

1 Evaluation of Lightning Incidence to Elements of a Complex Structure:
2 A Monte Carlo Approach

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13 Abstract

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15 There are complex structures for which the installation and positioning of the lightning
16 protection system (LPS) cannot be done using the lightning protection standard
17 guidelines. As a result, there are some “unprotected” or “exposed” areas. In an effort to
18 quantify the lightning threat to these areas, a Monte Carlo statistical tool has been
19 developed. This statistical tool uses two random number generators: a uniform
20 distribution to generate the origin of downward propagating leaders and a lognormal
21 distribution to generate the corresponding returns stroke peak currents. Downward
22 leaders propagate vertically downward and their striking distances are defined by the
23 polarity and peak current. Following the electrogeometrical concept, we assume that the
24 leader attaches to the closest object within its striking distance. The statistical analysis is
25 run for N number of years with an assumed ground flash density and the output of the
26 program is the probability of direct attachment to objects of interest with its
27 corresponding peak current distribution.
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