

Assessment of the Lightning Performance of overhead distribution lines based on Lightning Location Systems data

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Abstract

This article presents the Lightning Performance (LP) assessment of a realistic portion of the Italian distribution network with the use of probability distributions for lightning parameters inferred from local data recorded by a Lightning Location System (LLS). The procedure considers downward negative first, negative subsequent, and positive return strokes, taking into account the number of strokes per flash (flash multiplicity) and the distance among return stroke impact points within the same flash (stroke terminations distance). The analysis of the effect produced using LLS data on the estimated number of flashovers per year on the test line is achieved by replacing one by one the standard distributions and parameters typically adopted in the literature, with those inferred from the LLS, when they can be considered reliable. Results show that adopting LLS-inferred parameters and distributions produces significant (positive or negative) variations in the estimated number of flashovers with respect to values computed with the standard approach.

Keywords: Lightning Locations Systems; Lightning Performance; Monte Carlo method; Overvoltage protection; Lightning parameters.