INTISARI

Penelitian ini dilakukan untuk menganalisis sebaran tegangan pada sistem pentanahan akibat variasi gelombang arus petir menggunakan pendekatan simulasi numerik FEM (*Finite Element Method*) menggunakan perangkat lunak ANSYS Maxwell Electronic dengan *Electric Transient Solver*. Latar belakang penelitian ini berangkat dari fenomena sambaran petir yang dapat menimbulkan lonjakan tegangan tanah berbahaya, sehingga diperlukan kajian mendalam mengenai pengaruh karakteristik gelombang arus petir dan lokasi sambaran. Penelitian ini menggunakan metode simulasi dengan variasi dua parameter, yaitu jenis gelombang arus petir (2,6/50 µs, 8/20 µs, dan 10/350 µs) dan lokasi sambaran (tengah, sisi-T, dan pojok). Hasil simulasi menunjukkan bahwa bentuk gelombang dan lokasi sambaran petir berpengaruh signifikan terhadap distribusi tegangan pada sistem pentanahan. Gelombang 2,6/50 µs menghasilkan sebaran tegangan paling cepat, 8/20 µs mengalami peluruhan tercepat, sedangkan 10/350 µs memiliki durasi puncak tegangan terlama. Sementara itu, lokasi sambaran di tengah sistem menghasilkan sebaran tegangan yang paling merata, sedangkan sambaran di tepi atau pojok menimbulkan konsentrasi tegangan tertinggi dan paling berpotensi menimbulkan bahaya listrik di sekitar sistem pentanahan.

Kata kunci : Lightning, Grounding, FEM (*Finite Element Method*), Numerical Simulation

ABSTRACT

This study was conducted to analyze the voltage distribution in a grounding system resulting from variations in lightning current waveforms using FEM (Finitel Element Method) as a numerical analysis with simulation approach based on the ANSYS Maxwell Electronic with Electric Transient Solver. The background of this research stems from the phenomenon of lightning strikes that can cause hazardous ground voltage surges, requiring an in-depth study of the effects of lightning current characteristics and strike locations. This research employed simulations by varying two main parameters: the types of lightning current waveforms (2.6/50 µs, 8/20 µs, and 10/350 µs) and the strike locations (center, T-side, and corner). The simulation results indicate that both the waveform and strike location of lightning significantly influence the voltage distribution in the grounding system. The 2.6/50 µs waveform produces the fastest voltage spread, the 8/20 µs waveform decays the quickest, while the 10/350 µs waveform maintains its peak voltage for the longest duration. Meanwhile, strikes occurring at the center of the grounding grid generate the most uniform voltage distribution, whereas strikes at the edges or corners create the highest voltage concentration, posing the greatest electrical hazard around the grounding system.

Keywords : Lightning, Grounding, FEM (Finite Element Method), Numerical Simulation