**Bulletin 54**

|  |
| --- |
| УДК 681.518.5 DOI: 10.17217/2079-0333-2020-54-6-19  **PRACTICAL APPLICATION OF THERMAL-imagING ANALYSIS  AND CONTROL METHODS**  Eshchenko D.V., Nikitin A.T., Belov O.A.  The process of operation of any technical objects is inevitably associated with a change in their technical condition and a decrease in operational characteristics. At the same time, the requirements for quality assurance of the specified reliability parameters and safety of various technical systems throughout the entire period of operation are constantly increasing. One of the ways to solve the given problem is integration to the technological process of various types of equipment of new means and methods of technical diagnostics [GOST (State standard) 20911-89, GOST (State standard) 13372-2013]. One of such perspective methods is the thermographic study of objects. In this paper, we experimentally evaluated the main means of thermal imaging control and methods of their application on certain types of equipment.  **Key words:** thermal-imaging control, thermal imaging equipment, technical diagnostics. |
| УДК 53.083.91:537.6 DOI: 10.17217/2079-0333-2020-54-20-28  **HIGH VOLTAGE MONITORING OF GEOMAGNETIC INDUCED CURRENTS**  Sivokon V.P.  Within the framework of the national project “Digital economy of the Russian Federation” the Ministry of energy of the Russian Federation is implementing the departmental project “unified technical policy – reliability of power supply”. The main objectives of the departmental project are aimed at implementing risk-based management, improving the level of reliability of energy supply to consumers. One of the risk factors for power supply systems is a natural phenomenon caused by ionospheric-magnetospheric connections – geomagnetic-induced currents. The proposed method for assessing these risks is based on the registration of higher harmonics in high-voltage power lines, which makes it possible to improve the accuracy of diagnostics of geomagnetic-induced currents by reducing the influence of the network’s own harmonics. The choice of the optimal even harmonic number for diagnostics is theoretically shown and experimentally confirmed. A contactless method for obtaining information about variations of higher harmonic components in high-voltage power lines is proposed and tested. The degree of the 6th harmonics correlation in 220 kV power transmission lines of Mutnovskaya Geothermal Power Plant with the Earth’s magnetic field variations obtained at the observatory “Paratunka” (Paratunka village, Kamchatsky Krai) was experimentally investigated.  **Key words:** high voltage power lines, higher harmonics, geomagnetic-induced currents, Berg coefficients. |
| УДК 621.313.333:004.9 DOI: 10.17217/2079-0333-2020-54-29-35  **COMPUTER SIMULATION OF A SINGLE-PHASE ASYNCHRONOUS MOTOR**  Trudnev S.Yu.  The most widely used single-phase asynchronous motors are described and also substitution and vector diagrams are reviewed. Theoretical and mathematical descriptions of processes of controlling and enabling asynchronous modes of operation were provided, on the basis of which computer models of a single-phase asynchronous motor in static and dynamic modes was created in the *Matlab* program. Experiments were performed on the real and virtual models, and the data obtained were processed and compared to confirm the adequacy of the developed virtual model.  **Key words:** computer model, capacitor, voltage, single-phase asynchronous motor. |
| УДК 664.64:594.55 DOI: 10.17217/2079-0333-2020-54-36-47  **DEVELOPMENT OF TECHNOLOGY OF REDUCED MOISTURE BAKERY PRODUCTS  WITH ADDITION OF SQUID AS A CONCENTRATOR** Blagonravova M.V., Samokhin А.В. Results of research on the development of the technology of bakery products in terms of low humidity (crisp breads) with the addition of squid as an enriching agent are presented. The technological parameters of production were as follows: baking for 30 minutes at 130°C followed by drying for 35 minutes at 60°C, dosage of crushed squid was 20% of flour weight. The recipe and production flow chart were developed and physical and chemical parameters of complete product quality were studied. The conformity of produced crisp breads for organoleptic and physicochemical indicators, including moisture, acidity and ragilety, to the requirements of regulatory documents was established. The food and biological values of crisp breads and control sample (without additive) were compared. As found, introduction of squid to the bread dough allows increasing the mass fraction of protein by 43% and also the daily protein requirement.  **Key words:** biological value, squid, fat mass fraction, minerals, organoleptic characteristics, nutritional value, crisp breads. |
