Theoretical Study & Modeling of the Intensity Distribution of VLF Signals

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Study of Very Low Frequency (VLF) radio electromagnetic wave is very important for knowing the behavior of the Ionospheric layer structures due to Earthquakes, Solar flares, and other terrestrial and extra terrestrial radiations like GRB & SGRs. The VLF signal of frequency 18.2 KHz, transmitted by Indian Naval Transmitter VTX at Vijayanarayanam near the southern tip of Indian subcontinent, is being received constantly all around the world. According to many receiving station data around India, this VLF signal strength varies significantly with place & time. To understand the diurnal & annual variation of the received signal, a complete knowledge of physics of intensity distribution of the VLF signal is essential. The spatial variation of VLF signal plays important role in selecting future VLF stations. In this model presented here, a horizontally stratified ionospheric layers have been considered. The VLF wave emitted by the transmitter has both the ground wave & the sky wave components according to the model. This ground wave attenuates during propagation. The sky wave component experiences reflection by the ionosphere on its way to the receiver and its attenuation depends on the degree of ionization. Intensity variation occurs at a given receiver location for interference among singly & multiply reflected waves. This has been simulated considering some simplified & justifiable assumptions.

References

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