

Finite Elements Method and Its Space Application in the Study of Movements and Deformations of GNSS BULiPOS Reference Stations in Bulgaria

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SUMMARY

The main objective of the work is the study of motion of GNSS BULiPOS reference stations in Bulgaria by applying Finite Elements Method (FEM) for the space. A development of the theoretical basis of the Finite Element Method for the spatial case is proposed. The developed model is applied to study the spatial changes of GNSS reference stations from BULiPOS network in Bulgaria. GPS data from one-week periods in five years 2009-2013 are used and processed with Bernese software, Version 5.0. Obtained estimations of Cartesian coordinates of the stations are used in the proposed FE model. Vectors of displacement for each apex of each formed finite element (triangle), change the lengths of the sides of each triangle and relative deformations of the sides of each triangle are calculated. The results obtained have been analyzed and areas of compression and extension have been inferred. An assessment of the effectiveness of the proposed method is made.