INFINITE ELECTRON OSCILLATIONS NEAR THE CELL SEPARATOR IN THE SIMPLEST REACTOR

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Today, there are many unsolved mysteries in the physics of atmospheric lightning discharge. The unexplained phenomenon of atmospheric electricity is gamma-ray bursts observed since 1994 by space gamma-ray observatories (for example, BATSE, Fermi), created for observing gamma radiation from astrophysical sources. Mysterious natural gamma radiation of the earth's atmosphere is called Terrestrial Gamma-ray Flushes (TGFs). Long-term observation of TGF made it possible to establish that, apparently, this natural phenomenon is based on the acceleration of relativistic electrons in the electric fields of thunderclouds. Actually, the fundamental phenomenon is the avalanche-like multiplication of fast electrons in matter. This phenomenon was proposed by Gurevich [1], it is called runaway breakdown.

If we investigate the propagation of relativistic avalanches of runaway electrons at a sufficiently large value of the electric field in the case of two adjoining parts of the cloud with opposite directions of the electric field. In the simulation, this configuration can be described as a system of two cells with different field directions and called the simplest reactor. Under certain conditions of the system, the initiation of feedback is possible. Electrons due to the presence of a field in the system will be accelerated, and when they get into the field in the opposite direction, they will turn. Along the way, they will emit gamma quanta, on which the field does not act, thus playing a key role in the formation of a non-stop process.

In this paper, electrons were described that exist in the system and, under the action of a field, can begin to oscillate near the plane of separation of two cells, thereby maintaining feedback in the system of a simple reactor. This relationship can exist even at small cell sizes and small margins. This means that for the explosion criterion in a reactor, not only the gamma feedback is essential, but also electronic communication, contributes to the development of gamma communication.

The purpose of this work was to study the process of gamma and electron multiplication for the simplest reactor, by modeling on GEANT4. The studies were carried out for particles with an energy of 5 MeV at a height of 10 km from the Earth's surface.

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