

Study on the Plasma Generated by Thermionic Low-Pressure Discharge to Simulate the Space Plasma Environment

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Properties of the plasma generated by the thermionic low-pressure ($\sim 10^{-4}$ Torr) discharge are reported. Plasmas are produced by a discharge device in a narrow region near one inner end of the cylindrical vacuum chamber, and they diffuse backwards to the whole space in the chamber to set up a low-density, low-temperature plasma bulk. A single Langmuir probe is used to obtain the axial profiles of the plasma density and the electron temperature. The result shows the plasmas have the electron temperature of the order of 0.1 eV and the plasma density of the order of $10^5/\text{cc}$, which is similar to the characteristics of the plasmas in the mid-latitude 200 km ionosphere. Several experiments have been performed in addition, to study the dependencies of the plasma characteristics on the anode voltage. This plasma source will be used in testing the Langmuir probe of KAISTSAT-4 and used for other useful purposes.