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Modelling and characterization of GNSS multipath effects via a novel approach

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Abstract

In the last decades many advances have been made in modeling the different error sources that are biasing GNSS signals and reduce the positioning accuracy. One of the last remaining non-modeled error source in GNSS, in terms of a standard correction model, is multipath. Multipath related biases occur when apart from the direct signal, indirect signal components reach also the receiving antenna. The major contribution of this work is the formulation of closed-form expressions for the characterization of multipath effects present in the GNSS data. A dedicated algorithm is developed which evaluates the before mentioned expressions and is further used in a simulation analysis. Key parameters of the process are simulated and their impact on the resulting error magnitude is characterized. For the validation of the theoretical developments as well as of the developed algorithm a controlled experiment is performed and results will be presented together with a comparison between real and simulated data. Thus, it will be demonstrated that multipath signatures present in the data can be replicated for complete satellite arcs with this new approach. The concept can be used for quantifying and characterize multipath effects either for positioning or for GNSS remote sensing applications.

Biography:

Marios Smyrnaios studied geomatics in Athens and geodesy in Berlin. He holds a PhD in the field of satellite-based navigation from the university of Hannover. He is currently working at Sapcorda Services GmbH as a GNSS systems engineer in the framework of the development of a high precision GNSS correction service. His research interests include satellite navigation, positioning with pseudolites, GNSS signal processing, multipath and high precision GNSS correction solutions.

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