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Partial wide-lane ambiguity resolution for single-difference model

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Multi-antenna synchronized GNSS receiver is an emerging receiver based on clock synchronization technology. It exhibits great advantages, such as low cost, flexibility, and high precision. With this type of receiver, single-difference (SD) model can eliminate common errors (such as satellite clock and atmosphere errors) and receiver clock error simultaneously, which is equivalent to double-difference (DD) model. Comparing with the DD model, the SD model has more observations and redundancy, and lower correlations among estimated parameters. And it also shows advantages in multipath effect mitigation and phase center variation correction. However, the biggest obstacle to realize SD algorithm is that SD ambiguities are no longer integers. To solve this problem, this study puts forward a partial wide-lane ambiguity resolution for SD model. In this method, an additional uncalibrated phase delay (UPD) parameter is introduced to be estimated together with the ambiguity parameters. Relying on the strong correlation between UPD and ambiguity parameters, we can separate the UPD from integer ambiguity. Wide-lane combination is adopted to increase calculating speed. And the philosophy of partial ambiguity resolution is also used to improve the reliability. To test the accuracy of the raised method, both ideal experiments and vehicle test were carried out. The results show that the proposed method can obtain the integer ambiguity with high efficiency and reliability, and further provides potential applications for precise positioning and attitude determination in real-time.