Investigation of Orthometric Height Correction on Spirit-Levelling

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The geoid is the reference surface for Orthometric heights and its fluctuation reflects the variation of Earth's gravity field mainly due to the density variation of sub-surface masses. To determine orthometric heights, gravity must be observed at the particular location. However in many regions, orthometric heights are obtained without gravity data through spirit-levelling technique. The objective of this study is to investigate the effect of orthometric height correction on spirit-levelling. Numerical experiments were carried out through field tests based on computed gravity at each set-up of the staff along number of leveling routes in the study area.

The study area is Pambahinna located in the Ratnapura district, Sri Lanka. The area lies approximately between 6° 42' - 6°44' N latitudes and 80° 46' - 80°48' E longitudes. In this study, fly- back levelling method was adopted and level lines run approximately North-South and East-West directions. The Earth Gravitational Model 2008 (EGM2008) was used to obtain the gravity anomalies along spirit leveling routes and subsequently gravity values at same locations were computed. Numerical investigations were carried out to find correlations of the computed orthometric height correction with direction, gravity and Height. From the obtained results of this study, it can be concluded that, the orthometric height corrections should be taken into account when high level of accuracy is required.

Keywords: EGM2008, Geoid, Gravity, Height, Levelling