

SIMPLER MAPPING FUNCTION FOR GPS TROPOSPHERIC DELAY

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The accuracy of Global Positioning System (GPS) measurement is determined by the sum of several sources of error, such as orbit error, satellite clock error, multipath error, receiver noise error, selective availability, ephemeris error and also atmospheric error. The principal error source in the GPS technology is a delay experienced by the GPS signal in propagating through the electrically neutral atmosphere, usually referred to as a tropospheric delay. This delay is normally calculated in the zenith direction, and is referred to as a zenith tropospheric delay. The delay consists of a zenith hydrostatic delay, which can be modeled accurately using surface barometric measurements, and a zenith wet delay, which cannot be modeled from surface barometric measurements and depends on atmospheric water vapor. The mapping function is the coefficient for the zenith delay, either hydrostatic (dry) or non-hydrostatic (wet) delay that can be used to increase or reduce the tropospheric delay.

In this research, UNBab mapping function is selected to be simplified. For the simplification of the mapping function models, regression method has been used to find the suitable equation. The simplified UNBab mapping function can reduce the number of operation compared to the original mapping function. The calculations of the sum of errors show that the deviation of the simplified model from the original model is not significant. The simplification of the mapping function models can also create better understanding of the models by using hiperbolic, linear and also quadratic equations rather than continued fractions.

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