Current system in the top ionosphere generated relativistic electrons, let out by a cloud of radioactive plasma

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In experiments such as "Starfisch" extending radioactive plasma radiates into a geomagnetic ionosphere a powerful stream of relativistic electrons. Being distributed along a geomagnetic field, beta-electrons form self-coordinated current system and generate electromagnetic indignations. Using 3D calculations of behaviour of a cloud of radioactive plasma and numerical modelling of movement beta-electrons inside and outside of a plasma cloud, the share from total emitted electrons which is capable to be grasped by the non-uniform geomagnetic field superseded from plasma is determined and to participate in formation current system. It is shown, that the radius of the current tube depends on radial distribution of plasma, and in a non-uniform magnetic field it is much less than the radius of the sphere. The amplitude of the current is proportional to activity of the plasma source and inside this source essentially depends on the speed of leaving electrons into tubes of current.

The dynamics of electrons in a tube of current, their interaction with the top ionosphere and the self-coordinated electric field was calculated numerically on the basis of a method of plasma sheets. It is shown, that if the height of a plasma source exceeds 120 km, there is an effect of partial lock-out of an output of electrons under the self-coordinated electric field. If the height of the source is about 300 km then in $5 \cdot 10^{-3}$ second a quasistationary mode of development of current system is realized. Thus the first group of electrons, penetrating to the on heights of 20–55 km, forms there a volumetric charge about 10–20 Coulomb, resolution time of which is about 100 seconds. This volumetric charge and movement of electrons in a tube of current forms electromagnetic indignations in a near area and on a surface of the Earth. The estimation of the intensity of the electromagnetic field is given in the work.