RECENT PROGRESS OF THE CHUNG-LI RADAR GROUP IN THE STUDY OF IONOSPHERIC ES IRREGULARITIES

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Abstract:

It has been more than ten years since the capability of the ionospheric observation was implemented at the Chung-Li VHF radar. In this report, we present the recent progress in the investigations of the ionsopheric Es irregularities. With the interferometry technique, we develop a method to reconstruct the three-dimensional structures of the Es field-aligned irregularities in the expected echoing region with slit-like configuration. We find that the structure the type 2 irregularities may be in a form of horizontal thin layer, or well-organized clump shape, or loose cluster. The characteristics of the different plasma structures are statistically analyzed. The plasma structure of the type 1 irregularities is also analyzed and the results show that the zonal extent of the spatial structure of the type 1 irregularities assembled in a form of thin layer with thickness of 1-2.5 km may be as large as greater than 12 km. The beam broadening effect on type 2 radar spectrum due to the drift of the type 2 irregularities is investigated theoretically and experimentally. We find that the beam broadening effect may appreciably dominate the Doppler spectral width of the Es type 2 field-aligned irregularities. We also examine the frozen-in property of the Es 3-meter plasma irregularities and the results indicate that the irregularities assembled in a form of clump-like structure show the frozen-in property, but they are not for the irregularities grouped in a thin layer structure.