THE APPROBATION OF THE CREATED SOFTWARE COMPLEX "LIGRO" FOR THE EXISTING GROUNDING SYSTEM

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The method of electromagnetic diagnostics (EMD) of the state of the grounding system (GS) of active energy facilities as a whole is in line with international Standards and involves three stages: the experimental, calculation and the stage of issuance of recommendations. The results of experimental studies, together with the characteristics of the energy object (voltage class, neutral mode of transformers, and the values of SC currents and protection time) are the input data for the second (calculation) EMD stage.

The aim of the work is to test the «LiGro» software package in modeling short circuit processes on an existing grounding device located in a three-layer soil.

The test was based on a comparison of the touch voltage on several selected substation equipment units when simulating a single-phase ground fault. The analysis was carried out on six equipment of substations with voltage class 150 kV. In this case, the traditional method of the set of experimental data was used to assess the adequacy of the mathematical model of the GS which is presented in [1] with measuring current – 5.13 A (See Fig.1).

Table 1 shows the calculated (U_{t1} and U_{t2}) and experimental values of the voltage Ut obtained, respectively, by mathematical modeling and simulating a single-phase short circuit on the territory of the substation with the return of the entire short circuit current to the grounding conductor of the supporting insulator. When comparing, the calculated current was taken equal to the measuring one, foot resistance (RO) was determined experimentally at each measuring point.

Table 1

Name of the equipment	Experimental results		Calculated results			
			IEEE model		LiGro	
	U_t, mV	Ro, Ω	U_{t1}, mV	δ_1, %	U_{t2}, mV	δ_2, %
C-2-2	19	1146	19,87	4,6	18,8	1,1
C-2-1	38	565	32,22	15,2	34,4	9,5
L-29-1	16	425	16,95	5,9	15,9	0,6
C-1-1	20	399	23,39	17,0	22,0	10,0
VT-2-2	37	472	22,09	33,4	30,9	16,5
T-2-2	6	4834	3,58	27,3	5,3	11,7

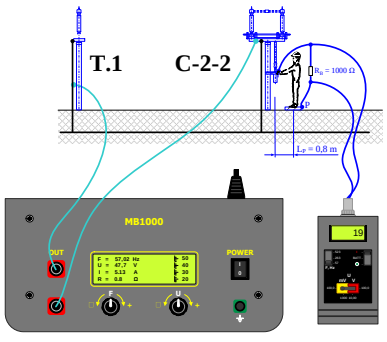

Fig.1 Method of the set of experimental data

Reference:

1. Koliushko D.G., Rudenko S.S. Experimental substantiation of the calculation procedure of normalized parameters of grounding device based on the three-layer soil model. Electrical engineering & electromechanics. 2018. №1. Pp. 66-70. DOI: https://doi.org/10.20998/2074-272X.2018.1.11H