A Navigation Summary of OMM6 Performance

OMM6 was successfully implemented 20 May 1994 at the scheduled burn centroid time of 23:52:00 UTC. The commanded ΔV magnitude was 3.1479 mm/sec, compared to an ideal value of 3.15 mm/sec. This maneuver was designed to increase the mean semi-major axis by ~6.76 meters in order to reverse the satellite ground track drift westward to remain inside the ±1-km control band. Independent evaluation techniques used by the NAVT and the GSFC/FDF agreed very well, both determining that the achieved ΔV magnitude was 3.123 mm/sec, or ~0.8% low.

Maneuver evaluation for previous OMMs (OMM1-5) used an orbit determination strategy which estimated an along-track thrust parameter to define the ``anomalous force" using tracking arcs of up to four days. Inflight experience has consistently shown that tracking arcs less than four days do not have sufficient information content to obtain a reliable estimate the thrust parameter. A degraded estimate of the thrust parameter corrupts the estimate of semi-major axis, the parameter most critical to the maneuver evaluation process.

For OMM6 maneuver evaluation, apriori estimates of the thrust parameter based on the best available prediction model were used in all orbit determination solutions. Previous inflight testing during periods of fixed yaw confirmed that this technique would yield more consistent estimates of semi-major axis.

The enclosed table entitled Post-OMM6 OD & Maneuver Parameters compares a series of four maneuver ΔV magnitude estimates independently obtained by the NAVT and the GSFC/FDF using different evaluation techniques. Each set of the four solutions reflects an additional day of tracking data, up to four days. The differences in achieved maneuver magnitudes obtained by the NAVT and the GSFC/FDF are negligible, agreeing much better than previous OMMs, when differences of ~0.02 mm/s were typical. This evalutation difference is slightly larger than the fixed commandable ΔV magnitude error of 0.013 mm/sec.

This new technique should provide similar results in future OMMs and reduce the contribution of maneuver magnitude evaluation error to thruster calibrations needed for maneuver design.

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