Robustness Analysis of the GPS Network of Oran City, Algeria.

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SUMMARY

Nowadays, GPS geodetic networks are used for several types of surveys, such as geodetic and topographic surveys, geodynamic monitoring and structures auscultation, etc. Generally, to analyze and control the quality of these GPS networks, the statistical and reliability aspects are studied. These analyses have been augmented with geometrical strength analysis using strain technique, resulting in the concept of the robustness analysis. This later is a combination of reliability and deformation of the network. The network robustness is quantified according to threshold values which are computed from errors confidence of adjusted points. The displacements of GPS points are compared to these threshold values, this permit to identify the weakness regions of the network in order to remedy them by changing the configuration or improvement of observations until acceptable robustness. The deformation of the network, due to measurements errors, can be expressed in terms of robustness in scale, in configuration and in twist. Throw this work, software of processing, reliability and robustness analyses of GPS networks has been realized, called ROBANA_3DNET. The validation of this program was performed on a test network composed of 45 points of the Oran city GPS network. The obtained results show the powerful and the efficiency of the analysis methodology adopted.