28th International Conference on Lightning Protection

Topic IV: Lightning attachment Moderator's Report

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The attachment of a lightning flash to a structure takes place through a series of complex physical processes including the inception of streamers from the structure, the streamer to leader transition, the launch of a continuous propagation of a connecting leader and the successful meeting of the connecting leader with the down coming stepped leader. These physical processes are determined by the electric field between the tip of the down coming stepped leader and the structure. The situation is complicated further due to the structure geometry and the corona space charge that can modify this electric field. This shows that in reality the widely-used rolling sphere method downplays the physics of the problem. This moderator believes that the time is ripe to include more physics into the problem of lightning attachment and to gather experimental data in the field that could be used to test these theories. Indeed, one can see from the papers submitted to this section that this view is also shared by many who work with the lightning attachment studies. The papers, **IV-3**, **VI-10**, **IV-11** and **IV-15** attempt to include physics into the problem of lightning attachment. The papers, **IV-1**, **IV-7**, **IV-8** report experimental/or theoretical studies on the space charge generation from conductors exposed to electric fields generated by thunderclouds and its influence on lightning attachment. The papers, **IV-6** and **IV-16** provide experimental evidence from the field that illustrate the complex nature of the lightning attachment. The paper **IV-2** illustrates how the computer simulation techniques could be utilized to evaluate the lightning protection of very large structures. The papers, **IV-4** and **IV-14** study the influence of field enhancement due to structures on the lightning attachment. There are two papers, **IV-5** and **IV-13** dealing with the conventional rolling sphere method but they illustrate the subtleties of this method when various statistical parameters are taken into account. There are several papers dealing with the laboratory experiments e.g. **IV-9**, **IV-12** and **IV-17**. Even though it is true that the laboratory experimental results cannot be directly extrapolated to lightning, these studies serve as probes to study the basic physics involved in the breakdown processes. Since the underlying physics is the same in small as well as long electrical discharges, laboratory studies serve in providing various parameters which are of interest even in lightning attachment studies. Moreover, the self consistent models developed for the purpose of lightning attachment should also be able to predict what happens in the laboratory gaps. In that respect these laboratory experiments will provide valuable information to test the physics that was incorporated into the problem of lightning attachments.

On the other hand, the judgement of the correctness of the experimental procedures and the physics utilized in the studies to be presented in this session will be left to the international scientific community gathered at the conference.

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