Application of GPS Ionospheric Tomography to Navigation Solution

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Abstract: Ionospheric activity is very severe in Taiwan, more detailed study of ionosphere can improve the GNSS positioning accuracy, and it can also learn more about the details of the ionospheric structure. Most available ionospheric models are based on a single ionospheric layer. An obvious drawback of such models is that they all assume that the electrons in the ionosphere are concentrated in a thin shell with an altitude between 250 through 450 km above Earth's surface. In fact, the ionosphere covers a region approximately between 50 and 1000 km above Earth's surface. This assumption would introduce extra modeling error. Taiwan has one of the best ground-based permanent GNSS network, using the measurements of the GNSS network and computerized ionospheric tomography (CIT) technology, three-dimensional total electron content (TEC) can be obtained. This study establish three-dimensional ionospheric model in Taiwan, and use this mode to improve GPS positioning accuracy.

Key words: Computerized Ionospheric Tomography (CIT), three-dimensional ionospheric model