An on-orbit calibration method for time delay of inter-satellite link transponder in TDRS

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Abstract

The tracking and data relay satellite (TDRS) in the geosynchronous orbit (GEO) is capable of providing ranging and communication services for user spacecraft in low Earth orbit (LEO) through the inter-satellite link (ISL). The time delay of TDRS' ISL transponder in orbit differs from that before launch and changes due to complex space environment, which contributes non-negligible errors to user spacecraft's orbit determination based on the four-way ranging data. We construct a calibration system and propose an efficient on-orbit calibration method for time delay of ISL transponder in TDRS. Experimental results verify the effectiveness of the proposed method and the RMS of calibration residuals is less than 0.5 meters.

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