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Daniil Nikiforov

Kazan Federal University, Russia

The construction of three-dimensional model of the field of artificial glow of the ionosphere stimulated by powerful radio emission of Sura

For several years, Kazan Federal University has conducted experiments with the ionosphere heating by means of Sura in the optical range. In August 2014, data were obtained from two spatially separated optical observations of artificial glow of the ionosphere using the highly sensitive CCD camera with a vertical impact. The first optical measuring point was organized directly on the Vasilsursk (Nizhny Novgorod region, 56.15°N, 46.11°E). The second point was located in the magnetic observatory near Zelenodolsk (Tatarstan Republic, 55.93°N, 48.74°E). The first point was equipped with the camera S1C with the field view of about 20°. The second point was equipped with the camera KEO with the lens of the fish-eye with the field view of about 145°. The distance between points is about 166 km. The experiment is represented schematically in the Figure. The work is devoted to determine the geometric dimensions of the area of artificial glow of the ionosphere on two measuring points at a wavelength $\lambda = 630$ nm stimulated by powerful radio emission of Sura. To perform the work necessary to solve several problems firstly, the image is applied to the azimuthal coordinate grid in order to determine orientation of the camera. Secondly, choose the optimal algorithm for processing in order to separate the area of artificial glow, as well as choose a pair of images from different cameras synchronized by time. Thirdly, to build a three-dimensional model of the experiment by placing virtual cameras at a distance equivalent to the distance between points, and lifting the object to the height at which the glow is recorded. After completing tasks, with the aid of the editing object, we can choose a model that most clearly reflects the contours of glow area with the real images.

Biography

Daniil Nikiforov is a student of the Institute of Physics of Kazan Federal University. After completing his high school, he was accepted to the Institute of Physics. He is interested in Basic Sciences. His scientific direction is to study the effects on the ionosphere by powerful radio emission in the optical range. He shows interest to take part in the experiments on the effects on the ionosphere by powerful radio emission of Sura. He takes part in scientific-practical conferences of the University. He deals with processing of experimental data.

danila935@mail.ru

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