Deriving Orthometric Heights from GPS Measurements Using a Height Reference Surface

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ABSTRACT

The use of navigation satellites for geodetic surveying is common practice today. The combined use of satellite receivers with total stations and levels is also relatively frequent.

The heights, or height differences, derived from satellite measurements refer to an ellipsoid. Orthometric heights refer to a geoid. To derive orthometric heights from satellite measurements and to combine satellite with traditional measurements, both require knowledge of the relationship between geoid and the ellipsoid in the area.

This paper describes a simple way of deriving orthometric heights from satellite measurements in areas where the geoid varies significantly. By use of a height reference surface the deflections of the vertical are computed and height differences are corrected.

The method is tested on a few projects with GPS data. The method seems to work well also in areas where the deflection of the vertical vary considerably. The method also gives good results when the height reference surface and the computations are referred to different geodetic reference frames. In addition a method to visualize the variation of the deflection of the vertical by computing the curvature of the height reference surface is shown.

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