

Development of Linear Spatial Geodesic Standards for Calibration of Total Station and Receivers GNSS

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SUMMARY

In this article the project of improvement of the standard spatial geodetic baseline (SSGB) and the standard spatial geodetic network (SSGN) for coordination of lengths of the lines which are measured by laser rangefinders and GNSS technology is developed.

The SSGB consists of 20 points. The length of the SSGB is 2260 m. Measurements are performed by calibrated total stations and GNSS technology. The Leica AT401 laser tracker is now also used to of SSGB line length measurements up to 500 m. In these measurements, the geodetic baseline is divided into intervals up to 75 m long. Studies have shown that the uncertainty of line length measurements with the Leica AT401 laser tracker is almost 4 times better than the regression formula. Line lengths up to 1000 m can be obtained with high-precision electronic rangefinders and GNSS technology. Lines longer than 1000 meters are best determined by GNSS technology. To bring the inclined distances to the horizon plane, the heights of all EPGB and EPGN points are determined from the geometric leveling according to the class 2 program.

The SSGN consists of five fundamental points. The coordinates of the SSGN points are determined from the processing of round-the-clock sessions of GNSS observations. The duration of observation campaigns is 3-5 days. To increase the accuracy of the coordinates of the SSGN points, one of the points will be equipped as a permanent station one. For calibration of GNSS receivers, an internal geodetic network in the form of an octagon is designed. To test the accuracy of GNSS leveling the heights of the points are determined from the geometric leveling. For corrections of geometric leveling are laid points of gravimetric network. The SSGN points will be combined with gravimetric points. The starting point of the gravimetric network will be set with a value of the acceleration of gravity with an accuracy of about 10

μGal.

Conclusions.

1. The combination of ground-based linear measurements and GNSS technology will establish the cause of the difference between the line lengths measured by these methods.
2. The coordinates of the points of the internal network will be determined and adjusted by the lengths of the lines measured by electronic rangefinder and by GNSS measurements for increase the accuracy of calibration of GNSS receivers.

The EPGB and EPGN together with the performed gravimetric measurements can simultaneously become a reference for gravimetric measurements.