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## Radio emission from fast streamers

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A new computational approach, based on treating an electric streamer as a nonlinear instability, allows to determine unambiguously its parameters, for a given streamer length and external electric field, which may be nonuniform. Among the determined parameters are the speed, current and conductivity inside the streamer. These parameters may vary over orders of magnitude, depending on external conditions.

We use these parameters to calculate the radio emissions which would be observed on the ground from fast discharges produced in lightning, in which streamer velocities approach a significant fraction of the speed of light. Fast discharges play an important role in lightning initiation and may be responsible for production of Terrestrial Gamma Flashes (TGF). They manifest themselves in ground-based radio observations as Narrow Bipolar Events (NBE), to which the calculation results are compared.

We will discuss conditions, the effect of which on streamer propagation (and therefore electromagnetic radiation) may be quantified with the used computational method. These include (i) the external electric field modification due to charges deposited by previous streamers; and (ii) electron attachment inside the streamer channel, which is strongly affected by cloud humidity.