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HIGH REPETITION RATE OF 1 KHZ SPACE DEBRIS LASER RANGING IN NEAR INFRARED WAVELENGTH OF 1064NM

Abstract

The near infrared wavelength of 1064nm has more advantages than that of 532nm in laser ranging, such as the less noise in daytime, better atmospheric transmittance, higher laser power and so on. An achromatic Galileo telescope with an aperture of 10 cm was designed to transmit the 1064 nm and 532 nm beam with no achromatic, which guarantee the 1064 nm and 532 nm beam were overlapped. In addition, with indium gallium arsenide (InGaAs) of single-photon infrared detector, high repetition rate of 1 kHz space debris laser ranging (DLR) at 1064nm wavelength with the power of 8W was achieved in nighttime at the Shanghai observatory (SHAO) with the aperture of 60 cm receiving telescope. The furthest distance of space debris was up to 2100km and the least size of radar cross section (RCS) was 0.51 m. The detecting ability was ten times than that in 532 nm. And the SHAO would develop the DLR at daytime by optimizing space debris orbit prediction with analyzing the orbital solution algorithm equation characteristics, two-line element (TLE) parameter analysis and so on. Hopefully, it will achieve orbital prediction accuracy of space debris at 24-hour with an angle of 20" and a radial distance of 500m to satisfy DLR requirement.