

DOI: <https://doi.org/10.15407/technd2020.01.003>

MATHEMATICAL MODEL OF THE PROTECTION ZONE DURING AN ARBITRARY CONFIGURATION OF THE AIR-TERMINATION RODS LOCATION

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 1, 2020 (January/February)
Pages	3 - 9

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Abstract

The aim of the paper is to analyze the basic principles of design the protection zone of a complex system of air-termination rods according to the rolling sphere method, which, at the moment, is the main in the field of lightning protection and meets the requirements of modern European standards. The problem of determining the minimum number of air-termination rods required to calculate the surface of the protection zone of any complexity, with their arbitrary height and location, is solved. Through the use of the stereometry laws of, for the first time in Ukraine, a mathematical model was developed to build such a protection zone. The operation of this model was tested on the example of an electrical substation with a voltage of 110 kV using a test computer program with a real arrangement of air-termination rods with different heights. The result of this program is a three-dimensional display of the protection zone with the possibility of visual analysis of the protection of objects from direct lightning strike with a given probability. The value of the work lies in the possibility of practical implementation of the rolling sphere method to protect power facilities of Ukraine from direct lightning strikes in accordance with the modern standard EN 62305. References 12, figures 5.

Key words: rolling sphere method, air-termination rod, protection zone, power facility, substation, mathematical model.

Received: 05.09.2019

Accepted: 21.11.2019

Published: 16.01.2020

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