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Design of the Geodetic SVLBI Satellite Orbit

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Abstract: The unique radio astronomical technique of Space Very Long Baseline Interferometry (SVLBI) is an extension of the ground-based VLBI into the space. It has some important potential applications in geodesy and geodynamics, including the definition, practical realization, and the interconnection of different reference frames, determining the geocentric positions of VLBI stations, estimation of the gravity field of the Earth, and satellite orbit determination using the delay and delay rate observables. With the launching of the first SVLBI satellite of the VLBI Space Observatory Program (VSOP) of Japan, in February 1997, this technique has become a reality. But the geodetic and geodynamic study requires precise tracking capabilities resulting in cm orbit accuracy. Appropriate design of geodetic SVLBI Satellite Orbit is helpful to improve the accuracy of satellite orbit determination.

Based on the above, this investigation studies and summarizes the geodetic requirements of space VLBI satellite, studies several technologies which will possibly be able to determine the orbit of space VLBI satellite,analyses the time efficiency of the joint observations and the efficiency of observing radio source . And then, according to the kind of tracking satellites(such as GNSS,and especially the Relay Satellite) and the requirements for geodetic and astrometric study, the six Keplerian elements of the space VLBI satellite are determined,and the results are present.

Key Words: Geodesy; SVLBI; Satellite Orbit Determination; Relay Satellite

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