

Comparative Study on Ellipsoidal and Orthometric Heighting on Construction Sites

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SUMMARY

The work refers to the possibility of obtaining normal-orthometric heights from ellipsoidal heights GPS but without a geoidal model. I suggest the use of a mathematical model that models the correlation between the orthometric and ellipsoidal heights directly. For purposes of autocorrelation, the positional horizontal coordinates were included as some of the determinants of the correction factor. This research relied on the determination of some geodetic coordinates on twenty-six bench marks through GPS – leveling. The “Parametric Model Design” adopted a three parameters and one-dimensional transformation using Hofmann – Wellenhof, 1994 equation of the form $H_i = h_i + \Delta h - y_i \cdot \partial\alpha_1 + x_i \cdot \partial\alpha_2$. With the method selected, the classic empirical approach of assessing the goodness of fit, by performing cross-validation and testing for parameter significance were adopted in addition to the R-squared value and the mean absolute error (MAE).

The results showed that the developed model is capable of accuracies of ± 0.4253 meters in standard deviation and a mean absolute error of 0.3499 meters. The coefficient of determination was found to be 99.93% and the results goodness of fit further authenticated through a cross validation process. It is recommended that the accuracies obtained in this work would largely be improved to centimeter level by modifying the model used to include polynomial functions instead of the linear model used. It is further recommended that as, GPS-Levelling promises to be a good option for the country, a coordinated effort be employed to obtain common points Sufficiently dense over the country to obtain a country-wide model.