

Orbit Determination for Space Debris Tracking using Laser Ranging and Angular Data from An Encoder in Geochang SLR system

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Reliable Orbit Determination(OD) for space debris tracking might be accomplished as increasing an accuracy of measured data, types of measurement and numbers of the tracking station. Newly constructing Geochang Satellite Laser Ranging(SLR) station will operate its system independently but the system will be a millimeter level range accuracy and can provide angular data with 1 arc-second accuracy from system's encoder. This research investigates Orbit Prediction(OP) capability of an OD process using range and angular(azimuth and elevation) data which can be obtained from Geochang SLR system's encoder, not from other optical tracking systems. An analysis is conducted under similar environment from general SLR's OD(range only) process except including the angular data. Periods of measuring data and accuracy difference between angular data obtained from the encoder and general optical tracking system are analyzed.

The results show that the improvement of OP accuracy when using range and angular data together for the OD of space debris. And a case of using the angular data from the encoder can predict better than a case of using the angular data from other optical tracking systems. Moreover, this OD process using both range and angular data makes periods of measuring data shorten to reach optimal orbit prediction accuracy. The results are achievable due to the angular data from the encoder is more accurate. And it can obtain longer periods of measuring data than other optical tracking systems. Because it does not be affected by the sun-illuminated and visible condition to obtain the angular data.