| УДК [504.5:669.018.67](571.66-25) DOI: 10.17217/2079-0333-2020-54-48-64  **CONTENTS OF HEAVY METALS IN THE PLANTS  OF PETROPAVLOVSK-KAMCHATSKY (KAMCHATKA TERRITORY) IN 2017–2018**  Avdoshchenko V.G., Klimova A.V.  Results of determining the content of zinc, copper, lead and cadmium in the leaves of *Alnus irsute, Artemisia vulgaris kamtschatica,* *Betula ermanii, Rosa amblyotis, Salix udensis* collected from the territories of Petropavlovsk-Kamchatsky in 2017–2018 summer period are discussed. In the summer of 2017, the copper content in the plants from studied areas varied in the range from 5.5 to 22.5 mg/kg, in 2018 – from 7.7  to 36.6 mg/kg. Its highest content in 2017 and 2018 was found in *A. vulgaris*, and the lowest in *R. amblyotis*.  In 2017, the concentration of zinc varied from 12.9 to 281 mg/kg, in 2018 – from 20.8 to 246 mg/kg, the highest concentration in 2017 and 2018 is typical for *S. udensis*, the lowest for *R. amblyotis*. In 2017, the range of lead content in plant samples was from 0.3 to 3.0 mg/kg, in 2018 – from 1.2 to 3.8 mg/kg. In the summer of 2017, the cadmium content in studied plant samples varied in the range from 0.2 to 2.7 mg/kg, in 2018 – from 0.1 to 3.6 mg/kg. The lowest concentration of cadmium was found in 2017 in *R. amblyotis*, in 2018 – *B. ermanii*, the highest in the leaves of *S. udensis* in 2017 and 2018. Our results allowed identifying species – indicators of metal pollution for the territories of Petropavlovsk-Kamchatsky: *A. vulgaris kamtschatica* from the representatives of the herbaceous-shrub layer and *S. udensis* from the tree layer.  **Key words:** cadmium, copper, metal pollution, Petropavlovsk-Kamchatsky, lead, heavy metals, urbanized territories, phytocoenosis,zinc, *Artemisia vulgaris kamtschatica*, *Salix udensis*. |
| УДК [597.553.511:591.53](571.66) DOI: 10.17217/2079-0333-2020-54-65-81  **FEEDING PECULIARITIES of FISH JUVENILES DURING HIGH WATER LEVEL  IN KARYMAI STREAM IN SUMMER 2018**  Karpenko V.I., Pogorelov E.A.  The results of study on the food composition of juvenile fish during an anomalous flood in Karymai stream in summer 2018 are presented. The problem of the occurrence of an abnormally low supply of juveniles of most salmonids and the use of the maximum number of components for species survival under such conditions are discussed. Possible directions of the formation of interspecific food relations in fresh waters are considered.  **Key words**: juvenile fish, flood, food relations, food composition. |
| УДК 582.272.462(265.51) DOI: 10.17217/2079-0333-2020-54-82-107  **MARINE BENTHIC ALGAE FROM COMMANDER ISLANDS (REVISION 2020).**  **I. CHLOROPHYTA AND OCHROPHYTA**  Klochkova N.G., Klochkova T.A., Klimova A.V.  In Commander Islands, the peculiar geographic location, hydrology and geomorphology contributed to development of a very peculiar algal floristic complex. First scientific information on species composition in this region appeared in XIX century. In this revision, we analyzed scientific publications containing algal floristic information from this region and composed list of species recorded during 1889–2020. We provided information about 52 green and 55 brown algal species recorded from the Commander Islands. The information concerning representatives of Laminariales is discussed in details, as they form basis of the underwater vegetation. Our species list includes citations of references containing records from the Commander Islands and brief description of their biological and morphological characteristics. As we noted, in Russian Far East, Commander Islands belong to one of the few regions with highly examined algal flora.  **Key words:** species composition, seaweeds, biodiversity, Commander Islands, Chlorophyta, *Hedophyllum sessile*, Ochrophyta. |
| УДК 631.46(282.256.341) DOI: 10.17217/2079-0333-2020-54-108-116  **SOILS OF EASTern COAST OF BAIKAL lake  AND THEIR ECOLOGIC-MICROBIOLOGIC CHARACTERISTIC**  **Naprasnikova E.V., Belozertseva I.A.**  In this paper, we discuss new experimental data on the soils from eastern coast of the Baikal natural territory. We provide description of the soils, also the acid-alkaline conditions (from pH 5.1 to 7.9) and humus content (from 0.1 to 13.8%) were determined. The degree of biological activity determined by express method permitted categorizing soils as moderately and weakly active. We revealed a noticeable (on Chaddock’s scale) relationship of this activity with acid-alkaline conditions (*R*2 = 0.52). The quantitative-qualitative characteristics of soil microbiocoenoses were studied in details, revealing a high diversity of the main systematic groups of organisms. Qualitatively, the fugal component was very diverse. The specific feature of soils was the absence of the most common microscopic fungus *Aspergillus niger*, which is characteristic for the other Siberian soils. The investigated soils were found to be epidemiologically safe.  **Key words:** Baikal Lake, biological activity, microbiocoenosis, microorganisms, soils, *Aspergillus niger*. |