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Receiver positioning with zero-difference integer ambiguity fixing

F. Mercier and D. Laurichesse
CNES, Toulouse,France

A method for solving GPS problems using zero difference integer ambiguities has been recently developed at CNES. This ambiguity resolution involves two steps :

- first the zero-difference widelane ambiguities are solved for using GPS satellite biases. This solution can be performed independently on each receiver (no network solution is needed). The satellite biases are estimated using a small reference network of three or four stations, and are sufficiently stable to be defined by daily values.

- second, the ionosphere free phase observables corrected with these identified widelane ambiguities are constructed. The complete problem is now reduced to a single frequency problem, with no first order ionosphere effects and a remaining ambiguity to solve, corresponding to a wavelength of 10.7 cm.

This characteristic has important applications for time transfer, as it is now possible to estimate the clock differences between two stations without any frequency error. Also the computed clocks solutions are defined modulo this wavelength of 10.7 cm, and this allows the construction of very long clocks solutions using overlapping daily solutions for example ('integer phase clocks'). Some results will be shown for a baseline of $\sim$500 km.

Also, using these observations on a global network, it is now possible to define GPS satellite clocks which are consistent enough to produce integer ambiguities in the residuals computed for an isolated receiver.

This means that integer ambiguity solutions are possible using all the satellite in view of the receiver, and not only the satellites which are in common view with a reference station. This is very interesting when there is no close reference station in order to construct a standard double difference solution.

Results will be shown for static and kinematic positioning.