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Ray Tracing Study of the Variation of GPS Occultation Signals

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The FORMOSAT-3/COSMIC mission is a collaborative Taiwan-US science experiment to deploy a constellation of six microsatellites in low Earth orbits for weather forecast, climate monitoring, and atmospheric, ionospheric, and geodesy research. The GPS Occultation Experiment (GOX) payload tracks GPS signals to collect data for radio occultation sounding and precise orbit. The occulted GPS signal passing through the ionosphere and atmosphere will be refracted to lead to the signal bending and slowing. We study the propagation of GPS signals in the atmosphere and ionosphere based on ray tracing simulations. The ray path is traced by a basic ray tracing technique in the approximation of geometric optics. Especially, the high order terms in plasma dispersion relation are also included to obtain the information related to geomagnetic activities. The GPS L1/L2 wavelengths are on the order of 20cm. Therefore, our study is useful for the investigation of irregularities in the atmosphere and ionosphere.

Keywords: FORMOSAT-3; COSMIC; occultation; ray tracing.

References

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