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Connected-element interferometry and error analysis of Beidou GEO navigation satellites

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Using the same frequency standard, a high-precision phase delay can be obtained in a connected element interferometry (CEI) system. Beidou GEO navigation satellite C02 is tracked from a CEI observations, where the CEI of the two stations at hangtiancheng and shahe linked by a phase stabilization system is built by Beijing Aerospace Control Center (BACC). And Beidou GEO navigation satellite C03 is applied as calibration to conduct a differential measurement. After introducing group-delay-aided phase delay, the measure noise of the interferometry delay is about 9.4ps (root mean square of the linear fitting residuals in each 300 seconds). Following a differential observation as “2 hours calibration-13 hours tracking -2 hours calibration”, the accuracy of the interferometry delay for C02 is better than 0.4ns. Results show that using a GEO satellite with high-accuracy ephemeris as the calibration, a high-accuracy interferometry can be achieved for the target satellite using small aperture antennas.

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