

Liang Zhipeng, Han Xingwei, Fan Cunbo, Liu Chengzhi

Orbit Determination of CZ-2C Rocket bodies with SLR

To examine the feasibility for satellite laser ranging (SLR) technology to track space debris sustainably and independently, the experiment of laser ranging observation and precise orbit determination of in-orbit CZ-2 rocket body is carried out, while methods of observation and orbit determination are discussed in detail. Firstly, two line element (TLE) is used for tracking operation and data acquisition. Then orbit improvement is implemented with single-station orbit determination method, giving improved orbit. Finally, prediction is generated from the improved orbit, and orbit verification is done with new observation data. Experiment results showed the accuracy of improved orbit to be 0.33 km. The experiment realized kilo-hertz laser ranging to CZ-2 rocket body in daylight and low SNR conditions, for the first time in China. We conclude that single-station orbit improvement satisfies the required accuracy of space debris laser ranging, and is sufficient for single laser ranging station to track space debris sustainably and independently.