



Modeling of laboratory streamer discharge features leading to x-ray emissions

Nikolai Lehtinen, Nikolai Ostgaard, and Pavlo Kochkin

University of Bergen, BCSS, Physics and Technology, Bergen, Norway (nlehtinen@gmail.com)

We model the propagation of a branching negative streamer in air under the conditions of the experiment of Kochkin et al [2014, doi:10.1088/0022-3727/47/14/145203]. We compare the results with the peculiar phenomena which were observed in this experiment, such as (1) the reverse streamers which propagate towards the initiating electrode; (2) quasi-periodic pulsation of the electrode current; and (3) quasi-static spatial charge structures. Some of these features are signatures of streamer stepping and may provide the base for the transition from a streamer corona to a stepped leader. A numerical model gives an advantage of isolating the physical mechanisms which could lead to these features. We analyse how the calculated electric field may lead to acceleration of electrons and estimate the possible x-ray output in the Cooray [2009, doi:10.1016/j.jastp.2009.07.010] mechanism of streamer collision.