

MEASUREMENT OF ELECTRON TEMPERATURE AND DENSITY IN THE SPEAR-3 EXPERIMENT

Hwang-Jae Rhee

Center for Atmospheric and Space Science

Utah State University

Logan, UT 84322-4415

rhee@fiziks.physics.usu.edu

Langmuir probe was housed in the sounding rocket to test the probe's performance and to find the environmental parameters at the flight trajectory. The Langmuir probe had cylindrical geometry, and the collecting area and the guard electrode were deployed at a short distance from the vehicle surface. The probe was a gold plated cylinder with a length of 14 cm and a diameter of 0.096 cm. The bias to the probe consisted of 0.9 sec fixed positive bias followed by a down/up sweep with a total duration of 1 sec. This ensured that the probe swept through the probe's current-voltage characteristic at least once during the 1 sec quiescent periods enabling both the electron temperature and density to be measured during the undisturbed times of the flight. The experimental electron temperatures and densities were compared with those from the International Reference Ionosphere (IRI) model 1990 version. In order to make better comparison, the flight data - local time, latitude, and longitude - was used, and the geomagnetic conditions - sunspot number, solar particle effects, and solar radio flux released from the National Geophysical Data Center (NGDC) - were also referred for the IRI modeling.