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GROUND EXPERIMENT ON SIX DEGREES OF FREEDOM RESPONSE OF LASER-ABLATION DRIVEN TARGET

Abstract

Laser-ablation removal of space debris technology is one of the effective technologies to deal with the increasing growth of debris. The accuracy of position and attitude changes during laser-ablation directly determine the effectiveness of debris removal. In order to study the movement of the target under laser ablation, ground experiments were conducted in this paper. The experiment records the target's three degrees of velocity, acceleration and angle and angular acceleration data within 5min based on the self-developed six degrees of freedom sensor system. The system include a 10J, 5ns, 20Hz pulsed laser and cubes and spheres with a size of 5cm and a mass of 50g. The data accuracy is 0.1cm/s2 for three-axis acceleration and 0.05rad/s2 for three-axis angular acceleration respectively. The laser-driven cube and sphere dynamic models are verified through experimental data, which lays an experimental foundation for laser spin off and precise control of debris velocity increment.