Theoretical and Empirical Minimum Detectable Displacements for Deformation Networks

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SUMMARY

In deformation analysis, statistical methods have been used to determine displaced point(s) and to identify the characteristic feature of object with a high of probability. These methods can sometimes have wrong results; that's why the reliability of the method should be known. However; to measure the reliabilities of the methods, it is required to know actual displaced point(s) before the analysis. Since it is impossible in practice, displacements of points are simulated. Displacement ellipse of point have been used to determine the magnitude of minimum detectable displacements of point. However, the magnitudes and directions of semi-minor and semi-major axes are different, corresponding displacement circle can be used to calculate minimum detectable displacement. Displacement circle is an empirical method. Also, minimum detectable displacement based on the non-centrality parameter is also important for the sensitivity of a deformation network which is characterised its efficiency to detect displacements in the area covered by the network. This method is called theoretical method. In this study, we have investigated methods to measure which is more realistic, both empirical and theoretical minimum detectable displacements have been calculated for horizontal control network and GPS network. At the same time, an empirical method based on global test for minimum detectable displacement has been estimated. The theoretical minimum detectable displacements changes for different power of the test (e.g. 70%, 80%). It has been shown that the theoretical minimum detectable displacements converges to empirical minimum detectable displacements when the power of test is %70.