Abstract : IGS workshop

A new methodology for zero difference ambiguity fixing with a dual frequency navigation system has been recently developed at CNES. This methodology allows the computation of zero difference ambiguities, first for the widelane ambiguity, then for the remaining N1 ambiguity. The corresponding satellite and receiver clocks are also obtained.

These clocks are named ‘integer phase clocks’, because they rely mainly on the phase measurements, and have discrete properties related to the characteristic wavelength of the problem (10.7 cm for GPS).

Zero difference ambiguity fixing on a network means for example that all double differences on any baseline of the network are integer. Also the use of zero-difference measurements allows the construction of satellite and stations clocks which are consistent with the now unambiguous ionosphere free phase combination. The corresponding satellite clocks obtained using these measurements have very useful properties.

For example, it has been shown in time transfer applications that it is possible to connect indefinitely elementary overlapping clock solutions, because the only remaining ambiguity in the clock biases is discrete with 10.7 cm steps. For example a continuous solution on an European network has been constructed for more than one month (TimeNav07, TimeNav08). Some effects such as code-phase biases on the ionosphere free combinations where clearly observed.

An other promising application is the integer PPP : using these satellite integer phase clocks, it is possible to construct a PPP solution with integer ambiguity fixing. Some real time issues of this process have been shown earlier (Ion2007, Ion2008).

The complete measurement formulation will be detailed with examples for specific cases (widelane ambiguity fixing properties, use of different receiver technologies). The corresponding algorithms for simultaneous ambiguities and clock solutions will be briefly described.

The complete results on a global network of 54 IGS Ashtech receivers will be shown. Almost all ambiguities have been fixed on this network. The properties of the corresponding satellite clock solution will be analysed.

The performance of these solutions will probably allow new performances in orbit determination, PPP, time transfer, antenna phase maps ....