

LIGHTNING PROTECTION SYSTEM: A COMPARATIVE ANALYSIS OF FOUR MODIFIED MODELS

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ABSTRACT

This paper develops and modifies the current and the attractive radius analytical expressions used in modeling a lightning protection system (LPS). The modified expressions are used as a performance and measurement tool. The tools are used to carry out a comparative analysis of four popular LPS models. The models are implemented with data collected from the Nigeria Meteorological Service (NMS) and isokeraunic level respectively in the North-East Zone of Nigeria. The modified LPS model is applied to the Improved Electro-geometric models (IEGM); the Self-consistent Linear Model; Eriksson Collection Volume Model (CVM), and Petrov-and-Water (CVM). These models are converted into a computer simulation model by using Microsoft Excel (Ms Excel) spreadsheet. The mean of the area of exposure and the probability of the mean number of lightning hit per year for a period of twelve years are analyzed with the template developed with the MExcel template. The paper found out that the area of exposure of the LPS system increases with increase in height of the tower while the probability of the mean number of hits per year decrease with an increase in the correction factor. The result of the analysis presented SLIM model as the best model, and the Petrov and Waters CVM model as the worst model.

KEYWORDS: LPS, Model, NMS, Nigeria, North, East Zone