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LUNAR PROBE DIFFERENTIAL CONNECTED ELEMENT INTERFEROMETRY(CEI) USING
BEIDOU GEO SATELLITES

Abstract

A novel differential connected element interferometry method is proposed in the paper. The fiber is used to connect the two ground stations together; precise frequency transfer and time synchronization between two ground stations would be realized based on fiber link. Two ground stations share the same frequency. The Beidou GEO satellites are considered as quasars, alternative observations are taken between Beidou GEO satellites and lunar probe, and the accurate geometry delay of lunar probe is obtained by differential between them. The delay error caused by ionosphere, troposphere and the ground facilities is demarcated using the Navigation Message of the Beidou GEO satellites. Then, the geometry delay of lunar probe is determined by the alternative observations. Usually, the intensity of Beidou GEO satellites is hundreds times of quasar, so the observations would be realized when the diameter of antenna is small, and the random error would be much smaller. Then, a CEI system formed by using Jiamusi deep space station and another station located near it, with baseline length about 50km, is depicted in the paper. Alternative observations are taken between Beidou GEO satellites and CE5T1 probe. The differential delay results of the CEI system are obtained, the error of the group delay is in order of 1ns, and efforts are done to try to resolving the cycle ambiguity and get phase delay. And the comparison of the orbit determination results between by ranging and Doppler and by ranging, Doppler and CEI results are given.