Geophysical Research Abstracts
Vol. 19, EGU2017-2974, 2017
EGU General Assembly 2017

An Investigation on the Reliability of the Robust Methods in Deformation Analysis

Bahattin Erdogan and Gulsah Mandalinci

Yildiz Technical University, Civil Engineering Faculty, Department of Geomatic Engineering, Istanbul, Turkey (berdogan@yildiz.edu.tr)

Deformation analysis conventionally depends on the comparison of coordinate differences between different observation epochs. If the coordinates' differences are statistically confirmed, then the changes in point coordinates are interpreted as the displacement. At the first step, global congruency test is applied and if H0 hypothesis is rejected the localization process is performed. Moreover, coordinate transformation between two epochs is employed for deformation analysis. In this case robust methods can be carried out. The residuals estimated in coordinate transformation are used for detecting displaced point(s). Chi square test is implemented for having a decision whether the differences between two epochs are deformation or not. Furthermore, we can investigate the displaced point(s) by using residual of transformed coordinates in the outlier detection problem. For this problem conventional or robust methods can be implemented. In this study the reliability of the robust methods in deformation analysis have been investigated at the simulated horizontal control network. The displacement magnitude has been estimated depending on the displacement ellipse. After simulating observations for two epochs, since first epoch's observations contain only random errors and second epoch's observations contain both random errors and displacement; the conventional deformation analysis method, robust methods that use chi square test and outlier detection methods have been applied. The reliability has been measured by Mean Success Rate. The results show that, if one point in the network is displaced, the reliabilities of the methods are high. Nevertheless, for two or more displaced points the reliabilities of the robust methods decrease significantly.

Keywords: Deformation Analysis, Robust Methods, Coordinate Transformation, Reliability, Mean Success Rate