

Precise Satellite Positioning Based on a Search Procedure in the Coordinate Domain

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SUMMARY

The concept of precise satellite positioning, based on an ambiguity function (AF), has been known since the beginning of GPS. In this approach, a search procedure is conducted in the coordinate domain. However, the methods based on a search procedure in an ambiguity domain (e.g., the LAMBDA method) have prevailed over the AF-based methods because of their higher efficiency and better theoretical grounds. Recently, due to the development of the GNSS system, there are more and more satellites available for surveying. In such a case, the computational load considerably rises. The computational load increase is due to the large dimension of the search region in an ambiguity domain. Therefore, it seems reasonable to reconsider the idea of applying the AF-based methods in which a search procedure is moved from the many-dimensional ambiguity domain into the three-dimensional coordinate domain. In such an approach, the computational complexity is robust to the number of satellites. A substantial improvement of the AF-based methods has been developed in the last decade. The Modified Ambiguity Function Approach (MAFA) is based on a search procedure conducted in the coordinate domain. The paper presents the improvements that can be applied to the search procedure. A way of forming a search region is described. A search region encloses the candidate set. The distance between the closest candidates is computed using actual satellites' configuration. The formula of the criterion of seeking the final solution is presented and discussed. The numeric experiment has been designed and performed. The test results demonstrate a good performance of the proposed method.

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