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DETERMINATION THE ELECTRICAL POTENTIAL OF A CREATED GROUNDING DEVICE IN A THREE-LAYER GROUND

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Abstract

The work is devoted to the definition of analytical expressions for the electric field potential created by a system of grounding devices of arbitrary configuration taking into account a three-layer geoelectrical structure. The potential is determined on the basis of the solution of the problem of the potential of a point source of current, taking into account the linear distribution of the current along the length of the electrode, and also the method of analogy between the electrostatic field and the field created by a quasi-constant current source. The total potential of the grounding system is determined using the superposition principle of the fields. Analytic

expressions are obtained for the determination of the potential at an arbitrary observation point created by the field of a solitary electrode. The received expressions allow to calculate the grounding devices without application of the equivalent method and to determine their normalized parameters for the vast majority of power objects of Ukraine with the voltage class of 35–750 kV. The application of the analytical solution makes it possible to significantly improve the accuracy of calculating the electric potential in comparison with models based on the methods of optical analogy or finite differences. References 11, figure 1, table 1.

Key words: grounding device, electrical potential, a three-layer soil, rated parameters, a point source of current.

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