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Development of the correlation processing technology in space-time information justification verification

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In recent years, practical use of position information is spreading by the spread of information terminals, such as a GPS cellphone and a smart phone.

In connection with it, the cases where position information is asked for fixed reliability and justification are also increasing in number.

Then, development of the system which can verify the justification of the ”space-time information” on a fourth dimension which united the time which acquired position information and its position information is performed now.

Moreover, a space-time information justification verification system is 2 of data acquisition and data post-processing. It is divided into a group and research and development are performed.

This research is research on the latter data post-processing technology.

Space-time information justification verification is performed by receiving electric waves, such as GNSS, ground digital broadcasting, and a quasi-stellar object, at two points.

Two points are a user office using justification verification, and a standard office which the precision position understands.

At least four radio sources are needed for justification verification (since it is fourth dimension information).

In this research, justification verification can be performed by a large number’s existing in the same frequency band, and not being bound in the area, but asking for the arrival time interval of the electric wave of a receivable GNSS satellite, converting delay time into distance, and comparing with a theoretical figure.

In this research, the processing technique corresponding to a short baseline and each long baseline was developed.

Since there was the feature that the search range of delay time and a rate of change is small in a short baseline, the rough determination processing technique in which more efficient 2D-FFT than the conventional VLBI type correlation processing was used was developed.

By this processing technique, the correlation peak of all the satellites can be once observed by processing.

However, this processing technique can apply only about 200 km or less of base length’s case.

Since the problem that peak width spreads would arise about a long baseline if rough determination processing of a short baseline is applied as it is, the rough determination processing technique of achieving results at high speed was developed separately, performing the compensation.

Unlike the short baseline, this processing technique could observe only the correlation peak of one satellite by processing once, but delay time accuracy almost equivalent to the rough determination of a short baseline was able to be secured.

Moreover, performing more precise compensation, since the search unit of delay time has a weak point of being restricted by bit, delay time could be searched with the fine particle size, and rough determination performed prolonged integration and development of the possible energy determination processing technique.

By energy determination, accuracy has been greatly improved from rough determination.

Introduction of GPU was also carried out to these processings for processing time shortening.

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