phone and the smart socket. If the WIFI connection is unsuccessful, it will continue to identify the connection until it is successful and then upload the circuit information of the connected circuit to the client via WIFI for the user to view and understand the circuit in time.

In this paper, a transparent waterproof box is designed for the instrument to guarantee its waterproofness. The design of the transparent waterproof box makes its waterproof performance more excellent, prolongs the service life of the socket, increases the application scenarios in various situations such as outdoor, and has certain significance for the prevention of electrical fires and the safety of users' electricity use.

The instrument designed in this paper uses a wireless communication module to transmit information about the circuit. It can collect the voltage value and grounding condition of the connected circuit and can display the voltage value and voice broadcast the relevant information, and can also upload the test results to the user side, so that the user can understand the circuit information in real time, which is more practical and convenient. In the instrumentation research, domestic and foreign have been pursuing digitalization, intelligence, networking, miniaturization, the design to meet the current pace of the times, for the international market.

УДК 69.04

CALCULATION OF A REINFORCED CONCRETE CONSTRUCTION WITH FINITE ELEMENT MODELING LOCATED IN SOIL

Medvedev L. U.
BNTU, department "G&SM"
e-mail: sm@bntu.by

Summary. *In this article there is a completed description of a calculation of a reinforced concrete construction with finite element modeling located in soil. The calculation was carried out on an electronic computer complex using software. Physical and mechanical properties of soil and reinforced concrete construction were taken into account.*

Properties of soil were determined by averages of interval data and characteristics of soil at normal condition. Properties of the reinforced concrete were provided by the SP 5.03.01-2020. Upper girder was loaded with equally distributed load in 60 kN/m. On the figure 1 geometry of the calculated construction is presented.

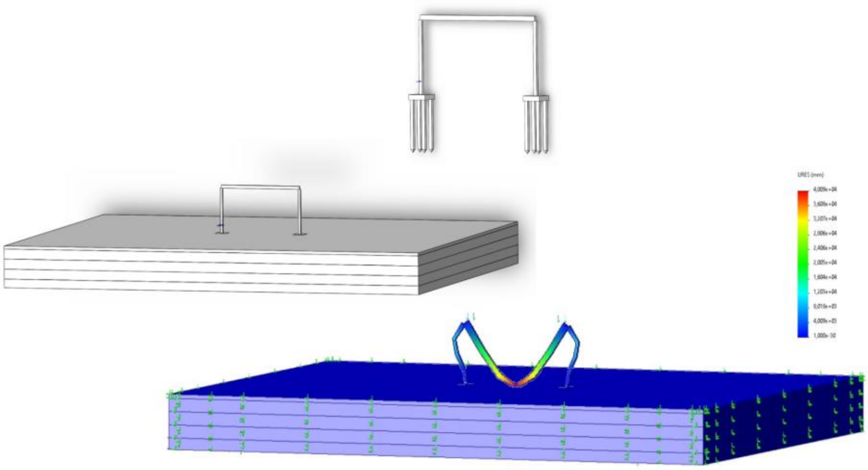

Figure 1 – Geometry of the reinforced concrete element, joint geometry of soil types, deformation diagram construction under load

Table 1 – Properties of soil types and reinforced concrete

Denomination of an element, characteristic, dimension	Reinforced concrete	Sandy loam	Clay loam	Clay	Limestone	Vegetal layer
Modulus of elasticity, H/m^2	30000000	90000000	345500000	1267900000	22000000000	55000000
Poisson's ratio	0.2	0.31	0.37	0.41	0.3	0.15
Shear modulus, H/m^2	12500000	60380000	26710000	48160000	7692000000000	13355000
Mass density, kg/m^3	2500	2000	2100	2200	2670	1250
Ultimate tensile strength, H/m^2	3528000	6000000	14000000	20000000	11500000	6000000
Ultimate strength in compression, H/m^2	39200000	58900000	88000000	100000000	100000000	58900000

Type of soil located in sequence: vegetal layer – sandy loam – clay loam – clay – limestone. Net finite elements were taken on warp mingled curvature, having 16 points of Jacobian size 100 mm on 50 mm. Diagrams of the routes, deformation (on the fig. 1), and stress were received as well. Functional also allows the acquisition of margin of safety. It is possible to make conclusions about deformations and routes only on the terrestrial parts of the reinforced concrete construction, on primings, which are located on the territory of the Republic, and at given averaged properties.

УДК 544.653.2

THE ELECTRICAL INSULATION STRENGTH OF ANODIC Al_2O_3 COATINGS WITH VIAS FOR POWER MULTICHIP MODULES

Shimanovich D. L.
Belarusian State University of Informatics and Radioelectronics
e-mail: ShDL@tut.by

***Summary.** The technological methods and regimes to improve the electrical insulation strength of anodic Al_2O_3 in vias of double-sided alumina bases for potential use in power multichip modules were discussed. It was shown that after using of the appropriate technological approaches the breakdown voltages of the obtained test samples were up to ~6 kV on working surfaces without holes and up to ~2,5 kV in vias.*

The aim of the presented research is developing of the methods and techniques using optimized technological regimes to improve the electrical insulation strength of anodic Al_2O_3 in vias of double-sided alumina bases for potential use in power multichip modules [1–6].

Preliminary experimental studies of fabricated alumina bases with vias matrices showed that in the process of electrochemical anodization at the junction of horizontal and vertical surfaces in vias, microcracks inevitably appeared due to anodizing fronts competing in different directions, restructuring of the porous structure and arising mechanical stresses, even if on the continuous surface of alumina bases, microcracks were completely absent.

It was shown that the dielectric strength of anodic Al_2O_3 in vias increased by minimizing the number of microcracks due to vias have chamfers (at an angle of up to 45 °C), a smooth profile at the inputs with satisfactory roughness parameters were formed on the initial samples of aluminum