It is shown that the parameters of the technique are the coercive force and the degree of damage to steel under fatigue. These characteristics combine the simplicity of experimental preparation and adequately reflect the change in the dislocation structure. It is assumed that the maximum damage (equal to one) corresponds to the greatest true uniform strain under tension. The value of the residual life of steel is determined from the dependence of the coercive force on the degree of plastic deformation. The residual life of steel without deformation is taken as 100 %. At maximum load, the tensile test is assumed to be 0 %. Intermediate damage is determined by the ratio of the true strain to the true strain at the highest load, that is, with a temporary load resistance. The upper limit of reversible damage is 0.3 of the maximum damage.

Keywords: carbon and low-alloy steels, non-destructive testing, coercive force, dislocation structure, reversible and irreversible damage, true deformation.