

The Error Evaluation of VLBI Type Wireless Positioning System

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Recently, the car navigation system and the cellular phone equipped with GPS are rapidly widespread. The measurement technology became familiar by these for general people. 'Where am I now?' and 'Where is the target thing now?' will become more important because of the achievement of the ubiquitous society in the future.

The measurement technology can be greatly classified for three categories.

(1) Classification by medium used

- radio wave
- light wave
- sound wave

(2) Classification according to measurement technique

- angle is measured.
- arrival time is measured.
- arrival time interval is measured.
- signal strength is measured.

(3) Classification according to equipment scale

- big equipment is necessary. (GPS etc.)
- It is comparatively possible by small equipment (RFID etc.).

The example of the measurement technology being used now is as follows by these classifications.

GPS that needs equipment of (3) satellite scale measurement of (2) arrival time (1) radio wave.

Loran C that needs equipment of (3) oceanic scale measurement of (2) arrival time interval (1) long wave (radio wave of frequency about 100kHz).

(*Loran C is chiefly used as a measurement technology for the ship.)

Supersonic wave measurement technology that can do measurement of (2) arrival time (1) supersonic wave by small-scale (3) equipment (equipment).

Optical measurement technology of (1) light wave, measurement of (2) arrival time (reflected light of scanning laser), and (3) autonomous type.

Authors have been researching before the measurement technology named geodetic VLBI that needs the equipment of (3) earth scale the measurement of the (2) arrival time interval (1) radio wave (slight radio wave from space). Geodetic VLBI (Very Long Baseline Interferometry) uses slight wideband radio wave that comes from space (quasar etc.), and is a measurement technology that can measure the movement of the continental plate by the order of cm. Recently, making to wideband such as spread spectrum and UWB is rapidly advanced in a wireless communication. Therefore, the signal used begins to look like slight wideband radio wave used with VLBI. In other words, compatibility with the VLBI technology has risen. Authors pay attention to this respect, and are examining the adjustment of the technique of the accuracy evaluation of geodetic VLBI to a wireless communication. Especially, the diversion to the measurement system of a wireless network is examined.

The point where the measurement system that we are assuming in this research is the most different from geodetic VLBI is that the radio source becomes a wireless terminal of the ground from the radio star of space. By this respect, coming radio wave becomes not the plane wave but sphered wave. Therefore, this measurement system uses the measurement technique by 'Hyperbolic navigation' used by loran C etc. Concretely, four standard observation terminals are set up, and radio wave from the measurement object is received. And, the radio source position is specified by the technique of 'Hyperbolic navigation' by using the arrival time interval of radio wave to each standard observation terminal. In this research, some kinds of radio wave are assumed as a radio source of this measurement system, and the measurement accuracy is examined about of each.