

Precise Determination of Hong Kong Geoid Using Heterogeneous Data

Dr. LUO Zhicai and Prof. CHEN Yong-qi, Hong Kong, China

Key words: Geoid determination, GPS/leveling, Gravity anomaly, Digital terrain model, Geopotential model.

ABSTRACT

The precise determination of local geoid is of considerable importance not only for surveying and mapping but also for studying some related problems of geophysics, oceanography and geodynamics, and now especially for applying GPS technique to determine orthometric or normal height in geodesy and surveying engineering. In the paper, based on the remove-restore technique, the Hong Kong gravimetric geoid with resolution of one kilometer has been computed using high degree global spherical harmonic geopotential model WDM94, gravity anomalies and digital terrain model which covering the whole territory of Hong Kong and its neighboring region. By comparing with precise GPS/leveling data the standard deviation of the geoid is ± 7.6 cm, and the relative accuracy about 4ppm for baseline length longer than 50 km. The results illustrate that the systematic bias exists obviously between the two types of geoid heights. Employing four parameter transform model the gravimetric geoid can be improved significantly by precise GPS/leveling data. The results show that the standard deviation of the improved geoid is ± 1.9 cm, and the relative accuracy better than 1ppm for baseline length longer than 40 km. Moreover, after the systematic bias removed the combined geoid was obtained by interpolating the residuals at grid points with Shepard surface fitting method, and the final geoid will be evaluated using independent precise GPS/leveling data in near future.

CONTACT

Prof. Y.Q.CHEN and Dr. Z.C. LUO

Department of Land Surveying & Geo-Informatics, The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

P. R. CHINA

Tel. + 852 2766 5966

Fax + 852 2330 2994

E-mail: lsyqchen@polyu.edu.hk and lszcluo@polyu.edu.hk

Web site: <http://www.lsgi.polyu.edu.hk/staff/YQ.Chen/index.htm>