R005-15
Zoom meeting C ：11/1　PM1　(13:45-15:30)
14:30-14:45

超高層大気測定用圧力計の開発

#阿部　琢美[1)],渡部　重十[2)],田中　勇人[3)],三宅　亙[4)]
[1)]ＪＡＸＡ宇宙科学研究所,[2)]北海道情報大学,[3)]東海大・工,[4)]東海大・工

Development of a pressure gauge for a study of upper atmosphere

#Takumi Abe[1)], Shigeto Watanabe[2)], Yuto Tanaka[3)], Wataru Miyake[4)]
[1)]ISAS/JAXA,[2)]Hokkaido Information University,[3)]Tokai Univ.,[4)]Tokai Univ.

We are developing a pressure gauge for installing the sounding rocket to estimate the number density of neutral atmospheric particles in the lower thermosphere. A brief overview of this instrument development will be presented in this paper.
Charged and neutral particles co-exist in the lower ionosphere. The former tends to move in a direction different from the latter, because of a difference in those behaviors against the electromagnetic force. The ionospheric current and ambipolar electric field existing in this region are attributed to a difference in a collision frequency between ion and electron with neutral particles. Characteristic phenomena such as traveling ionospheric disturbance and electron density irregularity are significantly generated due to the diversity of the particles in this region. Sounding rocket is only the platform which enables us to make in-situ measurement at altitudes from 60 to 250 km because the atmospheric drag prevents low-altitude satellite from staying in orbit for a long time period. It is desirable to develop an instrument which provides information on local quantities about charged and neutral particles.
We have started developing a pressure gauge for the sounding rocket to estimate the neutral atmospheric density in the lower thermosphere. The pressure gauge has two sensor elements; 1) crystal gauge for the relatively higher-pressure region and 2) B-A (Bayard-Alpert) gauge for the lower-pressure region. The B-A gauge will be turned on under the pressure below 4 Pa while the crystal gauge is responsible for the measurement at pressures above this threshold. In our measurement, two identical pressure gauges will be stored in two different shaped containers. The first container is designed on the basis of Patterson probe, which is known as a closed spherical container with a long tube, from which gases flow in. In the Patterson probe, incoming gas first collide with inner wall of the tube and lose translational kinetic energy, and the pressure gauge inside can measure static pressure due to thermal motion of atmospheric particles. The second one is an open-type cylindrical container. This container is newly developed in this study and has a small inlet for gas inflow. The internal structure was designed so that it can have high sensitivity in the direction of the incoming gas flow.
Both of the pressure gauges are expected to install on the top side of payload section of the sounding rocket. Detailed design of the sensor, container, and electronics will be made within one year. Laboratory experiment to evaluate the instrument performance will be made afterwards. In addition, numerical simulation to verify the instrumental response to gas inflow is planned to carry out. The latest status of our instrument development will be described in the presentation.