

Simulation of an avalanche of runaway electrons formed in an atmospheric pressure air discharge

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A numerical simulation of a beam of runaway electrons formed from an individual emission zone on a cathode [1] has been performed for discharges in air of atmospheric pressure. The model is based on solving numerically two-dimensional equations of motion for the electrons [2] and allows one to describe the dynamics of the fast electrons injected from the surface [3] of the emission zone. In calculations it was supposed that the electric field at the surface of the emission zone is enhanced due to which conditions are realized for the electrons injected from the surface to switch into the mode of continuous acceleration. It is shown that the formation of a runaway electron beam in a highly overvolted discharge [1] is largely associated with avalanche-type processes and that the number of electrons of an avalanche reaches 50% of the total number of runaway electrons [2].

[1] Yalandin, M. I., et al. *Technical Physics Letters* **37.4**, 371 (2011)

[2] E.V. Oreshkin, et. al., *Technical Physics Letters* **38**, 604 (2012)

[3] E.V. Oreshkin, et. al., *Physics of Plasmas* **19**, 043105 (2012).