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Study on the estimation of the electron density profile with time domain Full wave analysis

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MF radar estimates the electron density profile in lower ionospheric D and E regions at the altitude from 60km to 100km by using the partial reflection information of MF radar transmission wave. Electrons of lower ionosphere are closely related to neutral dynamic meteorology and chemistry including such as hydrated ion and NO_x in the region, therefore, it has the possibility to find a new physical knowledge in mesosphere and lower ionosphere. However, it is difficult to observe precise electron density profile in the lower ionosphere continuously with the present MF radar system.

In this study, we are going to simulate the observation process of the present MF radar system with using time domain Full wave method and investigate the observation method with which we can observe precise electron density profile in the lower ionosphere. One of the methods to estimate the electron density by the present MF radar system is DAE. DAE is a technique to estimate the electron density from the differential amount between the left and the right polarized waves reflected by the lower ionosphere. Therefore, we will simulate MF radar and examine the problem and improvement points with time domain Full wave analysis. Prospectively, we can expect to examine a new rocket experiment with using not only continuous waves such as broadcast waves but also impulsive waves.