

Modern Height Determination Techniques and Comparison of Accuracies

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SUMMARY

In academic studies and engineering works, it is required to determine height differences between points or the height of points itself in those applications such as measurements of national or local networks, vertical applications of bridge, dam and infrastructures, maintenance and control measurements, determination of vertical crustal movements, motorway, railway, sewerage and pipe line measurements.

Height determination can be classified as geometric levelling, trigonometric levelling and GPS/Levelling depending on used instruments or the methods applied. They have advantages and disadvantages.

The purpose of this study is to analyze the trigonometric levelling with using total station, which are capable of high accuracy observing vertical angles and distances, geometric levelling with using digital level and GPS/Levelling with using GPS observations. To fulfill this aim, a levelling line with 11 points was established in Alaeddin Keykubat Campus area of Selçuk University. During the study done on this levelling line, three separate geometric levelling with different three equipments (Wild N3 precise level, invar rods, Sokkia B2 automatic level and wooden rods, Sokkia SDL 30M digital level and bar coded aluminum rods), trigonometric levelling by using different two equipments (Wild T2 theodolite for vertical angle measurements and Topcon GTS 701 electronic total station for distance measurements, only Topcon GTS 701 electronic total station for vertical angle and distance measurements) and GPS/levelling (with Leica 9500 receiver) were used. The height differences of precise levelling were assumed as true values, and these differences were then compared with these from other techniques and mean square errors were computed using these measurement differences. Consequently, it was seen that the results from digital level showed the best approach to those from precise geometric levelling.