

COMPARATIVE ANALYSIS OF ORIGINAL AND MODIFIED LIGHTNING PROTECTION SYSTEMS

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ABSTRACT

This paper compares the performance and relative effectiveness, of the original Improved Electro-geometric Model (IEGM), the Collection Volume Model and the Self-consistent Leader Inception Model (SLIM) with their modified models proposed in this study. Data based on the isokeraunic level and field measurements presented by the Nigeria Meteorological Service (NMS) are used in assessing and evaluating the models. The mean area and the number of thunderstorm days per year of the North-East Region are computed with the Microsoft Excel spreadsheet. The results of the models are illustrated graphically. It was observed that the improved models proposed by Emechebe et al, are relatively more effective and have better performance in terms of the LPS to be applied than the original models. The modified SLIM model presented here shows that between 100-180m above the surface of the earth, the area of the radio equipment exposed to lightning strike increases slowly from 0.103-0.222 m² and steeply from 0.272-0.981m² between 200-320m. The number of lightning hits on the radio equipment decreases with the increase of the correction factor (η). The modified SLIM model recorded a mean number of hits, which decreases from 2.88×10^{-5} - 6.47×10^{-6} and 4.82×10^{-5} - 9.73×10^{-7} respectively, with the correction factor (η) increasing from 5-50 when the mean thunderstorm days are 65.33 and 89.42 days per year.

KEYWORDS: Analysis, LPS, Models, Nigeria