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Local field approximation and runaway electron generation in streamer tip conditions W.J.M. BROK, Eindhoven University of Technology, The Netherlands, CHAO LI, Centre of Mathematics and Informatics (CWI) Amsterdam, The Netherlands, J.J.A.M. VAN DER MULLEN, Eindhoven University of Technology, The Netherlands, U. EBERT, Centre of Mathematics and Informatics (CWI) Amsterdam and Eindhoven University of Technology, The Netherlands
— Recent advances in lightning and streamer physics indicate that the kinetic behaviour of particles plays a role: the detection of x-rays emanating from lightning events indicates that processes occur in which individual particles have higher energies than can be accounted for in the models that have been used in the past. In order to investigate the influence of microscopic processes such as individual electron avalanches in front of a streamer tip, we are in the process of developing a hybrid fluid – particle model. As a step towards this goal, to study the manner in which the coupling between a fluid and Monte Carlo model can be established, we developed a Particle In Cell Monte Carlo simulation of a planar front. By means of this model the electrons kinetics in the tip of the front are studied and common fluid models assumptions such as the local field approximation are re-evaluated. Enhancement of the electric field, due to space charges in the front, is shown to augment the probability of runaway electron generation in the conditions typical for negative streamers.

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