The new type of plasma wave instruments capable of both waveform and spectrum observation

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Recently, the miniaturization of the instruments onboard scientific satellites is required because of the diversification of observation targets and the use of microsatellites. In this study, we propose a miniaturized plasma wave instruments for both waveforms and spectrum using an ASIC with variable frequency characteristics to further reduce the size of the plasma wave instruments.

Plasma wave instrument is classified into two types: waveform type and spectrum type. Since these two types of instruments play complementary roles, it is common to have both types of instruments in recent scientific missions. These two types of instruments required different analog circuits, which led to the increase in size of the instruments. The analog circuits of the waveform type are required to have a wide bandwidth to cover the entire frequency coverage, while the spectral receiver is required to have a narrow bandwidth. The dedicated integrated circuit for the new instruments is designed to select from several cutoff frequencies of the band-limiting filter. This makes it possible to measure waveforms with a wide bandwidth when using as waveform type and with a narrow bandwidth when using as spectrum type. The new plasma wave instruments will be realized by combining such externally controllable analog circuits and digital circuits that perform the signal processing required for both the waveform and spectrum type instruments.

In the presentation, we will describe the detail design of the new plasma wave instruments and analog circuit. In addition, we will report the performance of the new receiver based on the simulation using system model.

Keywords: Plasma wave instruments, Plasma wave, Application specific integrated circuit

