

Approximation of local covariance function for geoid undulations and its application in the refinement of local geoid: a case study

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Collocation is widely used for the processing of geodetic measurements, especially for the gravity data. One of the advantages is that collocation can deal with different types of observed gravity data simultaneously. However, the covariance function should be known. In the paper, based on the empirical formulae, the local covariance function for geoid undulations over Shenzhen, P.R.China, is approximated by Gauss function and polynomial function, respectively. To evaluate the effectiveness of the local covariance models, the geoid heights computed by collocation method are compared to those derived from the observed high precision GPS/leveling data at 29 checkpoints. The comparison results show that the polynomial model of the local covariance function is better than the Gauss model. Furthermore, on the basis of the polynomial model of the local covariance function, the collocation method is employed to refine the geoid of Shenzhen. The test results demonstrated that the method is very useful and effective, and the geoid can be improved significantly.

Keywords: collocation; geoid; covariance function; polynomial fitting.

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