



Investigation of peculiarities of discharge between artificial thunderstorm cell and ground in presence of model hydrometeors array

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Results of the experimental investigation of the specific influence of the model hydrometeor group (simulating the different variants of the large hail arrays) on the peculiarities and the characteristics of the discharge between the artificial thunderstorm cells and the ground are presented. Complex model hydrometeor array consisting of the model hydrometeors with the different forms and sizes (typical situation for thunderclouds) has been investigated. Artificial thunderstorm cells of the positive and negative polarity and the combination of the vertically disposed cells of the same polarity were under the investigation.

On the base of the generalization of the received experimental data, it was found that the probability of the discharge initiation, peculiarities of the following its development, and the characteristics of the return stroke significantly depend on the specific parameters of the model hydrometeors group and the artificial thunderstorm cells.

Relative to the arrays of the alike model hydrometeors the specific peculiarities of the discharge initiation and propagation stimulation between the artificial thunderstorm cells and the ground have been found for the arrays consisting of the different model hydrometeors. It has been established that the specific combining in the array of the model hydrometeors with the different forms and sizes could lead to the significant increase the probability of the channel discharge initiation and its successful development in the gap "artificial thunderstorm cell of negative or positive polarity – ground". Also, it was found that the distance between the neighboring model hydrometeors is one of such specific parameters too. Increasing of the distance between the hydrometeors leads to nonlinear change of the probability of the discharge artificially initiated between the charged cell and the ground. Possible reasons of such result are discussed in the paper. Peculiarities of application of such results for the natural thunderclouds and for artificial lightning initiation are considered in the paper.

Specific influence of the upper artificial thunderstorm cell on the discharge formation from the bottom artificial thunderstorm cell in presence of model hydrometeors array has been established. Probability of the channel discharge initiation between the bottom artificial thunderstorm cells and the ground significantly increased for the system of two positively charged artificial thunderstorm cells. For negatively charged artificial thunderstorm cells such effect was less pronounced. Possibilities of the scaling of received result to the real thunderstorm situation are discussed in the paper.

Analysis of the experimental results has shown the main stage of the discharge between the artificial thunderstorm cell and the ground in presence of the model hydrometeors array has the specific peculiarities of the formation and the different characteristics in dependence of the polarity of the artificial thunderstorm cell. For example, it was found that the discharging of the artificial thunderstorm cell during the main stage significantly depends on the hydrometeor array parameters. Possible influence of the natural and artificially introduced large hail arrays in thundercloud on the parameters of the negative and positive return stroke parameters are considered in the paper.

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