Derivation of cross-section shape of sporadic E by HF-Doppler spectral analysis

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The surface of the frontal sporadic E (Es) was not same cylindrical shape, but was found that had the structure that varied according to the arrival place on the cross-section surface [1] [2].
In this study, surface of cross-section of the frontal Es via the middle reflection point of HFD of Kanto is observed and three dimensions of details data of the electric field strength every the Doppler shift frequency of the neighborhood at the midway point passage time is demanded. the change is considered to be the incidence angle dependence of the equivalence of value dispersion cross section when an electric wave was incident on a surface of slim frontal Es from the lower part in time for field strength that cut and brought down these data every constant frequency. Because the baseline halfway houses between each transmission and reception points are different, the section of the reflection surface of the frontal Es is estimated finely. A movement direction and the speed of the frontal Es is found by performing this analysis at a plural observation point and the cross-section of the reflection surface of the whole surface of the frontal Es is derived in detail.
For this method, the result that investigated a cross-section structure of the shape of surface of the frontal Es lower part by analyzing HF Doppler spectral using four transmit frequencies in detail at multiple receiving points of the Kanto HFD observation network was showed. A change really demands an average change from the electric field strength graph which cut and brought down observation data in the frequency direction by a quadratic equation fitting by the least-squares method because it is difficult to greatly analyze it directly. Based on this average change, the max field intensity, the time and 3 dB time width every the Doppler shift frequency are found. The surface of cross-section width of the surface of the frontal Es undersurface is found from the product of width and the horizontal mobility speed with the irregularity of the surface of cross-section is estimated at 3 dB time width from the max field intensity and the time.
The above-mentioned method of analysis was applied, found it about a sectional structure of surface of the frontal Es observed in 21 JST(UT+9) of January 16, 2013 and 19th in detail. The surface of the frontal Es of January 16 was 205 m/s and move to the 279° direction, January 19 was 151 m/s and move to the 205° direction. The both of frontal Es were high speed and have small cross-section width. The high speed frontal Es has few changes at peak field intensity for time, and has the structure that was cylindrical or near. In addition, as for the surface of the frontal Es of January 16, section width of high frequency becomes about the same with Fresnel zone diameter (4.1km); center of circle structure becoming higher leading electron density in this at the midway point passage time of the Es at each frequency was different, and center sectional structure knew that there was a degree of leaning.
By the lecture, I am going to argue about the sectional structure by applying this analytical method for the different surface of the water-formed Es of the Doppler shift change curve.

[1] Hiroki Ohta and Ichiro Tomizawa: Derivation of shape of cross-section of frontal sporadic E by the HF Doppler spectral analysis, JPGU 2015, P-EM27-P11, 2015.5.
[2] Ichiro Tomizawa and Kotaro Fujii: HF propagation model reflected by frontal Es, JPGU 2013, PEM29-01, 2013.5.

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