The Non-Fiducial Approach Applied to GPS Networks

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ABSTRACT

The adjustment of a GPS network can either be carried out by using one of the available ephemerides, or by estimating the satellite orbit (state vector) during the processing. At both cases, it is usual to constrain the coordinates of a number of stations to their known values. This approach is called fiducial GPS. In the non-fiducial one, all station coordinates are estimated instead, as well as the satellites state vectors. Such approach has been applied to global GPS experiments, in which fiducial stations are not necessary to provide an origin and scale. However, this approach may also be suitable for regional networks, but in such a case, instead of estimating the satellites state vectors, one can use the IGS precise ephemerides. In order to make the non-fiducial approach solution consistent with that of the fiducial one (both using precise ephemeris), some extra computation should be carried out. The main advantage of the non-fiducial approach over the fiducial one is the simplicity of computation if the choice of the known stations change. In the traditional fiducial technique, however, all the main steps of the processing must be repeated. Therefore, if both approaches provide the same results, it is advisable to make use of the non-fiducial one. In this presentation, the basic fundaments of both approaches will be presented, followed by an example involving the São Paulo State Network, which is composed of 24 stations (plus 3 fiducial stations), and was integrated to the ITRF by using the fiducial technique in conjunction with the IGS precise ephemerides. The results of both approaches will be compared.