Dam Deformation of High Precision GNSS Satellite Research on Calibration Method of Monitor

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Abstract

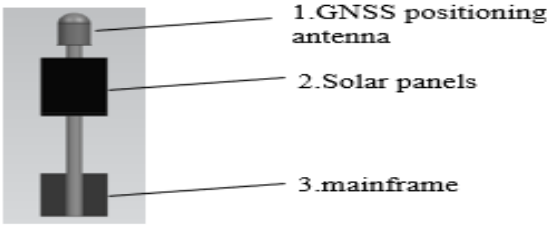
In order to ensure the data validity of the GNSS dam deformation monitor with high precision, a method for calibrating the GNSS satellite dam deformation monitor with high precision is presented, which makes the GNSS satellite dam deformation monitor with high precision trace to the national standard effectively.

I. Introduction

At present, there is no mature Traceability Method for high-precision GNSS satellite dam deformation monitoring instrument, and the results are usually compared with traditional methods, which neither meets the measurement characteristics nor the accuracy requirements. Therefore, a calibration method and uncertainty evaluation method are proposed in this paper, which can meet the calibration requirements of indication error of high-precision GNSS satellite dam deformation monitor.

II. Composition and Working Principle

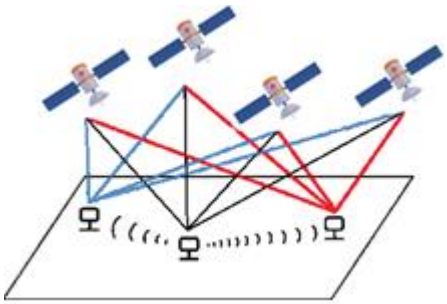
A. Composition of High Precision GNSS Satellite Dam Deformation Monitor



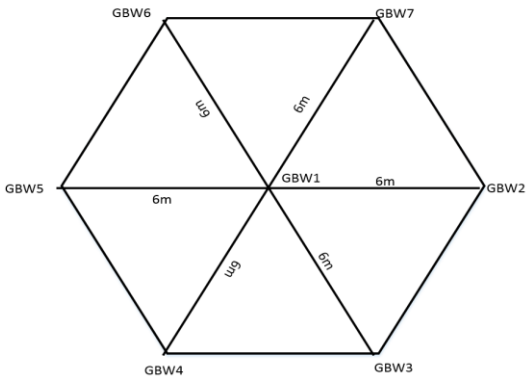
B. Working Principle of High Precision GNSS Satellite Dam Deformation Monitor

III. MAIN ERROR ANALYSIS

A. Main Error Analysis of GNSS Satellite Navigation System

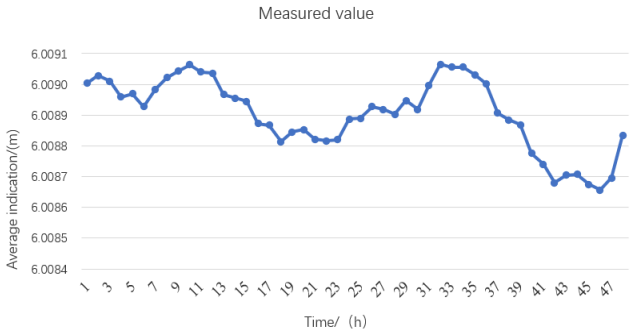


B. Introduction of GNSS Receiver Verification Field



IV. Calibration Experiments and Results

A. Flat Range Error Measurement



B. Elevation Error Measurement

Test Projects	Time (Year, Month and Day)	Solve the value (m)
Before changes in elevation measurements	2021-4-6 9:00:00	-0.002512
	2021-4-6 8:00:00	-0.002499
	2021-4-6 7:00:00	-0.002436
Changes in elevation measurements	2021-4-6 14:00:00	-0.005840
	2021-4-6 13:00:00	-0.003363
	2021-4-6 12:00:00	-0.003117
After changes in elevation measurements	2021-4-6 11:00:00	-0.002869
	2021-4-6 16:00:00	-0.008123
	2021-4-6 15:00:00	-0.008131

C. Measurements

$$w_s = L_G - L$$

Antenna	Test Projects	Measurement error of test results (mm)
SUM202101002	Flat distance measurement	1.2
	Elevation measurement	0.8
SUM202101001	Flat distance measurement	1.1
	Elevation measurement	0.9

D. Evaluation of Uncertainty of Display Error of Dam Deformation Monitor

$$U = ku_c = 0.62\text{mm} \quad k = 2$$

V. CONCLUSION

According to the structure and working principle of the high-precision GNSS satellite dam deformation monitor, this paper puts forward the method of static calibration using GNSS calibration field, introduces the leveling and elevation measurement methods of the satellite dam deformation monitor, carries out the uncertainty analysis of the calibration results, and finally gives the leveling and elevation of the high-precision GNSS satellite dam deformation monitor. Elevation error. The results prove that the static calibration method with GNSS calibration field has a uncertainty of 0.6mm, which provides a calibration method for indication error of satellite dam deformation monitor, will be beneficial to promote the development and research of satellite dam deformation monitor, and make the high-precision GNSS satellite dam deformation monitor traceable to national datum effectively.

References

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