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On Precise Orbit Determination of HY-2 with Space Geodetic Techniques

Jinyun GUO[1,2,3], Qiaoli KONG[1,2,3], Jian QIN[1], and Yu SUN[1]

[1]College of Geodesy and Geomatics, Shandong University of Science and Technology, Qingdao, China; e-mail: jinyunguo1@126.com (corresponding author)

[2]Key Laboratory of Surveying and Mapping Technology on Island and Reef, National Administration of Surveying, Mapping and Geoinformation, Qingdao, China

[3]State Key Laboratory of Geodesy and Earth's Dynamics, Wuhan, China

Abstract

As the first radar altimetric satellite of China, HY-2 requires the precise orbit determination with a higher accuracy than that of other satellites. In order to achieve the designed radial orbit with the accuracy better than 10 cm for HY-2, the methods of precise orbit determination for HY-2 with the centimeter-level accuracy based on space geodetic techniques (DORIS, SLR, and satellite-borne GPS) are studied in this paper. Perturbations on HY-2 orbit are analyzed, in particular those due to the non-spherical gravitation of the earth, ocean tide, solid earth tide, solar and earth radiation, and atmospheric drag. Space geodetic data of HY-2 are simulated with the designed HY-2 orbit parameters based on the orbit dynamics theory to optimize the approaches and strategies of precise orbit determination of HY-2 with the dynamic and reduced-dynamic methods, respectively. Different methods based on different techniques are analyzed and compared. The experiment results show that the non-spherical perturbation modeled by GGM02C causes a maximum perturbation, and errors caused by the imperfect modeling of atmospheric drag have an increasing trend on T direction, but errors are relatively stable on the other two directions; besides, the methods with three space geodetic techniques achieve the radial orbit with the precision better than 10 cm.

Key words: HY-2, precise orbit determination, DORIS, SLR, satellite-borne GPS, dynamic method, reduced-dynamic method.

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