The VLBI correlator ambiguity and the relativistic group delay model

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Abstract

The conventional VLBI relativistic delay model refers to the time epoch when the signal passes one of two stations of an interferometer baseline. Before, 2002, this model was used as part of the correlation procedure. Since 2002, a new correlation procedure has been adopted in which the VLBI group delays referr to the time epoch of signal passage at the geocenter. In this paper, we present a new alternative to the conventional VLBI model delay we believe should be introduced. The disagreement between the two relativistic geometrical delay models is up to 6 ps for ground-based VLBI experiments. In addition, a miscalculation of the signal arrival moment to the geocentre or the "reference station" may cause a larger modelling error (up to 50 ps) which would directly affect the radio telescope positions with a corresponding formal error of 15 mm. This is particularly essential for upcoming broadband technology geodetic VLBI observations as the final goal of 1-mm accuracy needs to be achieved.

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