ORBIT DETERMINATION OF THE NOZOMI SPACECRAFT USING DIFFERENTIAL VLBI TECHNIQUE

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We performed a preliminary differential VLBI (DVLBI) observation with National Astronomical Observatory (NAO) and the Institute of Space and Astronautical Science (ISAS) to determine precise orbit of the GEOTAIL spacecraft on June 4, 2002. The purpose of this observation is to establish the positioning technology for the interplanetary spacecraft using differential VLBI in realtime. Our main concern is to determine the PLANET-B (NOZOMI) orbit just before the second swing-by on next June [Yoshikawa et al., 2001]. It is significantly important to get the timing to maneuver the spacecraft before the swing-by. However, the usual range and range rate orbit determination will not be available because it will be difficult to point the high-gain antenna mounted the spacecraft toward the earth at that time. So we need a new technique to determine the precise orbit of the NOZOMI.

We performed several DVLBI observations for the NOZOMI spacecraft since September 2002 using the 'IP-VLBI system' which is under development at Communications Research Laboratory (CRL) [Kondo et al., 2002]. We are developing an orbit determination software package to analyze the DVLBI observables. The VLBI delay model for finite distance radio source is already implemented in the package [Sekido et al., 2003]. The package will include the DVLBI observation scheduling to take account of the passage of the spacecraft near the quasar line of sight and the propagation delay estimating for the ionosphere and the neutral atmosphere. We will present the orbit determination accuracy of our package and an evaluation of the propagation delay models in the meeting.